PROCEEDINGS

ONE HUNDRED AND SIXTEENTH ANNUAL MEETING

OF THE

UNITED STATES ANIMAL HEALTH ASSOCIATION

SHERATON GREENSBORO HOTEL
GREENSBORO, NORTH CAROLINA
OCTOBER 18 – 24, 2012
ABOUT USAHA

USAHA’S MISSION…
The United States Animal Health Association is a forum for communication and coordination among State and Federal governments, universities, industry, and other concerned groups for consideration of issues of animal health and disease control, animal welfare, food safety and public health. It is a clearinghouse for new information and methods, which may be incorporated into laws, regulations, policy, and programs. It develops solutions of animal health-related issues based on science, new information and methods, public policy, risk/benefit analysis and the ability to develop a consensus for changing laws, regulations, policies, and programs.

USAHA MEMBERSHIP

State Official Agency Members (50)
Alabama Indiana Nebraska South Carolina
Alaska Iowa Nevada South Dakota
Arizona Kansas New Hampshire Tennessee
Arkansas Kentucky New Jersey Texas
California Louisiana New Mexico Utah
Colorado Maine New York Vermont
Connecticut Maryland North Carolina Virginia
Delaware Massachusetts North Dakota Washington
Florida Michigan Ohio West Virginia
Georgia Minnesota Oklahoma Wisconsin
Hawaii Mississippi Oregon Wyoming
Idaho Missouri Pennsylvania
Illinois Montana Rhode Island

Federal Official Agency Members (11)
USDA, APHIS, Veterinary Services USDHS, Office of Health Affairs
USDA, Agriculture Research Service USDI, US Fish and Wildlife Service
USDA, Cooperative State Research, USDI, National Park Service
   Education and Extension Service USDI, USGS, National Wildlife Health
   USDA, APHIS, Wildlife Services Center
   USDHHS, Centers for Disease Control and USDOE, Lawrence Livermore National
   Prevention Laboratory
   USDHS, Science and Technology
   Directorate

Territory and Sovereign Agency Members (2)
North Mariana Island
Navajo Nation

International Animal Health Agencies (4)
Australia
Canada
Mexico
New Zealand
ABOUT USAHA (continued)

**Allied Industry Organizations (37)**
- Alpaca Owners & Breeders Association
- American Association of Avian Pathologists
- American Association of Bovine Veterinarians
- American Association of Small Ruminant Practitioners
- American Association of Swine Veterinarians
- American Association of Veterinary Laboratory Diagnosticians
- American Association of Wildlife Veterinarians
- American Association of Zoo Veterinarians
- American Dairy Goat Association
- American Farm Bureau Federation
- American Quarter Horse Assn./American Horse Council
- American Sheep Industry Association
- American Veterinary Medical Association
- Association of American Veterinary Medical Colleges
- Association of Fish & Wildlife Agencies Battelle
- Exotic Wildlife Association
- Holstein Friesian Association USA, Inc.
- International Lama Registry
- Livestock Exporters Association, USA
- Livestock Marketing Association
- National Aquaculture Association
- National Association of State Public Health Veterinarians
- National Bison Association
- National Cattlemen’s Beef Association
- National Chicken Council
- National Dairy Herd Improvement Association, Inc.
- National Institute for Animal Agriculture
- National Milk Producers Federation
- National Pork Board
- National Pork Producers Council
- National Renderers Association
- National Turkey Federation
- North American Deer Farmers Association
- North American Elk Breeders Association
- Professional Rodeo Cowboys Association
- US Poultry & Egg Association

**District Delegates**
- Northeast: S. Klopp; E. Zirkle
- North Central: V. Green; H. Hill
- South: L. O. Lollis; A. G. Rosales
- West: W. Sauble; H.M. Richards

**Individual Members: 745**
**Life Members: 118**
**Student Members: 86**
2012
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A. Glossary of Acronyms
I. 2012 Officers, Directors and Committees

A. Officers

2011-2012 Executive Committee

Front row (from left): Steven Halstead, MI, Immediate Past President; David Marshall, NC, President; David Meeker, VA, President-elect. Back row (from left): David Schmitt, IA, Third Vice President; Stephen Crawford, NH, First Vice President; Bruce King, UT Second Vice President; Annette Jones, CA, Treasurer.
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<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tr>
<td>Jim</td>
<td>Kistler American Assoc. of Veterinary Laboratory Diagnosticians</td>
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<td>Robert</td>
<td>Gerlach Alaska Dept. of Environmental Cons.</td>
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<td>Tony</td>
<td>Frazier Alabama Dept. of Agriculture</td>
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<td>Pat</td>
<td>Long Alpaca Owners &amp; Breeders Assoc.</td>
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<td>Bob</td>
<td>Evans-Kerr American Assoc. of Avian Pathologists</td>
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<td>Chris</td>
<td>Ashworth American Assoc. of Bovine Practitioners</td>
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<td>Shirley</td>
<td>McKenzie American Dairy Goat Association</td>
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<td>Mary Kay</td>
<td>Thatcher American Farm Bureau Federation</td>
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<td>Rodgers American Sheep Industry Assoc.</td>
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<td>Christine</td>
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<td>Adam</td>
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<td>George</td>
<td>Badley Arkansas Livestock &amp; Poultry Commission</td>
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<td>John</td>
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<td>Andrew</td>
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<td>Brian</td>
<td>Evans CAN Food Inspection Agency</td>
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<td>Stacey</td>
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<td>Keith</td>
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<td>Livestock Marketing Assoc.</td>
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<td>Lorraine O'Connor</td>
<td>Massachusetts Dept. of Food &amp; Agric.</td>
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<td>Michele Walsh</td>
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<td>Steven Halstead</td>
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<td>William Hartmann</td>
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<td>Marty Zaluski</td>
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<td>Karen Simmons</td>
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<td>Jamie Jonker</td>
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<tr>
<td>James Logan</td>
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Arnold Gertonson, CO  
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Dustin Oedekoven, SD  
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William Pittenger, MO  
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I. C. USAHA COMMITTEES

Captive Wildlife & Alternative Livestock, cont’d

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USAHA/AAVLD Committee on Diagnostic Laboratory and Veterinary Workforce Development
Chair: Michael Gilsdorf, MD
Vice Chair: Gary Anderson, KS

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Debbie Cunningham, OK

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Peter Timoney, KY
Alfonso Torres, NY
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Arnaldo Vaquer, VA
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Liz Wagstrom, DC
Sherrilyn Wainwright, ITA
Mark Walter, PA
Patrick Webb, IA
Steve Weber, CO
### I. C. USAHA COMMITTEES

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**Committee on Government Relations**

Chair: Bruce King, UT

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**Committee on Import-Export**

Chair: Mark Engle, TN

Vice Chairs: George Winegar, MI

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Kathryn Simmons, DC
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Bruce Stewart-Brown, MD
R. Flint Taylor, NM
David Zeman, SD
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Chair: David Marshall, NC

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### Committee on Parasitic Diseases

Chair: Dee Ellis, TX
Vice Chair: David Winters, TX

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Vice Chair: Ellen Wilson, CA

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<td>Stephanie Yendell</td>
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I. C. USAHA COMMITTEES

Committee on Salmonella
Chair: Doug Waltman, GA
Vice Chair: Richard Sellers, VA

Deanna Baldwin, MD  Edward Mallinson, MD
Marilyn Balmer, MD  Beth Mamer, ID
Stacey Bosch, GA  Sarah Mason, NC
Richard Breitmeyer, CA  Patrick McDonough, NY
Paul Brennan, IN  James McKean, IA
Jones Bryan, SC  David Meeker, VA
Kevin Custer, IA  Thomas Myers, MD
Sherrill Davison, PA  Kakambi Nagaraja, MN
Brandon Doss, AR  Steve Olson, MN
Tracy DuVernoy, MD  Kristy Pabilonia, CO
James Foppoli, HI  Lynn Post, TX
Rose Foster, MO  Shelley Rankin, PA
Tony Frazier, AL  G. Donald Ritter, DE
Richard Gast, GA  Charles S Roney, GA
Eric Gingerich, IN  John Sanders, WV
Eric Gonder, NC  Joni Scheftel, MN
Jean Guard, GA  Richard Sellers, VA
Rudolf Hein, DE  Tom Sidwa, TX
Julie Helm, SC  Bruce Stewart-Brown, MD
Bill Hewat, AR  Belinda Thompson, NY
Danny Hughes, AR  Bob Tully, KS
Annette Jones, CA  Liz Wagstrom, DC
Barry Kelly, CA  Don Waldrip, TN
Spangler Klopp, DE  Doug Waltman, GA
Jennifer Koeman, IA  Scott Wells, MN
Elizabeth Krushinskie, DE  Nora Wineland, MO
Dale Lauer, MN  Ching Ching Wu, IN
Elizabeth Lautner, IA
Tsang Long Lin, IN

Committee on Scrapie
Chair: Charles Palmer, CA
Vice Chair: Kristine Petrini, MN

Deborah Brennan, GA  Dee Ellis, TX
Beth Carlson, ND  Dave Fly, NM
John Clifford, DC  Keith Forbes, NV
Thomas Conner, OH  Michael Gilisdorf, MD
Walter Cook, WY  William Hartmann, MN
Stephen Crawford, NH  Susan Keller, ND
Linda Detwiler, NJ  James Leafstedt, SD
Nancy East, CA  Mary Lis, CT
William Edmiston, TX  Jim Logan, WY
Anita Edmondson, CA  Michael Marshall, UT
### I. C. USAHA COMMITTEES

#### Scrapie, cont’d

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<tr>
<th>Committee on Sheep and Goats</th>
<th>Chair: William Edmiston Jr., TX</th>
<th>Vice Chair: Don Knowles, WA</th>
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#### Committee on Program

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<td>Lisa Becton, IA</td>
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<td>W. Kent Fowler, CA</td>
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Committee on Transmissible Diseases of Poultry and Other Avian Species

Chair: Julie Helm, SC
Vice Chair: Pending

Bruce Akey, NY
John Atwell, NC
George Badley, AR
Deanna Baldwin, MD
Marilyn Balmer, MD
Sue Billings, KY
Richard Breitmeyer, CA
Deborah Brennan, GA
Paul Brennan, IN
Max Brugh, GA
Nancy Chapman, MD
Bruce Charlton, CA
Steven Clark, NC
Max Coats, Jr., TX
Stephen Crawford, NH
Sherrill Davison, PA
Thomas DeLiberto, CO
Brandon Doss, AR
Aly Fadly, MI
Naola Ferguson-Noel, GA
Tony Forshey, OH
Rose Foster, MO
Marion Garcia, WV
Eric Gingerich, IN
Eric Gonder, NC
Tanya Graham, SD
James Grimm, TX
Scott Gustin, AR
Jeffrey Hamer, PA
William Hartmann, MN

Rudolf Hein, DE
Julie Helm, SC
Michael Herrin, OK
Bill Hewat, AR
Dee Hilliard, OK
Heather Hirst, DE
Donald Hoenig, ME
Guy Hohenhaus, MD
Floyd Horn, MD
Danny Hughes, AR
Dennis Hughes, NE
John Huntley, WA
Mark Jackwood, GA
Jarra Jagne, NY
Eric Jensen, AL
Annette Jones, CA
Gary Kinder, WV
Bruce King, UT
Patrice Klein, MD
Spangler Klopp, DE
Michael Kopp, IN
Elizabeth Krushinskie, DE
Dale Lauer, MN
Randall Leavings, IA
Anne Lichtenwalner, ME
Tsang Long Lin, IN
Mary Lis, CT
Edward Mallinson, MD
David Marshall, NC
Sarah Mason, NC
I. C. USAHA COMMITTEES

Trans. Diseases of Poultry & Other Avian Spp, cont’d

Todd McAloon, MN  Andy Schwartz, TX
Gay Miller, IL  Jack Shere, NC
Kristi Moore Dorsey, KS  Marilyn Simunich, ID
Lee Myers, GA  John Smith, GA
Thomas Myers, MD  Philip Stayer, MS
Kakambi Nagaraja, MN  Bruce Stewart-Brown, MD
Steve Olson, MN  Darrel Styles, MD
Kristy Pabilonia, CO  David Suarez, GA
Mary Pantin-Jackwood, GA  David Swayne, GA
Boyd Parr, SC  Manoel Tamassia, NJ
James Pearson, IA  H. Wesley Towers, DE
Jewell Plumley, WV  Deoki Tripathy, IL
Willie Reed, IN  Susan Trock, GA
G. Donald Ritter, DE  Jesse Vollmer, ND
Keith Roehr, CO  Patricia Wakenell, IN
Thomas Roffe, MT  Don Waldrip, TN
Charles S Roney, GA  Doug Walmat, GA
A. Gregorio Rosales, AL  James Watson, MS
Michael Rybolt, DC  Steve Weber, CO
Mo Saif, OH  Richard Wilkes, VA
John Sanders, WV  Ching Ching Wu, IN
David Schmitt, IA  Ernest Zirkle, NJ

Committee on Transmissible Diseases of Swine
Chair:  Harry Snelson, NC
Vice Chair: Lisa Becton, IA

Bobby Acord, NC  Thomas Hagerty, MN
Gary Anderson, KS  Rod Hall, OK
Paul Anderson, MN  James Mark Hammer, NC
William Ballantyne, CAN  William Hartmann, MN
Karen Beck, NC  Greg Hawkins, TX
Lisa Becton, IA  Michael Herrin, OK
C. Black, GA  Richard Hesse, KS
Becky Brewer-Walker, AR  Sam Hines, MI
Corrie Brown, GA  Ken Horton, TX
Tom Burkgren, IA  Jennifer Koeman, IA
Jim Collins, MN  Elizabeth Lautner, IA
Joseph Corn, GA  James Leafstedt, SD
Thomas DeLiberto, CO  Donald Lein, NY
Effingham Embree, Jr., IL  Karen Lichtenegger, CAN
Mark Engle, TN  Tsang Long Lin, IN
J. Flanagan, FL  Bret Marsh, IN
James Foppoli, HI  David Marshall, NC
Tony Forshey, OH  Chuck Massengill, MO
Nancy Frank, MI  James McKean, IA
Cyril Gay, MD  Gene Nemechek, NC
Michael Gilsdorf, MD  Sandra Norman, IN
I. C. USAHA COMMITTEES

Transmissible Diseases of Swine, cont’d

Gary Osweiler, IA
Kris Petrini, MN
Barbara Porter-Spalding, NC
Tom Ray, NC
Mo Salman, CO
David Schmitt, IA
Richard Sibbel, IA
Harry Snelson, NC
Paul Sundberg, IA
Brad Thacker, MD
Beth Thompson, MN
Susan Trock, GA
Patrick Webb, IA
Margaret Wild, CO
Larry Williams, NE
Ellen Mary Wilson, CA
George Winegar, MI
Nora Wineland, MO
Paul Yeske, MN

Committee on Tuberculosis
Chair: Dustin Oedekoven, SD
Vice Chair: Beth Thompson, MN

John Adams, VA
Bruce Akey, NY
Joan Arnoldi, WI
James Averill, MI
Lowell Barnes, IN
Bill Barton, ID
Warren Bluntzer, TX
Steven Bolin, MI
Richard Breitmeyer, CA
Becky Brewer-Walker, AR
Gary Brickler, CA
Charlie Broaddus, VA
Charles Brown, WI
Mike Chaddock, DC
John Clifford, DC
Michael Coe, UT
Jim Collins, GA
Kathleen Connell, WA
Thomas Conner, OH
Walter Cook, WY
Donald Davis, TX
Thomas DeLiberto, CO
Scott Dewald, OK
Jere Dick, MD
Leah Dorman, OH
Brandon Doss, AR
Phil Durst, MI
Michael Dutcher, WI
Reta Dyess, TX
Anita Edmondson, CA
Robert Ehlenfeldt, WI
Leonard Eldridge, WA
Dee Ellis, TX
Steven England, NM
Donald Evans, KS
John Fischer, GA
Dave Fly, NM
James Foppoli, HI
W. Kent Fowler, CA
Clifford Frank, KS
Nancy Frank, MI
Mallory Gaines, DC
Tam Garland, TX
Robert Gerlach, AK
Michael Gilsdorf, MD
Velmar Green, MI
Thomas Hagerty, MN
Rod Hall, OK
Steven Halstead, MI
William Hartmann, MN
Burke Healey, CO
Carl Heckendorf, CO
Bob Hillman, ID
Donald Hoening, ME
Thomas Holt, FL
Dennis Hughes, NE
John Huntley, WA
Billy Johnson, AR
Jon Johnson, TX
Shylo Johnson, CO
Jamie Jonker, VA
Karen Jordan, NC
Susan Keller, ND
Bruce King, UT
Paul Kohrs, WA
Maria Koller-Jones, CAN
I. C. USAHA COMMITTEES

Tuberculosis, cont’d

John Lawrence, ME
Maxwell Lea, Jr., LA
Rick Linscott, ME
Konstantin Lyashchenko, NY
Daniel Manzanoares, NM
Bret Marsh, IN
Chuck Massengill, MO
Paul McGraw, WI
Robert Meyer, WY
Susan Mikota, TN
Michele Miller, FL
Ernie Morales, TX
Henry Moreau, LA
Sherrie Nash, MT
Cheryl Nelson, KY
Jeffrey Nelson, IA
Dustin Oedekoven, SD
Kenneth Olson, IL
Mitchell Palmer, IA
Elizabeth Parker, ITA
Boyd Parr, SC
Elisabeth Patton, WI
Janet Payeur, IA
Kris Petrini, MN
Alex Raeber, CHE
John Ragsdale, NM
Jeanne Rankin, MT
Suelee Robbe-Austerman, IA
Nancy Robinson, MO
Keith Roehr, CO
Mo Salman, CO
Larry Samples, PA
Bill Sauble, NM
Shawn Schafer, ND

Irene Schiller, CHE
David Schmitt, IA
Dennis Schmitt, MO
Stephen Schmitt, MI
Andy Schwartz, TX
Charly Seale, TX
Laurie Seale, WI
Kathryn Simmons, DC
Daryl Simon, MN
Nick Striegel, CO
R. Flint Taylor, NM
Tyler Thacker, IA
David Thain, NV
Charles Thoen, IA
Beth Thompson, MN
Kenneth Throlson, ND
Arnaldo Vaquer, VA
Kurt VerCauteren, CO
Jesse Vollmer, ND
Ray Waters, IA
Scott Wells, MN
Diana Whipple, IA
Richard Willer, HI
Brad Williams, TX
Kyle Wilson, TN
Ross Wilson, TX
George Winegar, MI
Josh Winegarner, TX
David Winters, TX
Jill Bryar Wood, TX
Ching Ching Wu, IN
Stephanie Yendell, MN
Glen Zebarth, MN

Committee on Wildlife Diseases
Chair: John Fischer, GA
Vice Chair: Colin Gillin, OR

Gary Anderson, KS
Neil Anderson, MT
Joan Arnoldi, WI
Scott Bender, AZ
Warren Bluntzer, TX
Kristina Brunjes, KY
Beth Carlson, ND
Walter Cook, WY
Joseph Corn, GA
Lynn Creekmore, CO

Donald Davis, TX
Thomas DeLiberto, CO
Mark Drew, ID
James Evermann, WA
John Fischer, GA
Richard French, NH
Francis Galey, WY
Robert Gerlach, AK
Paul Gibbs, FL
Colin Gillin, OR
I. C. USAHA COMMITTEES

Wildlife Diseases, cont’d

Linda Glaser, MN          Shawn Schafer, ND
Dean Goeldner, MD         David Schmitt, IA
Greg Hawkins, TX          Dennis Schmitt, MO
Robert Hilsenroth, FL     Stephen Schmitt, MI
Donald Hoenig, ME         Charly Seale, TX
David Hunter, MT          Laurie Seale, WI
Mandy Kauffman, WY        Daryl Simon, MN
Kevin Keel, CA            Jonathan Sleeman, WI
Susan Keller, ND          David Stallknecht, GA
Patrice Klein, MD         Cleve Tedford, TN
Terry Kreeger, WY         Robert Temple, OH
Jim Logan, WY             Charles Thoen, IA
Francine Lord, CAN        Lee Ann Thomas, MD
Margie Lyness, GA         Brad Thurston, IN
David Marshall, NC        Kurt VerCauteren, CO
Chuck Massengill, MO      Diana Whipple, IA
Leslie McFarlane, UT      Margaret Wild, CO
Daniel Mead, GA           Richard Willer, HI
Robert Meyer, WY          Ellen Mary Wilson, CA
Michele Miller, FL        George Winegar, MI
Mitchell Palmer, IA       David Winters, TX
Jewell Plumley, WV        Richard Winters, Jr., TX
Jennifer Ramsey, MT       Cindy Wolf, MN
Justin Roffe, OK          Peregrine Wolff, NV
Thomas Roffe, MT          Marty Zaluski, MT
Mark Ruder, KS            Glen Zebarth, MN
Emi Saito, CO
II. 2012 Annual Meeting Proceedings
   A. USAHA/AAVLD President’s Reception and Dinner
   B. USAHA/AAVLD Plenary Session
   C. USAHA Scientific, Posters, Papers and Abstracts
   D. USAHA Membership Meetings
   E. Committee Reports
   F. Other Reports
A. USAHA/AAVLD President’s Reception and Dinner

INVOCATION

Stephen Crawford

MEMORIAL SERVICE

David Meeker

Colleagues, let us take a moment this evening to humbly pause in our busy lives to remember those that have served with us over the years, but will not be with us this evening because of their passing. Let us keep in mind that life is fragile, but also enjoy the memories, contributions and fellowship that we share that are no longer with us. We wish for strength to their families and friends, and that we carry forward their dedication in the work we do here.

Please take a moment and reflect on these individuals as I read their names:

Harold C. King, Florida
Phillip O’Berry, Iowa
John Niemi, South Dakota
Donald Johnson, Minnesota
R. Swope, Pennsylvania
Anthony Gallina, Florida
John Nehay, California
Thomas Freas, Indiana
Raymond Morter, Indiana
James Bivins, Georgia
John Hyde, New York
Henry Joe Bearden, Mississippi
James Hourrigan, Virginia
Vader Loomis, Pennsylvania
Ralph Knowles, Florida
Hiram Lasher, Delaware
Alex Bermudez, Missouri

Please join me in a moment of silent prayer in remembrance of these deceased members. Amen.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

WELCOME TO NORTH CAROLINA

David Smith
North Carolina Department of Agriculture and Consumer Services

Thank you for selecting Greensboro for your conference. Tourism and business conferences are important to Greensboro and to this state’s economy. We need for you to be generous this week as you move around the city.

Today is the last day of the North Carolina State Fair. It seems to me your organizers always plan your conference during our annual State Fair and for that reason Commissioner Troxler in not able to personally welcome you. If not for the State Fair this event would be very convenient for him as his farm is just north of the city.

Having you in Greensboro this week is special, but with my colleague, Dr. David Marshall, being the president of the US Animal Health Association I feel a great sense of honor and pride to formally recognize Dr. Marshall. I am also pleased to recognize Dr. Tim Baszler, president of the American Association of Veterinary Laboratory Diagnosticians. Drs. Marshall and Baszler, thank you for your many contributions and the contributions of your organizations’ members to animal agriculture and food safety.

Please permit me a moment of personal privilege. Dr. Marshall and I have been colleagues for almost 30 years. During that time we have dealt with emergencies of all kinds and faced other stressful situations. Throughout it all Dr. Marshall has been professional and ethical in his dealings with everyone. I have seen his children grow from elementary students to college students to young professionals. But I can tell you what the bedrock of Dr. Marshall’s success is—it is his wife Cheryl. To use a football term, Dr. Marshall out kicked his coverage when he proposed to Cheryl.

I looked over previous welcoming statements we have presented at this conference. It seems the presenters talked about the value of agriculture
and agribusiness to North Carolina. Except to say agriculture and agribusiness are this state’s single biggest economic drivers, I’m going to skip reciting the long list of agricultural rankings. I would rather give you brief information on North Carolina.

- We are the 10th largest state in terms of population with just under 10 million residents. Over the past decade the state’s population grew at almost twice the national average.
- North Carolina has something for everyone. We have the mountains to the west and an extensive Atlantic coast line. In between we have a mix of cities, agriculture, industry, university centers, excellent museums, and a thriving technology sector. Regardless of the time of the year, one can find something exciting and interesting to do in this state.
- If you like extremes, North Carolina is the place for you. We go from sea level to Mt. Mitchell’s 6,684 feet, the tallest peak in the eastern part of the country.
- We are regarded as the most military friendly state in the country. North Carolina is home to eight very significant military installations and this state works hard to maintain excellent relationships with the military. In fact agriculture plays a significant role in those relationships by serving as buffers to development.
- We like visitors. We want folks to come to our state to enjoy our hospitality, varied climate, diverse population, golf courses, beaches and mountains. We want you to come and then go home and tell your friends you had a good time.
- If you love college basketball, you are now located at the epicenter of the best in college basketball. The March 2013 Atlantic Coast Conference Tournament will be played in Greensboro, the frequent host city due to its central location for member schools.
- And to add frenzy to an already basketball crazed state, it very likely three North Carolina teams located just 25 miles apart will start the basketball season ranked in the nation’s top ten.

Drs. Marshall and Baszler, thank you for again making Greensboro a stop in your conference rotation. The North Carolina Department of Agriculture and Consumer Services and the State of North Carolina are proud of our relationship with your organizations and we intend to do what is necessary to keep you coming back to Greensboro. I know your meeting will be successful.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

INVITATION TO CALIFORNIA

Annette Jones

Dr. Jones introduced a brief vignette highlighting California, from the California Tourism Board.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

DINNER SPONSOR’S RECOGNITION

Kevin Maher
GlobalVetLink, LC

Kirk Adams
Life Technologies
USAHA President’s Remarks

David Marshall

Good evening everyone. It is my great pleasure to co-host this event with my colleague, Tim Baszler, and I’d like to express my gratitude to our gracious sponsors and all of those who helped bring this meeting and dinner together. It was only a short year ago that I was providing the invitation to this meeting while we were in Buffalo, as well as accepting the position as the 116th President of the US Animal Health Association. I can assure you that the events of the past year have only reinforced my appreciation for the important role of both of our organizations.

Some of you may know that my daughter is a fourth year medical student at the University of South Carolina pursuing her dream of becoming a “real doctor”, as my clients used to call them when I was in practice. (Actually she is sitting down front here as I invited her to this meeting in hopes that could be exposed to some real world, hard core science and diagnostics!). She and I frequently enjoy some friendly back and forth sparring as we challenge each other regarding who knows the most about anatomy, disease processes, influenza viruses, and whatever the “One Health” topic of the month may be. As I watch her progress through her education on the human medicine side, I continue to find myself comparing and becoming more amazed at the breadth of knowledge and talent possessed by our members on the animal health side. I also reflect back to comments made by Kevin Shea at an APHIS-VS Eastern Regional meeting in Raleigh earlier this year when he stated that “the only difference between civilization and anarchy is nine meals.” I’ve attempted to keep both concepts firmly in grasp as we have charted the course of the organization this past year - that of protecting and promoting animal health and a food supply that will need to double through the use of technology by 2050, and passing along the foundation and tools for the generation behind us to accomplish that goal. My work with our members this past year has me firmly convinced that we are up to the task.
Over the past 5 years while serving on the Executive Committee (EC) I have had the opportunity to serve with and under some incredibly talented individuals and I’d like to take a brief moment to thank them publically. First and foremost are those who have stepped up to the challenge of serving on our EC, both current and in recent past. Dr.’s Halstead, Meeker, Crawford, King, Schmitt, and Jones (Whiteford) as well as the five others who have rotated off during my five years, thanks for all the support and hard work you have dedicated to this organization and me personally. What a collegial and talented group of professionals. The US Animal Health Association is in great hands in the coming years.

Dr. Baszler, it’s been a great year and a pleasure. We started this journey two years ago barely knowing each other and I quickly gained full appreciation for your German pragmatism and impressive depth of scientific knowledge. I’m proud that we have been able to continue to cultivate the great partnership between our two organizations, and we must continue to enhance that relationship into the future and never take the synergy this relationship creates for granted.

I’d also be remiss if I didn’t mention and thank Dr. John Clifford and his team at APHIS Veterinary Services (VS). Despite immense challenges in an environment of increased responsibility and decreasing budgets, I have never once found John to be anything less than sympathetic and attentive to and of assistance to the needs of this organization and our members.

Ben, Kelly, and Linda, we couldn’t do it without you. I asked Ben about a month ago if I was becoming an extreme pain in the rear with my obsessive contacts to the office and requests for information or clarification. Fortunately he answered correctly, “No,” but I’m not sure he was being fully truthful. I think we all find that when you have support staff as congenial and competent as Ben and Kelly, one tends to unintentionally pile on more responsibility and work load. I hope our members appreciate how blessed we are to have them on our side and how hard they work for you. I know the American Association of Veterinary Laboratory Diagnosticians (AAVLD) is and am thrilled for their next step into the full time Executive Director stage of the organization. I know it will work out great for them.

I’d also like to thank my colleagues in the Southern District for the confidence they had in nominating me for this position in Birmingham back in 2007, and lastly, my lovely wife Cheryl. I made a pledge 32 years ago to not “talk shop” and bring the challenges and frustrations of the workplace home. Well, I’ve pretty much broken that promise over the years and she’s been a great listener for me.

Let me close by reaffirming my belief that the United States Animal Health Association has achieved the reputation of and continues to remain the nation’s foremost authority and forum for developing solutions for animal health related issues and a voice to be respected and heard. Our unique three legged stool model of melding government, industry, and academia with the resolution process, supported by the consensus of the membership,
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

has effectively served our mission during the past 116 years. Nowhere is that more apparent than in interactions with all branches of the USDA, other federal and state agencies, and our stakeholders, the farmers and ranchers of America. Again, thank you for the privilege of serving as your USAHA President for 2012. I consider it the highlight of my professional career, and look forward to working with everyone into the future.
Good evening. Fellow AAVLD and USAHA members, distinguished guests, colleagues, friends, ladies and gentlemen it is my distinct pleasure to welcome you to the joint USAHA/AAVLD President’s reception and dinner.

My name is Tim Baszler and I served as President of AAVLD this past year.

This year’s Joint AAVLD / USAHA Annual Meeting is again another excellent forum for exchange of ideas in laboratory diagnostics and animal health. The partnership between AAVLD and USAHA has never been stronger and it has been an honor to serve alongside Dave Marshall, USAHA President in 2012. The missions AAVLD and USAHA are indisputably linked. Our organizations have much to learn from each other and it has been a privilege to help foster that long term, mutually beneficial alliance over this past year.

I would like to take a few minutes to highlight two major AAVLD accomplishments this past year that I think will provide a fundamental direction for us as an organization into the future.

Number one, our hiring of an Executive Director, and number two, our political advocacy efforts to stabilize funding for the National Animal Health Laboratory Network (NAHLN).

Last year, AAVLD came to the realization that it had outgrown its all-volunteer heritage and needed an association professional, an Executive Director, to provide operational oversight to more effectively direct the use of our financial, human and technology resources.

Well we finally did folks; AAVLD hired our first solely dedicated Executive Director last month, Mr. Jim Kistler. Before officially introducing and welcoming Jim, let me tell you a little bit about him.

Jim has nearly 20 years of experience in association management at the state and national level.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

Jim attained the designation of "Certified Association Executive" or CAE - the highest level of certification granted by the American Society of Association Executives.

Jim is a graduate of the University of Central Missouri with a degree in Biology and worked as a chemist for the Missouri Department of Agriculture early in his career.

Jim brings to AAVLD outstanding skills and a proven track record in association management. He has professional experience with the health care industry and an educational background in biological and agricultural sciences. Jim is an excellent fit for AAVLD.

Jim was one of 145 applicants in an outstanding applicant pool resulting from a national search. By the time the search committee finished their very thorough evaluation of candidates it was like winning on the television show Survivor!

Jim, we are thrilled to have you join AAVLD and look forward to growing our organization with you in the years ahead. Please stand and meet your new colleagues. Welcome to the AAVLD family!

And for all of you out there that e-mailed and called me this year when problems arose in AAVLD, now you can e-mail and call him!

The NAHLN program, based within USDA, is truly our nation’s most vital early warning system guarding against emerging and foreign animal diseases that could economically devastate our animal agriculture. It is a model for efficient and effective partnering of state and federal laboratory resources toward a national need. State partners provide the majority of infrastructure capital while federal partners coordinate and optimize operations at the national level.

AAVLD had a wakeup call in 2011 when Congress zeroed out a significant part of support for the NAHLN. AAVLD needed to “step up to the plate” regarding political advocacy for the NAHLN in order to help preserve such an important national food security program. So, AAVLD hired a lobbying firm and started marching letters and people to Capitol Hill in Washington, DC. During 2012 alone, AAVLD and USAHA members made over 40 personal visits to Washington DC educating legislators about the NAHLN. Although the time was not right in 2012 to secure stabilized funding for the NAHLN (if you did not notice, Congress didn’t get much done the past year!) we laid a firm foundation to seek more stable funding for the NAHLN into 2013.

So to summarize, professional association management and entering into the world of active, direct political advocacy are two efforts that will fundamentally advance the function and influence of AAVLD into the future.

I want to close by saying a few words about the importance of relationships.

This past July, Washington State University hosted a USDA-FADD Northwest regional refresher training course, focusing on immediate response to foreign animal disease event. While participating in the course as a NAHLN laboratory, it struck me that the course was not so much about
knowing the appropriate procedures and communication channels but about relationships.

Relationships within and across federal agencies, state agencies, field personnel, laboratory personnel, and local resources (like when cattle quarantined during the 2003 Bovine Spongiform Encephalopathy (BSE) event in Washington state could get fed because of an established relationship between a federal field Veterinary Medical Officer (VMO) and a local trucker).

What effective surveillance, response and recovery from an emerging or foreign animal disease requires is established relationships at many levels.

One can't just turn on relationships in an emergency. Maintaining good relationships requires effort. It is an active, not a passive process. This is not unique to foreign animal disease response but is a basic tenant of human interaction.

Relationships with spouses, children and grandchildren take sustained effort.

Relationships with colleagues and friends require active maintenance.

Relationships between organizations like AAVLD and USAHA require a desire to listen to and internalize diverse missions and opinions.

Effective functioning of the NAHLN, which celebrated its tenth anniversary this year, requires maintaining effective relationships between the federal and state partners within the NAHLN, a function that Barb Martin, NAHLN Coordinator does so effectively. Barb will be retiring at the end of 2012 and AAVLD looks forward to participating in the search to fill this critical position, so vital to the NAHLN, so that this established state / federal partnership, can grow and celebrate a 20 year anniversary.

I would now like to take a moment to present Barb Martin with flowers in honor of her retirement as NAHLN Coordinator. Your skills as a relationship builder are largely responsible for the success of the NAHLN in its first ten years. Congratulations on your retirement Barb. We are sorry to see you go!

So to all of our AAVLD partners I urge us to continue to build and strengthen our relationships, built on a foundation of mutual respect, for the good of animal health.

Finally, I am grateful to have been a part of helping to build relationships for AAVLD this past year. It has been a special honor to work with my colleagues and friends in AAVLD, the Executive Committee, the Executive Board, and the membership, the most dedicated group of volunteers I have ever known.

Thank you for the opportunity to share these thoughts with you this evening.
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David Marshall and Tim Baszler

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Good evening to you all. Dr. Greg Parham is serving as an Acting Assistant Secretary in USDA's Office of Departmental Management, so it my pleasure this year to present the APHIS Administrator’s Award.

This award is a symbol of APHIS’ esteem for all of you; our longstanding partners in animal health. Past recipients of this award have included program directors and developers…regulators and researchers…educators and advisors. All have made noteworthy contributions to protecting or improving the health of agricultural animals.

Tonight, we present the Administrator’s Award to someone who has labored on many fronts and served this organization with great distinction—including a term as president from 2008 to 2009. Dr. Don Hoenig is a well-respected veterinarian, a farmer, an outdoorsman, and an infamous prankster.

Don is a proud graduate of Bowdoin College in Brunswick, Maine, where he was a pre-med biology major and a spirited soccer player. He then earned his VMD from the University of Pennsylvania’s School of Veterinary Medicine.

After three years in mixed private practice on Martha’s Vineyard, Don came to work for APHIS in the early 1980s, and he served on the avian influenza task force in Pennsylvania in 1983, Don’s full-time role was as a veterinary medical officer in Massachusetts and Maine, and during this time, Don and his wife, Lynn, decided they wanted to make Maine home.

So in 1986, Don moved to the Maine Department of Agriculture, Conservation and Forestry, and he spent 26 years there. When he retired on August 31st of this year, the Maine Department of Agriculture determined that Don was the second-longest-serving state veterinarian in the country. He also simultaneously served as director of the Division of Animal Health and Industry and, since the State didn’t employ a public health veterinarian, he performed that function as well.

In Maine, Don has been at the forefront of many animal health issues: avian influenza, canine rabies, and chronic wasting disease, to name just a few.

And when the foot-and-mouth disease (FMD) epidemic hit England in 2001, Don was one of the first US veterinarians on the scene. He spent a month helping with the response there, and that effort help shape our FMD prevention and treatment strategies here in the United States. And Don continued to offer his help to other countries—in 2005, he participated in a 2-week FMD evaluation in Argentina with the APHIS review team.

In addition to helping protect the animals of others, Don was also a hobby farmer. He and Lynn raised much of their family’s food, with goats, turkeys, pigs and two dozen laying hens. Now, I understand that Don and his
family named the animals they were going to kill after unpopular politicians. For obvious reasons, I won’t go into detail here. I’ll also exercise even more discretion and not go into detail about the time Don let some chickens lose in a supervisor’s car.

Thankfully, the supervisor in question had a good sense of humor and some cleaning supplies. On a serious note, though, Don has never been shy about taking on leadership roles. As I mentioned, he was president of USAHA and also was president of the Association’s Northeast chapter. And he has served on the Secretary’s Advisory Committee on Animal Health.

Given Don’s interest in all animals—on land and in the water—he made valuable contributions as chairman of the Maine Fish Health Advisory Board, as well as chairman of the Maine Aquaculture Association’s Ad Hoc Fish Health Committee. Don also was a board member and chairman of the American Veterinary Medical Association (AVMA) Aquaculture and Seafood Advisory Committee. And he currently serves on the AVMA Council on Public Health and Regulatory Veterinary Medicine.

Throughout his life, Don also has been very involved with sports and his community. He was an avid adult soccer player and he serves on the board of directors of the Waldo County, Maine YMCA. He spent seven years as a high school girls’ soccer coach, and in 2003 he was named the large school coach of the year for both Maine and New England.

And though you might think Don has set himself up for a leisurely retirement, he has taken on yet another important role. Don is one of three veterinarians who will serve a one-year Congressional fellowship, sponsored by the AVMA, to advise Congress. I’m sure our Congressional representatives will reap the benefits of Don’s guidance and many years of hard work on behalf of US animal agriculture. (I also hope Don will refrain from offering them advice on potential names for farm animals.)

Don, thank you for all of your efforts. Please join me in congratulating Dr. Don Hoenig—the 2012 winner of the APHIS Administrator Award. Thank you.
Mr. Kevin Shea (l) and Dr. John Clifford (r) with APHIS Administrator Award Winner, Dr. Donald Hoenig.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

AAVLD Awards
Craig C. Carter

Distinguished Service Award
Dr. Donal O’Toole

Thermo-Scientific Award for Excellence in Diagnostic Microbiology
Dr. Mike Donahue

Pioneers in Virology Award
Dr. Bruce Calnek

Richard L. Walker Bacteriology Award
Dr. Fabio Vannucci

J. Lindsay Oaks Bacteriology Award
Dr. Christa Goodell

Best Oral Presentation
Dr. Christa Goodell

Best Poster
Dr. Stephanie Ostrowski

Best JVDI Manuscript
Dr. Roxann S. Brooks

Best JVDI Brief Communication
Dr. David Bemis

AAVLD Trainee Travel Awards
Dr. Kenitra Hammac, Washington State University
Dr. John Schaefer, Cornell University
Dr. Melissa Macias Rioseco, University of California-Davis
Dr. Noah Hull, University of Alabama-Birmingham
Dr. Kerry Sondgeroth, Washington State University
Dr. Barbara Brito, University of California-Davis
Dr. Celeste Foster, University of California-Davis
Dr. Misa Komine, Michigan State University
Dr. Stephanie R. Ostrowski, University of California-Davis

CPCVM Travel Awards
Emily Aston, Cornell University
Brittany McCauslin, Colorado State University
Cassie Wedd, VA-MD Regional College of Veterinary Medicine
II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

Keiko Petrosky, Tufts Commings School of Veterinary Medicine
Danielle Lundquist, North Carolina State University
Erez Gueta, Michigan State University
Gabriel Mills, VA-MD Regional College of Veterinary Medicine
Lucy Lee, VA-MD Regional College of Veterinary Medicine
Uri Donnett, Iowa State University
Charlie Alex, Virginia-Maryland Regional College of Veterinary Medicine
Nicole Lukovsky, Tuskegee University School of Veterinary Medicine

AAVLD/ACVP Diagnostic Pathology Resident/Graduate Student Award
Brian Butler, Biomedical Sciences, Cornell, Ithaca, NY
The E. P. Pope Memorial Award is presented in memory of Dr. Edward P. Pope who was one of the founders of the American Association of Veterinary Laboratory Diagnosticians (AAVLD) and who served with distinction as its Secretary-Treasurer from 1950 to 1972. The award was established in his honor in 1974. The Pope Award is the highest award given by the Association and is presented to an individual who has made noteworthy and significant contributions to the Association in regard to implementing and advancing the recognition of the specialty of veterinary diagnostic laboratory medicine. The 2012 E.P. Pope award is presented to Dr. Grant Maxie of Guelph, Canada.

After completing his DVM at Western College of Veterinary Medicine (WCVM) in 1969, and PhD in Veterinary Clinical Pathology at the Ontario Veterinary College in 1973, Dr. Maxie worked in Kenya investigating the pathology of trypanosomiasis and theileriosis (1974-77). He has worked on faculty at the Ontario Veterinary College (OVC) (1977-82, tenured associate professor) and as a Veterinary Pathologist (1982-94), and then as Guelph Laboratory Head (1994-97), for Veterinary Laboratory Services of Ontario Ministry of Rural Affairs (OMAFRA). He is currently the Director of the Animal Health Laboratory (1997) and co-Executive Director (2007) of the Laboratory Services Division at the University of Guelph.

Dr. Maxie was the editor-in-chief of the Canadian Veterinary Journal (1986-1991), and chair of the editorial committee of the Canadian Veterinary Medical Association (CVMA) until 1998. His scientific publications include ten book chapters and ~50 peer-reviewed articles. He edited the three volumes, and co-authored three chapters, in the fifth edition of “Jubb, Kennedy and Palmer's, Pathology of Domestic Animals", published in 2007. He is a past-president of the American Association of Veterinary Laboratory Diagnosticians (AAVLD) (2007-08), and is a member of the AAVLD Accreditation Committee and chair of the Strategic Planning Committee. He was the 2011-12 president of the Canadian Animal Health Laboratorians Network (CAHLN).

Dr. Maxie has served the AAVLD and the diagnostic community in exemplary fashion for many years, and we are very pleased to present him with the 2012 E.P. Pope Memorial Award.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

Dr. Grant Maxie (l) receives the E. P. Pope award from Dr. Craig Carter.
USAHA Federal Partnership Award
David Marshall

Last year, USAHA established an award to recognize our federal partners who may work closely with USAHA members on a regular basis. The USAHA Federal Partnership Award is designated for the recognition of a federal employee that has demonstrated commendable service to the betterment of animal health in the United States. Candidates can be employed at any level of an Official Federal Agency Member of USAHA. The candidate should exemplify partnership with states and industry stakeholders through leadership, expertise and/or other accomplishments. The recipient need not be a member of USAHA, but have a positive impact on animal health related to the work of USAHA. This year, we would like to honor an individual that we feel represents these characteristics.

This year’s honoree is known for his ability to get the job done, regardless of the degree of difficulty. Over his career, this individual has spent time on numerous task forces around the country, as well as overseas in a variety of emergency disease outbreaks, and has been a willing and strong leader in many of those situations. His experience in emergency response has positioned him as a decisive and effective asset through many of these situations. A colleague had this to say about our recipient: “This individual is one of those guys that you want with you when you go to war, and that is what we did. We battled a highly contagious foreign animal disease under trying circumstances. We were in a situation demanding rapid, clear direction and strong leaders. He definitely fits that bill.”

Our honoree received his DVM from Iowa State University, College of Veterinary Medicine in 1971. He has held his current assignment since 1981. He acted as the USDA Designated Brucellosis Epidemiologist for Iowa from 1981 to 1989. He joined teams that completed reviews of the Brucellosis Eradication programs in several states. As I have mentioned, he was deployed on task forces to: Highly Pathogenic Avian Influenza (HPAI) in Pennsylvania -1984; Brucellosis in Arkansas-1984; Low Pathogenic Avian Influenza (LPAI) in Virginia - 2002; Exotic Newcastle Disease (END) in California - 2002-2003; Bovine Spongiform Encephalopathy (BSE) in Washington - 2004; Tuberculosis (TB) in New Mexico - 2007; and TB in California- 2008. He responded to the 2001 Foot and Mouth Disease (FMD) outbreak in the United Kingdom. He was trained as a Foreign Animal Disease Diagnostician (FADD) in 1986 and assisted with the FADD course during the 1990’s. He has been a member of a National Incident Management Team and a member of the Central and Western Regional Emergency Animal Disease Eradication Organizations (READEOs). He was president of the National Association of Federal Veterinarians (NAFV) during 2009-2010 and an APHIS representative for that same organization from 2001-2011. He served as a mentor in Veterinary Services’ Public Veterinary Practice Career Program and he has provided opportunities for numerous veterinary students to spend a day with a field Veterinary Medical Officer
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

(VMO). He continues to serve currently as a field Veterinary Medical Officer with USDA in Knoxville, Iowa, covering 24 counties in southern Iowa.

A colleague noted, after working with him on the Exotic Newcastle Disease outbreak in California “I wholeheartedly support the recognition of [this individual] in is his ability to leave the anonymity of his farm and his field veterinarian job to be a strong leader when we need leaders the most, and then quietly return to his field job with little expectation of reward or recognition. He symbolizes the best of many of us, there are many [like him] out there who will understand and applaud this recognition. Tonight, we are pleased to recognize Dr. Donald J. Otto with the USAHA Federal Partnership Award.

Unfortunately, Don is unable to join us this evening, but accepting the award on his behalf is Kevin Peterson, Area Veterinarian in Charge (AVIC) in Iowa.

Dr. Donald Otto
USAHA Medal of Distinction Award
David Marshall

The USAHA Medal of Distinction is awarded annually to recognize one or more distinguished USAHA members who have demonstrated outstanding leadership, provided exemplary service, and have made significant contributions to the advancement of the Association.

The Executive Committee thanks all who provided several excellent candidate nominations this year, and after much deliberation has selected one deserving individual to honor tonight.

Tonight’s honoree is among the longest active members of USAHA, first joining in the organization in 1970. He has missed few, if any, annual meetings over the past 42 years, and has demonstrated a long-standing commitment to USAHA through these years serving in a variety of leadership and contributing roles. Notably, this individual was instrumental in the partnership with the American Association of Veterinary Laboratory Diagnosticians, creating effective communication that resulted in the affirmation of the value of collaboration between our two organizations. Through this, a commitment to restructure this joint annual meeting was made, an effort that continues to serve and strengthen both organizations and their members to this day.

Our recipient is a 1966 graduate of Auburn University College of Veterinary Medicine, and has served as a laboratory diagnostician, a state veterinarian for 26 years, national livestock program leader with USDA-FSIS, and senior staff veterinarian with USDA-APHIS-Veterinary Services. Our honoree has served many industry and animal health organizations, from the Secretary’s Advisory Committee on Foreign Animal Disease, the Livestock Conservation Institute, the Pseudorabies Control Board, National User’s Advisory Board on Research and Extension in Food and Agriculture, and the Tennessee Beef Industry Council, as well as serving as president of both the National Assembly of State Animal Health Officials and the Southern Animal Health Association.

He is a life member of USAHA, and served as President of our association in 1983. He has served on the Board of Directors for most of his membership. He is a valued contributor on several current and past USAHA committees, and in particular has been a strong asset to the Committee on Nominations and Resolutions over the years, reviewing countless USAHA resolutions for accuracy and content. Today, his leadership and service continues as the current Vice Chair of the Committee on Food and Feed Safety, and serves as our organization’s liaison to the Food and Drug Administration (FDA) Partnership for Food Protection. A native of Tennessee, he now resides in Maryland.

I personally have been impressed with this individual throughout my years of involvement in USAHA as someone who is ever-present, a deep thinker, thoughtful and respectful but willing to express his opinion, even if
that opinion is not in the majority, and always acting in the best interest of the United States Animal Health Association.

For these reasons it is my distinct honor to present the 2012 USAHA Medal of Distinction award to Dr. John Ragan.

Dr. David Marshall (l) with 2012 Medal of Distinction recipient, Dr. John Ragan.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

National Assembly Award
Keith Roehr
National Assembly President

I have eagerly anticipated this introduction. Like many of you, I recognize the recipient of this award as a veterinarian who possesses a tireless work ethic and dedication to the livestock industry. He is successful because of the terrific rapport he has established over 30 years of working with producers, first as a private practitioner for over 20 years and now as the state veterinarian for 14 years. Producers trust him. They respect his opinion because his actions are always fair, thoughtful, and true to his word. While he himself is a man of few words those who know him will describe at length his unending patience. They will also tell you he is always enthusiastic, engaged and genuinely concerned about the livestock producers in his state.

In addition to his responsibilities as State Veterinarian, he also participates in numerous professional organizations and committees. He is a true advocate for the livestock industry. He has served as USAHA Chair of both the Brucellosis Committee and Scrapie Committee. He has served as chair of the American Sheep Industry Association’s Animal Health Committee and a representative on the American Veterinary Medical Association’s (AVMA) Animal Agriculture Liaison Committee and representative on USDA’s National Animal Health Surveillance and Reporting System Committees. He is also a former President of the Western States Livestock Health Association.

While the list of his service to professional organizations and committees is numerous and distinguished I would rather not waste another moment. Please help me in welcoming our award winner and State Veterinarian of Wyoming, Dr. Jim Logan.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

Dr. Jim Logan (l) with National Assembly President Dr. Keith Roehr.
II. B. USAHA/AAVLD Plenary Session

Science, Economics and Politics, Oh My!
Moderated by Dr. Richard Breitmeyer

Economic Overview of Animal Agriculture – J. Lawrence, Iowa State University

Economic Impacts of FMD in the U.S. – P. Webb, National Pork Board

Antibiotic Use in Food Animals – L. Bull, NIAA Symposium Chairman

Detail on the Facts behind the Headlines of the UEP/HSUS Agreement – G. Gregory, United Egg Producers
Growing world corn demand for feed and fuel has resulted in higher and more volatile prices for corn. Livestock and poultry industries in the US and globally that developed during a time of plentiful and relatively low cost grain now face significant financial challenges as costs have risen faster than revenues. Consumer-level prices adjust when supplies of meat, milk and eggs decline, but the supply reductions have not been fully reflected in the stores or have been complicated by shifting levels of imports and exports or drought driven decisions. Ultimately, the supply of animal agriculture products will be smaller due to the higher feed costs than would have been the case had world grain prices remained at the pre-2006 levels. Livestock and poultry producers have few options to address the higher feed costs. First, is to hope for a change in energy and/or trade policy to reduce the competition for grain. Second, is to expand demand for their product. Checkoff programs have and continue to work on domestic demand and additional growth has come from exports. Like policy decisions, factors that impact trade are often beyond the producer’s control. The third option has been the basis for survival in commodity agriculture and that is for producers to lower their cost of production through improved biological and economic efficiency. Improved efficiency and lower costs of production require renewed innovation and research in technology and production systems. The majority of technologies and production systems used today were developed during a time of lower priced energy, grains and labor. These conditions do not exist today and are not likely to exist in the future. Why would the optimal system for $2/bushel corn be the optimal system for $6/bushel corn? While it is important to recognize that relative prices matter more than absolute prices, producers, the industry and researchers should reevaluate current beliefs and systems in the new paradigm. A new paradigm where the energy costs for transportation and fertilizer are significant, consumers are more diverse in their preferences and spending regarding food choices where labor for production systems is often less available, less experienced and more costly than before and where off-shore production is increasingly competitive.
II. B. USAHA/AAVLD PLENARY SESSION

ECONOMY WIDE IMPACT OF A FOREIGN ANIMAL DISEASE IN THE UNITED STATES

Patrick Webb
Director of Swine Health Programs
National Pork Board

This report uses the Center for Agricultural and Rural Development (CARD) Food and Agriculture Policy Research Institute (FAPRI) model to evaluate the economy wide impacts of a disease outbreak that eliminates US pork and beef exports simultaneously and pork exports alone. In either case industry losses are enormous and spread well beyond the pork and beef sectors. Revenues fall significantly for poultry, corn and soybean producers and employment in rural areas is negatively impacted as the US pork and beef sectors are forced to downsize. Revenue losses in the combined US pork and beef industries fall by an average of $12.9 billion per year. The removal of this level of value added activity is equivalent to the loss of as many as 58,000 full time jobs. The report uses option prices to calculate the likelihood of a price impact of the magnitude reported here. This suggests a less than one percent possibility of an outbreak of this severity. Multiplying the probability of an outbreak times the reduction in pork industry net revenues over variable costs in the event of an outbreak, suggests that the annual benefit of eliminating the possibility of this outcome would be worth $137 million.
The use of antibiotics in animal agriculture is frequently heard and read about in the news media. Because of a general lack of understanding around this topic and often misleading reference or inference by the media, there is increasing concern and confusion among the general public. This is especially important in a time when consumers are increasingly interested in where their food comes from and how it is produced. The concern about antibiotic use in animals primarily revolves around sub therapeutic use and its potential contribution to pathogen resistance to antibiotics. Unfortunately, the issue is frequently biased or oversimplified by the media. The National Institute for Animal Agriculture (NIAA): www.animalagriculture.org organized and hosted a forum in 2011 to bring together representatives from both the animal and human health professions to discuss what is known and what is not known about antibiotic use and the impact of use on antibiotic resistance in pathogens of both humans and animals. That highly successful forum, in which there was a significant exchange of factual, sound information around the entire topic, resulted in a summative White Paper (highlights to be presented-- see NIAA website has had nearly 250,000 views and is available in English, Spanish and Portuguese), and set the stage for a follow up forum in 2012 to focus on a discrete, substantive plan of action. All agree that antibiotic use must be judicious and managed in a careful manner. Everyone has a stake in engaging in meaningful dialogue and creating successful strategies to preserve antibiotic efficacy as a critical global public health tool. The forum, to be held November 13-15 in Columbus, Ohio, will build upon information and consensus from the previous forum. That venue was selected because it offers a unique collection of seven colleges and schools related to both animal and human health within the Ohio State University campus network in Columbus. This will allow NIAA to efficiently draw participation not only from a national and international audience, but from the local community that represents the entire scope of interest in this topic! The global perspective that is built into the program is critical to the discussion, especially from parts of the world where antibiotic use is regulated differently than in the United States. A high priority in the planning of this forum will be focused participation by attendees in the discussions. Details presented.
Gene Gregory  
United Egg Producers President and CEO

United Egg Producers (UEP) was one of the first, if not the first, among animal agriculture to develop a voluntary animal welfare program based upon the recommendations of an independent scientific committee. Despite these advancements in animal welfare, egg farmers faced state ballot initiatives brought forth by the Humane Society of the United States (HSUS) to force egg production into a cage-free industry. After seeing five states with conflicting laws that will impair our ability to distribute eggs across state lines, we determined for the benefit of egg farmers, our customers and consumers that we needed to find a way to end the conflict with HSUS and to advance the welfare of hens even further with enriched colony cages. UEP reached an agreement in July 2011 to join with HSUS in seeking federal legislation that would preempt conflicting state laws and enact a national standard that would transition the industry to enriched colony cage housing over an 18-year period. We purposely are proposing that a 40-year old egg law, the Egg Products Inspection Act, be amended to include all the points agreed upon between UEP and HSUS.
II. C. USAHA/AAVLD Joint Scientific Posters, Papers, and Abstracts

1. Posters
II. C. 1. POSTERS

DIAGNOSTIC FINDINGS FROM COMMON EIDER (SOMATERIA MOLLISSIMA) MORTALITY EVENTS IN THE NORTHEASTERN UNITED STATES ASSOCIATED WITH WELLFLEET BAY VIRUS, A NOVEL ORTHOMYXOVIRUS

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Between 1998 and 2011, 11 recognized mortality events occurred in common eiders (Somateria mollissima) along the coast of Cape Cod, Massachusetts. The estimated numbers of eiders involved in these outbreaks ranged from 30 to 2,800, with total losses exceeding 6,000 birds. Most of the affected eiders were found dead without showing premonitory signs of disease. When sick birds were detected, they displayed nonspecific signs including weakness, lethargy, and ataxia. A multi-institutional disease investigation was initiated and carcasses of dead or moribund common eiders were submitted to the National Wildlife Health Center, the Southeastern Cooperative Wildlife Disease Study (SCWDS), Tufts University, and the University of New Hampshire for postmortem examination. The findings reported herein are from the 24 common eider carcasses received at SCWDS from three of these mortality events occurring between 2009 and 2011. At necropsy, common gross lesions in the birds included emaciation, skeletal muscle congestion, multifocal hepatic necrosis, and splenomegaly. The most common histologic lesions included myositis, multifocal to coalescing hepatic necrosis, splenic necrosis, and renal tubular necrosis and/or hemorrhage. In 2010, a novel orthomyxovirus, tentatively named Wellfleet Bay Virus (WFBV), was isolated from the tissues of four of these birds. Based on initial genetic comparisons of the three polymerase proteins (PB1, PB2, PA), WFBV was demonstrated to be closely related to members of the newly proposed Quaranjavirus genus, which includes Quaranfil, Johnston Atoll, and Lake Chad viruses. To date, common eiders are the only species known to be susceptible to WFBV, and more research is currently underway to characterize the genetic composition, pathophysiology, epidemiology, and ecology of this virus, as well as to better understand the long-term implications of WFBV on common eider populations.
EVALUATION OF THE DEVELOPMENT OF THE BOVINE FOOT IN RESPONSE TO VARIATION IN MANAGEMENT PRACTICES

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A total of eight bull calves, four Holstein and four Jersey, were utilized, with random assignment of four in the control group and four in the treated group with equal number of Jerseys and Holsteins in each group. The control group was reared in accordance with standard practices consistent with the dairy industry, in calf hutch on pasture. The treated calves were housed in calf hutch for the first two weeks of life, and then they were allowed free access to a half mile lane where they walked for a total of at least two miles a day on rocky terrain. When all calves reached four months of age, they were humanely slaughtered and legs were collected and evaluated utilizing Computed Topography (CT) scans. The information from the CT scans was evaluated utilizing two software programs: Mimics 14 (Materialise; http://www.materialise.com/micro-CT) and 3-D Studio Max (Discreet; www.discreet.com/3dsmax). A three dimensional analysis of the medial claw, including P² and P³, and the lateral claw, including P² and P³, of the right rear foot from each calf was performed. The surface areas of the individual bones were calculated and evaluated for breed and treated verses control comparisons. The surface areas of both medial and lateral of P² and P³ in the treated group were increased in each calf by an average of 45mm² and 81mm², and 193mm² and 219mm², respectively. Additionally, the treated Jersey group had a greater average increase per calf in the surface area of lateral P³ (349mm²), in comparison to the Jersey control group than the average increase per treated Holstein calf (90mm²), when compared to the Holstein control group. In summary, this study implicates the environment’s role in the development of the boney structures of the bovine foot. However, additional studies with greater numbers of calves managed for a longer time period are necessary to allow for maximum bone remodeling so that the impact of changes in management especially involving rearing practices can more fully be assessed.
IDIOPATHIC GENERALIZED SOFT TISSUE MINERALIZATION IN AN APPALOOSA FILLY

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A ten-month old Appaloosa filly was submitted for necropsy at the UC Davis School of Veterinary Medicine, CAHFS-Davis Veterinary Diagnostic Laboratory, following treatment for a chronic upper respiratory infection. The animal had a history of inability to stand, subcutaneous edema of the ventral midline and upper hind legs, depression, poor appetite, loss of muscle mass, and fever. At necropsy, there was severe extensive mineralization of the heart affecting the semilunar aortic valves, atrial epicardium, endocardium of the left ventricle and aorta, and lungs. No bone lesions were observed. Microscopically, calcification was observed in the heart, aorta, lung, kidney, stomach, and thyroid gland. Concentrations of Ca and P in the serum were both elevated (Ca = 220ppm, ref. range 100-130ppm; P = 270ppm, ref. range 27-50ppm). Vitamin D concentration in the serum was within normal limits, and slightly above the normal range in the kidney. The parathyroid glands were not examined by histopathology. PTH was not measured in serum. The cause of the severe, generalized soft tissue mineralization could not be determined in this case. Vitamin D toxicosis was considered but could not be confirmed as there was no history of overzealous vitamin D supplementation, access to calcinogenic plants, or hypercalcemic rodenticides. No neoplasia that would cause primary hyperparathyroidism or hypercalcemia of malignancy was found. No granulomatous disease or bone lysis that would cause hypercalcemia was noted. No primary renal disease that would cause renal failure was seen ruling out renal secondary hyperparathyroidism. The possibility of nutritional secondary hyperparathyroidism was not thoroughly investigated as Ca/P analyses were not done on diet and serum of other horses from the farm, and PTH not measured in serum of any of these animals.
UNDERSTANDING THE FACTORS THAT INFLUENCE LOW PATHOGENIC AVIAN INFLUENZA VIRUS INFECTION IN DUCKS

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Certain species of wild ducks are natural reservoirs for low pathogenic avian influenza (LPAI) viruses and an important source of influenza viruses that have transmitted to and produced disease in a variety of avian and mammalian hosts. Characterizing LPAI virus infection in ducks is a crucial step for understanding the risks for LPAI virus spillover into aberrant hosts and guiding efforts to prevent future transmission events or respond more efficiently. Historically, LPAI virus challenge studies in ducks have consisted of stand-alone projects that characterize host susceptibility, pathobiology, patterns of viral shedding, and/or seroconversion. The ability to compare results between studies has historically been limited by variation between experimental designs and a lack of understanding on the influence that host, viral, or other factors can have on LPAI virus infection in ducks. To address this gap, as well as provide a template for future studies, we have conducted a series of related LPAI virus challenge studies in Mallards (Anas platyrhynchos) to evaluate the influence of virus subtype, virus host-of-origin, age, route of inoculation, and AI exposure history. Using the data from these studies, we have developed a more defined Mallard LPAI model system that will allow us to effectively evaluate increasingly complex and challenging variables, as well as atypical influenza viral strains (highly pathogenic avian influenza virus). For the former, we are currently examining differences in phenotype between field and laboratory (egg) propagated viruses.
2. Papers and Abstracts
BOVINE VIRAL DIARRHEA VIRUS INFECTIONS IN PREGNANT CATTLE: DIVERSE OUTCOMES OF FETAL INFECTIONS IN A NATURAL OCCURRING HERD DISEASE

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Bovine viral diarrhea virus (BVDV) affects cattle and clinical forms are varied, including fetal infections. Fetal outcomes depend on stage of fetal development. Outcomes include fetal malformations, abortions, stillbirths, and calves born persistently infected (PI). A herd owner purchased two cows pregnant and nursing calves in December, 2010. One cow (#31) delivered a calf in 2011 that was test positive in spring 2012 as yearling (#52) by skin test (ear notch) immunohistochemistry (IHC) for BVDV. Another 11 cows nursing small calves (assumed open) were purchased in March, 2011, and commingled with the first two cows. Vaccination status was not known, nor were cattle tested for BVDV at purchase. A breeding bull purchased in June, 2011, tested negative for BVDV by skin test IHC. On January 3, 2012, one cow (#33) aborted, and on February 5, another cow (#50) aborted with a suspect fetal anomaly. A third cow (#46) was believed to have aborted in 2012. The aborted fetuses from cows #33 and #46 were not collected for diagnostic testing. The fetus from #50 was approximately 6.5 months, consistent with breeding by the bull purchased in June, 2011. Necropsy examination confirmed multiple congenital anomalies including arthrogryposis, kyphosis, scoliosis, polydactylism, and cardiac overriding aorta. Many cases have genetic basis in the Angus breed, and arthrogryposis multiplexa (AM) and contractural arachnodactyly (CA) were suspected. BVDV was in the differential diagnosis, and BVDV fluorescent antibody testing was positive in the liver and kidney. Tissue homogenates of lung, liver, and kidney were positive for BVDV2 by PCR. The homogenates grown on MDBK cells were positive for BVDV2 by PCR and were subtyped as BVDV2a. Subsequently, 13 cows, 5 calves and 2 yearlings were tested using IHC, and were negative except for the yearling, #52, born in 2011. Serum from this calf and cell culture fluids were PCR positive for BVDV2. This virus has been submitted for subtyping. The dam of the calf with the congenital deformities was negative by the skin test IHC. Fetal tissue (liver/kidney) from the calf with the congenital deformities was submitted for AM and CA genetic testing, and was negative for AM and CA. This case illustrates issues for the clinician and diagnostician:

1) genetic based anomalies are possible, yet infections and toxin-based etiologies must be considered;
2) BVDV fetal infections are varied as illustrated with abortions, anomalies and PI calves all being possible; and
II. C. 2. PAPERS AND ABSTRACTS

3) biosecurity measures are not always followed nor known by the owner.
II. C. USAHA/AAVLD JOINT SCIENTIFIC POSTERS, PAPERS, AND ABSTRACTS

CANINE DISTEMPER OUTBREAK IN MULTIPLE PET STORE DOGS LINKED TO HIGH VOLUME BREEDER

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Canine distemper is uncommon in the pet trade in the United States, due in large part to effective vaccines against canine distemper virus. This is a report of distemper affecting 24 young dogs of multiple breeds shortly after sale by two pet stores in Wyoming in August–October, 2010. Cases were diagnosed over 37 days. It was the largest outbreak of distemper in pet dogs recognized by the Wyoming State Veterinary Laboratory over the past 20 years. Diagnosis was established by a combination of fluorescent antibody staining (FA), reverse transcriptase polymerase chain reaction (RT-PCR), virus isolation, negative stain electron microscopy, and necropsy/histopathology. A two-step approach was used to screen high risk dogs by FA of conjunctival swabs, followed by RT-PCR of swabs or buffy coat samples from FA-negative dogs. The approach kept costs low and encouraged submissions. Canine distemper virus hemagglutinin gene sequences were obtained from two affected dogs from each of the stores. They were identical. The sequences were distinct from those in an unrelated case of canine distemper occurring contemporaneously in a distempered Wyoming dog from an Indian reservation. Sequences were deposited in the National Center for Biotechnology Information database as one accession (GenBank JF283477; pet store dogs), along with those from the unrelated reservation case (JF283476; Wind River Reservation). The authors are curious to know whether other diagnostic laboratories recognized the former strain associated with distemper in recently purchased dogs in 2010. The breeding property from which dogs originated was quarantined by the Kansas Animal Health Department. Dogs intended for sale were tested for distemper. Distemper was diagnosed on site in November, 2010. At that point 1,466 dogs were euthanized to eliminate dispersal of distemper via commercial channels. The investigation underscores risks inherent in large-scale dog breeding where vaccination and biosecurity practices are suboptimal. Practical steps to diagnose, prevent and control canine distemper in high volume breeding facilities are suggested.
In the US, *M. bovis* gamma interferon testing (GIT) is used as a confirmatory test in cows testing positive for bovine tuberculosis on caudal fold testing. In the GIT as historically stipulated by USDA, lymphocytes are stimulated in tissue culture plates, IFN-γ is harvested, and ELISA technology is used to measure IFN-γ produced (Plate method). The harvesting step involves centrifuging 24-well plates and collecting serum using a single-channel pipet, both of which are time consuming, particularly with large numbers of samples. An alternative method involves stimulating lymphocytes in microtubes, rather than tissue culture plates (Microtube method). This shortens the harvesting step by increasing the number of samples centrifuged simultaneously, and by allowing the use of multichannel pipets for serum collection. The Microtube method uses smaller sample volumes for lymphocyte stimulation, potentially producing less IFN-γ and leading to false negative test results. The objective of this project was to compare test results between the Plate and Microtube methods of performing the GIT for *M. bovis*. Samples from 58 Holstein dairy cows from three California dairies currently or historically infected with *M. bovis* were simultaneously tested using both methods. Paired t-tests were used to separately compare the Nil, *M. avium*, *M. bovis*, Pokeweed, *M. bovis*-Nil, and *M. bovis*-M. avium values between the Plate and Microtube methods. Thirty of 58 cows tested positive on one or both gamma interferon test methods, and *M. bovis* was detected postmortem in 29 of these 30 via either culture or polymerase chain reaction (PCR). The *M. avium*, *M. bovis*, and *M. bovis*-Nil OD values produced by the Microtube method were significantly lower than those produced by the Plate method. One sample identified as *M. bovis* positive via Plate method was negative using the Microtube method. The Microtube method produces less IFN-γ than the Plate method. As a result, the sensitivity of the Microtube method appears lower than that of the Plate method when results from both methods are compared to the same threshold for a positive test. Optimizing an alternative *M. bovis*-Nil threshold for the Microtube method might allow for more efficient performance of GIT without a loss of sensitivity.
II. C. USAHA/AAVLD JOINT SCIENTIFIC POSTERS, PAPERS, AND ABSTRACTS

DEVELOPMENT AND EVALUATION OF A NEW SEROLOGICAL ELISA FOR DETECTION OF HERDS WITH SWINE DYSENTERY

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Swine dysentery (SD) is a major endemic disease in most pig-rearing countries in the world, with evidence of re-emergence in the US and Canada. SD results from infection of the caecum and colon by Brachyspira hyodysenteriae, a pathogenic anaerobic intestinal spirochaete, the activity of which causes mucohaemorrhagic colitis. The disease is seen particularly in grower and finisher pigs, and can have a severe impact on production efficiency. In order to develop a serological ELISA, recombinant antigens were produced. These were selected from predicted outer membrane proteins or lipoproteins of B. hyodysenteriae, based on bioinformatics analysis of the complete genome sequence of B. hyodysenteriae strain WA1. The suitability of the recombinant antigens was further verified by Western blot and ELISA with a range of sera from pigs experimentally challenged with different B. hyodysenteriae strains, sera from an individual infected pig with a serological conversion to B. hyodysenteriae, convalescent-phase sera from pigs recovering from SD, and sera from healthy grower pigs. In order to address potential cross-reactivity with other Brachyspira spp., a panel of sera from pigs infected with B. pilosicoli, B. intermedia and B. innocens/B. murdochii were included in the evaluation. A selected recombinant antigen was then used for the development of an indirect ELISA. Evaluation was performed in Australia with serum samples from healthy finisher pigs at slaughter, including 896 sera from pigs in 18 herds that were considered not to have SD and 355 sera from pigs on six farms that had a previous history of SD. Using the selected cut-off values, all negative herds were correctly identified as negative, and five of the six infected herds were correctly identified. The ELISA was then developed into a commercially available product, the PrioCHECKR Brachyspira Ab porcine ELISA. Sensitivity at the herd level was assessed on 133 samples collected from four herds from Switzerland, Spain and Australia with a history of B. hyodysenteriae infection, and all herds were correctly classified as positive. Specificity was tested on 108 samples from four herds from Switzerland, Germany, Spain and Australia and all samples were found negative. These findings demonstrate that the PrioCHECKR Brachyspira Ab porcine ELISA is an efficient tool for identifying infected herds. Its use will reduce the cost of pig production by enhancing identification and control of SD in these herds. Supported in part by the Pork CRC Ltd of Australia.
DEVELOPMENT OF A MULTIPLEX REAL-TIME PCR FOR THE DETECTION OF BOVINE CORONA AND ROTA VIRUSES

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A multiplex real-time reverse transcription polymerase chain reaction (rRT-PCR) panel for the detection of bovine corona and rota (type A) viruses has been developed at the Wisconsin Veterinary Diagnostic Laboratory (WVDL). Assays in the panel were validated individually as well as in multiplex format using Ambion Path-ID Multiplex One-Step RT-PCR Kit with samples prepared by making a 10% tissue or feces slurry in Phosphate Buffered Saline (PBS) and homogenized using ceramic beads. Samples were evaluated by PCR and compared to electron microscopy and PCR performed at another laboratory. The WVDL corona virus assay showed high sensitivity and specificity using primers directed to the spike gene as evidenced by detection of 40/40 negative samples and 15/15 positive samples. The bovine rotavirus assay showed high sensitivity and high specificity using primers directed to the RNA polymerase gene as evidenced by detection of 26/26 negative samples and 30/30 positive samples. An internal control reaction was also included in the multiplex assay in order to monitor for inhibition in every sample. To further improve cost effectiveness and to avoid the potential for over-loading the sample homogenates, new sampling procedures were also evaluated. The alternative sampling method comprised of swabs dipped into feces or mucosal intestinal tissue and then vortexed in 1 ml PBS. Comparable sensitivity and specificity was obtained using the swab as compared to the homogenate. In addition to the swab comparison, a pooling strategy was evaluated as a potential cost savings for clients. Positive pools (n=41) consisted of at least one positive sample with a maximum of three samples per pool. Comparable specificity was found. However, sensitivity decreased with pools containing individual fecal samples with a cycle threshold value greater than or equal to 35. The rRT-PCR multiplex assay developed at WVDL has increased the sensitivity of corona and rotavirus detection compared to electron microscopy. Modifying our sample preparation from homogenates to swabs has resulted in a savings of approximately 40% per sample to WVDL while not significantly compromising sensitivity. The pooling strategy will be more economical for the client but results in a loss of sensitivity.
DEVELOPMENT OF A MULTIPLEX REAL-TIME PCR PANEL FOR DETECTION OF RUMINANT ENDEMIC DISEASES THAT MIMIC FOOT-AND-MOUTH DISEASE

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The Wisconsin Veterinary Diagnostic Laboratory (WVDL) previously developed a real-time polymerase chain reaction (PCR) panel for rapid detection and concurrent confirmation of ruminant endemic diseases that mimic foot-and-mouth disease (FMD). This presentation describes the conversion of that panel to a multiplexing format with use of an internal control and includes the following viruses that are causative agents of diseases that must be considered in a differential diagnosis: bovine viral diarrhea virus (BVDV), bovine herpesvirus 1 (BHV-1), bovine herpesvirus 2 (BHV-2), bovine herpesvirus 4 (BHV-4), bluetongue virus (BTV), Epizootic hemorrhagic disease (EHD), Malignant catarrhal fever (MCF), Contagious ecthyma (ORF), and bovine papular stomatitis virus (BPSV). The FMD mimic panel detects, but does not differentiate the following serotypes: BVDV 1a, 1b, 2; BTV 2, 10, 11, 13, 17; and EHD 1, 2. Conversion of the panel to a multiplex format was initiated to increase efficiency and decrease cost. In addition, an exogenous internal control was included to monitor potential PCR inhibition and extraction success. To test performance of the assays, nucleic acid from viral stocks or clinical samples was purified using the MagMAX™-96 viral RNA isolation kit (Life Technologies) and a Kingfisher 96 magnetic particle processor. The nucleic acid was then serially diluted in triplicate and the limit of detection (LOD) and amplification efficiency were determined for each assay. Singleplex assays using ABI Taqman Universal Master Mix, Invitrogen Superscript III Platinum One-Step qRT-PCR System or TaqMan One-Step RT-PCR Master Mix Reagents were compared with assays using Ambion Ag-Path ID Multiplex One-Step RT-PCR chemistry. Primer and probe concentrations were modified as necessary until all assays demonstrated LODs comparable to the original data and an assay efficiency of ≥90%. Two to four assays were then grouped into multiplexed assays such that a clinical sample would unlikely be positive for more than one target in the multiplex reaction. An internal control PCR was included in two of the multiplex reaction groupings. Results show that LODs and PCR efficiencies were comparable using the multiplex format. In summary, the panel in a multiplex format will provide a more efficient and cost effective approach than singleplex assays for differential diagnoses in clinical samples with potential foot and mouth disease. Also, the internal control is an added benefit for the prevention of false negatives due to inhibition or extraction failures.
DEVELOPMENT OF ECOFRIENDLY EXTRACTION PROCESSES FOR ANALYSIS OF AFLATOXINS AND FUMONISINS IN CORN AND CORN BYPRODUCTS

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Mycotoxin poisoning is of great concern in food production for animal agriculture, and analysis of corn and corn byproducts for mycotoxins is a good preventative approach. Extraction of mycotoxins for analysis using lateral flow devices has traditionally been accomplished with 70% methanol. Unfortunately, methanol is toxic to the environment as well as laboratory workers. We developed an ecofriendly, aqueous-based extraction method which is also simple, inexpensive, efficient, and reproducible. We tested various solvents which included organic-based solvents comprised of acetonitrile/water mixtures, methanol/water mixtures, ethanol/water mixtures, and aqueous based solvents with sodium dodecyl sulphate (SDS), citrate, NaHCO₃, Brij-58, cyclodextrin and benzalkonium chloride as additives. The extracts were quantified by LC-MS/MS with ESI-MS detector. Spiking known amounts of mycotoxins in ground corn samples tested the extraction efficiency for each solvent and analyzing certified Trilogy samples checked for accuracy. The results of spiked corn samples (20 ppb total aflatoxins B1 and B2, i.e. AFB1 & AFB2) showed the following order of percent recoveries: acetonitrile/water (78%) > ethanol/water (42%) > methanol/water (30%). The Trilogy sample extraction accuracies were in the order methanol/water (104%) > ethanol/water (99%) > acetonitrile/water (94%). Extraction with aqueous solvents had mixed but interesting results. The SDS, NaHCO₃, benzalkonium chloride, and Brij-58 solutions had very suppressive effects on the signal, citrate was mildly suppressive at low concentration and more so at higher concentration, and cyclodextrin offered no advantages in extraction efficiency. The SDS system offered an ecofriendly alternative to the acetonitrile/water mixture regarded as the ‘gold standard’ in our laboratory, with the 100mM SDS concentration showing higher recoveries than acetonitrile/water. This, however, was determined after carrying out a back titration in which the SDS was precipitated out with saturated sodium chloride. The analysis of the Trilogy samples following back extraction with SDS solutions showed poor recoveries for AFB2 and good (86%) recovery for AFB1 with the 100mM SDS, whereas the 1mM and 10mM concentrations had less than 70% recovery. Similar studies carried out on fumonisins, which also included pure water as a solvent, had the following order in extraction efficiency of fumonisin B1 (FB1) in ground corn and Trilogy samples: acetonitrile/water (110%) > methanol/water (98%) > ethanol/water (97%) >> deionized water (52%). Similar extractions of FB1 using SDS solutions...
showed the order of efficiency: acetonitrile/water > 10mM SDS > 1mM SDS > 100mM SDS. In conclusion, our results show that non-toxic solvent combinations such as ethanol/water mixtures and 100mM SDS have been shown to perform well in comparison to 'gold standard' extraction solvents such as acetonitrile/water and methanol/water for both aflatoxins and fumonisins.
An outbreak of type A botulism involved four horses in northern California which were fed grass clippings obtained from a nearby park. Within 48 hours, all horses developed a progressive flaccid paralysis syndrome clinically consistent with exposure to pre-formed botulinum neurotoxin (BoNT). All horses exhibited marked cervical weakness (inability to raise their heads to a normal position), and died or required humane euthanasia by 96 hours. One animal was submitted to the Veterinary Medical Teaching Hospital at the University of California, Davis for diagnostic examination and treatment, and subsequently was presented to the pathology service. At necropsy, edema was observed in the areas of muscle attachment to the nuchal ligament and inguinal fascia; no other lesions were identified. A sample of the feed source (wilted grass clippings) tested positive by the mouse bioassay test for pre-formed BoNT type A. Sporadic cases of equine botulism occurring west of the Mississippi River are more likely to be caused by Clostridium botulinum serotypes A or C, rather than type B. The mapped distribution of botulism spore serotypes reported in North America corresponds to epidemiologic reports of the geospatial distribution of botulism serotypes for both human and equine cases. Cervical weakness and edema at the nuchal ligament and inguinal fascia were prominent clinico-pathologic features noted with the current type A outbreak; both have previously been reported as inconsistent findings for type C equine cases. An affordable trivalent (A, B, C) BoNT antiserum product provides therapeutic coverage for all three clinically important C. botulinum serotypes. Emphasis should be placed on early case recognition and rapid initiation of treatment with the trivalent antitoxin product, in addition to preventing dietary exposure to BoNT in spoiled forages.
EVALUATION OF SERODIAGNOSTIC ASSAYS FOR *MYCOBACTERIUM BOVIS* IN ELK, WHITE-TAILED DEER, AND REINDEER IN THE UNITED STATES

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In 2011, the United States Department of Agriculture conducted a project in which elk (Cervus elaphus spp.), white-tailed deer (WTD) (Odocoileus virginianus), and reindeer (Rangifer tarandus) were evaluated by the single cervical tuberculin test (SCT), comparative cervical tuberculin test (CCT) and serologic tests. The rapid antibody detection tests evaluated were the CervidTB Stat-PakR (Stat-Pak) and the Dual Path PlatformR VetTB (DPP). Blood was collected from presumably uninfected animals prior to tuberculin injection for the SCT. A total of 1,783 animals were enrolled in the project. Of these, 1,752 (98.3%) were classified as presumably uninfected, based on originating from a captive cervid herd with no history of exposure to tuberculosis (TB). Stat-Pak specificity estimates were 92.4% in reindeer, 96.7% in WTD and 98.3% in elk and were not significantly different from SCT specificity estimates. Using the DPP in series on Stat-Pak antibody positive samples improved specificity in the three species. Thirty-one animals were classified as confirmed infected, based on necropsy and laboratory results and 27/31 were antibody positive on Stat-Pak for an estimated sensitivity of 87.1%. The study findings indicate that rapid serologic tests used in series are comparable to the SCT and CCT, and may have a greater ability to detect TB infected cervids.
EXPERIMENTAL CO-INFECTION STUDIES WITH AVIAN INFLUENZA VIRUSES AND NEWCASTLE DISEASE VIRUSES IN CHICKENS, TURKEYS, AND DOMESTIC DUCKS

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Co-infections of poultry with Newcastle disease viruses (NDVs) and avian influenza viruses (AIVs) present a problem both from the clinical point of view and the diagnosis of these viruses. Little has been done to understand the interactions between these two viruses when infecting poultry. Exposure to NDV, either live vaccines or field strains, is nearly unavoidable for commercial and non-commercial poultry worldwide, so co-infections with avian influenza viruses are expected to occur. The goal of this study was to examine the interaction between NDV and AIV in infected poultry species. We conducted experiments in which we infected chickens, turkeys and domestic ducks with lentogenic, mesogenic or velogenic strains of NDV, and with low pathogenicity (LP) or high pathogenicity (HP) AIV, as relevant to specific ecosystems, by giving one of the viruses first or by giving them simultaneously. Pathogenesis (clinical signs, lesions), presence of the viruses in tissues, duration and titer of virus shedding for each virus, transmission to contact birds, and seroconversion to both viruses were evaluated. Chickens co-infected with a lentogen NDV vaccine strain (LaSota) and a LPAIV (H7N2) responded similarly to infection as chickens infected with the viruses given separately. In turkeys, infection with the LPAIV interfered with the NDV infection, especially if given first. Interestingly, chickens inoculated with a more virulent NDV virus (a mesogenic strain, Pigeon/84) were refractory to infection with a HPAIV (H5N2) if given three days after NDV infection (at the peak of virus replication in tissues). Similarly, previous infection of domestic ducks with a velogenic NDV or a LPAIV (H7N8) interfered with infection with the other virus. In conclusion, previous or simultaneous infection of NDV and AIV can affect the replication dynamics and the disease caused by these viruses in poultry. The information obtained from these studies helps in understanding the interaction of these viruses in the field and improves the diagnosis of these viruses.
EXPERIMENTAL INFECTION OF HOLSTEIN CALVES WITH EPIZOOTIC HEMORRHAGIC DISEASE VIRUS SEROTYPE 7: A PRELIMINARY STUDY USING A VARIETY OF INOCULATION ROUTES

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Infection of cattle with epizootic hemorrhagic disease (EHD) viruses (EHDV) is frequently subclinical but reports of EHD in cattle have increased in recent years. In 2006, a widespread EHDV-7 epizootic caused disease and economic loss in the Israeli dairy industry. EHDV-7 is exotic to North America, but previous studies show that white-tailed deer are potential hosts and Culicoides sonorensis, a North American vector of EHDV, is a competent vector. Our primary objective was to infect cattle with EHDV-7 and attempt to replicate disease observed in Israel. A sub-objective was to evaluate cattle with low titer viremia (<102.3 TCID50/ml) as a source of virus to feeding C. sonorensis. Seven, two-month-old Holstein calves were used. The virus was provided by the Institute for Animal Health, Pirbright Laboratory and was originally isolated from a cow in Israel. Three inoculation methods were used (two calves/method): group 1, baby hamster kidney (BHK) cell culture supernatant by intradermal (ID) and subcutaneous (SC) injection (1.5 ml/route; 107.12 TCID50); group 2: BHK supernatant by ID, SC, and intravenous (IV) injection (0.67 ml/route; 107.12 TCID50); and group 3: transmission by laboratory infected C. sonorensis. A negative control received non-infected BHK supernatant similar to group 2. Animals were monitored daily and blood collected on 0, 3, 5, 7, 10, 13, and 18 days post infection (dpi) for virus isolation and titration, serology, and complete blood count. On dpi 18, C. sonorensis were fed on four calves and processed in pools of five for virus isolation 10 days post feeding. All calves had detectable viremia by 3 dpi through 18 dpi (end of study). Peak viremia occurred 7-10 dpi (102.63-103.5 TCID50/ml). No differences in virus kinetics were observed between inoculation groups. Calves seroconverted by 10 dpi. Group 2 calves developed a transient fever (103.9 and 104.7 °F) on 1dpi and again 5-9 dpi (103.3-104.4 °F). No other clinical abnormalities were observed. Midges were fed on four calves on 18 dpi (viremia <102.3 TCID50/ml). None of the 124 midge pools processed were positive by virus isolation. This study demonstrates US-origin cattle are susceptible to
infection with EHDV-7 by multiple inoculation methods; however, similar to other studies, overt disease consistent with field reports was not replicated experimentally. Midges that fed on calves with low-titer viremia did not become infected; however, only 620 midges were processed, so these animals should not be excluded as a potential source of virus to biting midges.
HEPATIC ENCEPHALOMYELOPATHY IN TEN GOAT KIDS ASSOCIATED WITH CONGENITAL PORTOSYSTEMIC SHUNTING (CPSS)

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Ten goat kids (two live and eight dead) of various breeds, ages between one and a half and five months, and a body mass ranging from 3.67 to 18 kg were submitted for necropsy at the California Animal Health and Food Safety Laboratory System (CAHFS), or the Veterinary Medical Teaching Hospital (VMTH), School of Veterinary Medicine, University of California, Davis between 1999 and 2011. The history included two or more of the following clinical signs: ataxia, circling, blindness, seizures, teeth grinding, opisthotonus, paddling, general weakness, and ill thrift. Results of serum bile acids test from two animals were 134 and 209 μmol/l (reference intervals: 0-50 μmol/l). Gross necropsy revealed that animals were in poor to fair body conditions and had minimal fat reserve. Liver weights from three animals were 76 g (2% of the body weight), 280 g (1.8%), and 300 g (1.9%). Histologically, in all animals there was bilateral and symmetric spongy degeneration throughout the cerebrum, midbrain, cerebellum, brainstem, and spinal cord, more prominently at the white/grey matter junction. In three goats, proliferation of Alzheimer type II astrocytes were noted in the cerebral cortex and adjacent cerebral white matter. Histological lesions in the liver of these animals included atrophy of the hepatic parenchyma, small hepatocytes, increased numbers of arteriolar profiles, oval cell hyperplasia, and hypoplasia or absence of portal veins, and were consistent with congenital portosystemic shunting (cPSS). The clinical and pathological findings in all ten goats were consistent with hepatic encephalopathy. Spongy degeneration of the CNS in these cases resulted from liver failure due to cPSS. cPSS should be considered in the differential diagnosis of young goats with a history of weakness, ill thrift, and neurological signs.
IDENTIFICATION OF LYMPHOPROLIFERATIVE DISEASE VIRUS IN WILD TURKEYS (*MELEAGRIS GALLOPAVO*) IN THE UNITED STATES

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Viral-associated lymphoproliferative neoplasia in domestic poultry is caused by infection with a herpesvirus (Marek’s disease virus) or three species of retroviruses [Reticuloendotheliosis virus (REV), avian leukemia/sarcoma virus, and lymphoproliferative disease virus (LPDV)]. Previously, retroviral neoplasms reported in wild upland game birds in the US have typically been associated with REV infection. Since 2009, LPDV, a virus previously believed to be exotic to the US, has been identified in ten wild turkeys (*Meleagris gallopavo*) submitted to the Southeastern Cooperative Wildlife Disease Study for diagnostic examination. These birds were collected in six states, including West Virginia (n=5), North Carolina (n=1), Missouri (n=1), Georgia (n=1), and Arkansas (n=1). Infected turkeys were found dead or in moribund condition. Proviral sequences of LPDV were detected in various tissue samples from each turkey using PCR targeting a portion of the gag gene. Based on gross and microscopic lesions, lymphoproliferative disease associated with LPDV infection was determined to be the primary cause of mortality in five of the turkeys, with proliferating mononuclear cells identified in various visceral organs and tissues, including skin, intestines, liver, kidneys, spleen, pancreas, lungs, adrenal glands, skeletal muscle, esophagus, heart, and air sacs. Other primary causes of morbidity and/or mortality were determined in the remaining five turkeys. To follow up on these clinical cases, tissues collected from hunter-killed turkeys from multiple states were tested for LPDV, as described above, and additional positive turkeys were identified in Colorado (n=1) and South Carolina (n=36). Genetic comparisons of sequences obtained from tissues from all LPDV-positive turkeys demonstrated a high level of diversity, with nucleotide divergence ranging up to 15%. Notably, phylogenetic analysis of gag sequences from a subset of turkeys from South Carolina were shown to cluster independently from all other North American LPDV strains and formed a monophyletic group with the prototype Israeli strain, suggesting these viruses may represent an evolutionary bridge between the Old and New World viruses. The cases reported herein are novel as they represent the first reports of LPDV infection in wild turkeys and the first identification of LPDV in North America. Current research efforts are underway to better understand the epidemiology, natural history, and significance of this virus to
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wild and domestic galliforms, including 1) active surveillance of hunter-killed turkeys; 2) genetic characterization of North American strains; 3) experimental challenge studies in domestic turkeys; and 4) evaluation of LPDV replication in cell culture systems.
MODIFICATION OF THE USDA H5 RRT-PCR ASSAY FOR DETECTION OF H5N2 LOW PATHOGENIC AVIAN INFLUENZA VIRUSES OF MEXICAN LINEAGE

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Narrative: The fifth and final stage of assay validation as outlined by the World Organization for Animal Health (OIE) is the monitoring and maintenance of validation criteria, which includes evaluating the specificity of primers and probes for new lineages of viruses as well as mutations that have occurred due to genetic drift or shift and errors in RNA synthesis. The current United States Department of Agriculture (USDA) official H5 avian influenza (AI) real-time polymerase chain reaction (rRT-PCR) assay has been used for the detection of low pathogenic (LP) and highly pathogenic H5 AI in commercial, live bird market, and backyard poultry, as well as wild bird surveillance, since 2006. The assay is a semi-multiplex method with 2 forward primers, one targeted specifically for detection of European and Asian lineages of H5 and a second targeted to North American (NA) lineages of H5 AI. Assay evaluation and interlaboratory collaboration for harmonization of AI diagnostic tools identified a lineage of LPAI that is not detected by the current USDA H5 rRT-PCR assay. Mutations resulting from immunological pressure from an ongoing vaccination program in the Mexican (MX) poultry industry have resulted in a new lineage of H5 LPAI. Sequence alignments were conducted with H5N2 viruses isolated from poultry in Mexico, as well as NA and Asian H5 AIV for modification of the USDA H5 rRT-PCR assay. In reference to the MX H5 LPAI, the NA forward primer has three mismatches in the middle region of the primer located between nucleotides (nt) eight and 13. The NA probe has four mismatches in the first 12 nucleotides including the first nt while the NA reverse primer does not contain any mismatches with the MX viruses analyzed. A new forward primer and probe have been designed for detection of the MX lineage of H5 and are currently being validated for modification of the USDA H5 rRT-PCR assay. Both the new and old primers and probes are located in the H2 region of the HA gene. Primer and probe specificity was evaluated by single-nucleotide polymorphism analysis with 37 Mexican and 362 American H5 viruses and with H1-H16 subtypes of AI as well as near-neighbor agents. Analytical sensitivity and specificity testing data will be presented.
PATHOGENIC LUNGWORMS IN MAINE MOOSE: NOT *DICTYOCALUS VIVIPARUS*

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**Narrative:** Lungworms (presumably *Dictyocaulus spp.*) along with heavy winter tick (*Dermacentor albipictus*) infestation, have been reported to be associated with mortality in young moose in the Northeastern US. However, the pathogenicity of these lungworms, as well as definitive species identification, has not been well established. In Maine during 2011-12, six cases of young moose with heavy infestations of lungworm were necropsied in our laboratory. Clinical manifestations of lungworm infections in young moose included severe irregular dorso-caudal lobular congestion contrasting with lobular ischemic necrosis, manifesting as a “checkerboard” appearance of the lung lobes. Numerous coiled slender white nematodes, 0.5-1 inch in length, were seen in the airways. Histologic findings in the lungs included severe lobular chronic/active interstitial inflammation, extensive interstitial and peribronchial fibrosis, with partial obliteration of the alveoli. Cut sections of nematodes were visible within the interstitial tissues. Multifocal areas of bronchial mural fibrosis, mucosal hypertrophy and luminal “plugging” were seen. Adjacent lung lobules were either slightly hyperinflated and relatively normal in appearance, or severely and extensively congested within the vascular spaces, with some hemorrhage into the interstitial spaces. These lesions were seen in young moose with high numbers of both attached (feeding) and of unattached winter ticks. To investigate the species of lungworm, we collected lungworm samples from deceased Maine moose obtained as clinical cases or during the legal hunt. Eviscerated lungs were evaluated by pouring saline solution into the trachea, massaging the lungs, and then filtering the recovered saline with muslin. Lungworm adults were visually identified, measured and photographed for morphological identification, and preserved in ethanol or isopropyl for genomic DNA extraction. In some animals, fecal samples were also evaluated for lungworm ova. In order to speciate the lungworms, we developed a PCR assay based on the *Dictyocaulus* ribosomal internal transcribed spacer region 2 (ITS-2). The ITS-2 sequence from three adult worms, collected from two heavily infected Maine moose, were cloned and sequenced. The ITS-2 sequence from these three worms were 99% similar to each other. Compared to other known sequences of *Dictyocaulus spp.* from the NCBI database, the ITS-2 sequences from Maine isolates were closely homologous (92-96%) to *Dictyocaulus eckerti* and to three isolates reported to be found in red deer in New Zealand, but only 77% homologous to *Dictyocaulus viviparous*. Phylogenetic analysis suggests *D. eckerti* and these isolates share a
common ancestor, but *D. eckerti* has since diverged. Based on these preliminary findings, we hypothesize that Maine moose are host to a previously unreported species or subspecies of *Dictyocaulus*, closely related to *Dictyocaulus eckerti*. 
REAL-TIME PCR DETECTION OF HEMOTROPIC MYCOPLASMA SPECIES IN SYMPTOMATIC DAIRY CATTLE FROM THE MIDWEST UNITED STATES

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*Mycoplasma wenyonii,* previously *Eperythrozoon wenyonii,* is a non-culturable hemotropic Mycoplasma that infects cattle. In the United States, *M. wenyonii* has been thought to be of low pathogenicity, and reports of clinical disease are rare. An investigation into this organism was initiated in response to an outbreak of clinical disease in multiple dairy cows exhibiting signs previously reported in cattle infected with *M. wenyonii,* including hindlimb edema and reduced milk production. Blood smears from symptomatic cattle were consistent with *M. wenyonii* infection, however, PCR detection was recommended for confirmation. Several previously published qPCR assays for the detection of two bovine hemoplasma species, *Mycoplasma wenyonii* and *Candidatus Mycoplasma haemobos,* were validated in our laboratory for sensitivity and specificity and utilized to detect these hemotropic Mycoplasma species (Meli et al, 2010, 48(10) pg 3563 Journal of Clinical Microbiology). Serial samples from symptomatic and normal cattle demonstrated a high prevalence with cyclicity of hemoplasma species detection in this herd. Normal and symptomatic cattle demonstrated equally high prevalence of *C. M. haemobos,* and, to our knowledge, this is the first utilization of real time PCR for the detection of *C. M. haemobos* detection in the United States. Symptomatic animals had a higher prevalence of *M. wenyonii* than clinically normal herdmates and tended to be more likely to have dual infections with both *M. wenyonii* and *C. M. haemobos.* This work suggests that *M. wenyonii* can cause persistent infection in US cattle, warranting further investigation into the significance of this disease, including its pathogenesis and ecology. Additionally, we demonstrate the necessity of PCR for the sensitive and accurate detection of non-culturable hemotropic Mycoplasma species for investigational studies and diagnostics.
RECOVERY AND IDENTIFICATION OF *Listeria monocytogenes* DURING ROUTINE BACTERIOLOGY ABORTION SCREEN OF MISSOURI CANINE

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*Listeria monocytogenes* is a Gram-positive motile facultative anaerobe that inhabits a broad ecologic niche. It can be found in meat and vegetables, is a transient inhabitant of the gastrointestinal tract, and is a cause of septicemia, abortion, and central nervous tract infections in both animals and humans. During a recent routine bacteriological abortion screen of three canine tissues (liver, lung, and placenta), heavy growth of small translucent hemolytic colonies was noted in all samples examined. Results from initial bacteriological testing showed these organisms to be Gram-positive, motile, catalase-positive rods. Further phenotypic testing, employing the ThermoFisher-Trek-Sensititer AP90R Gram-positive identification panel identified the organisms as *Listeria monocytogenes*. Such findings were consistent with initial bacteriological findings and while not commonly noted, were consistent with a potential cause of canine abortion. Genotypic characterization of the isolated organisms showed that (i) ~1250 base pairs of the 16S ribosomal RNA genes were 100% identical to those of over thirty *L. monocytogenes* strains in the current GenBank databases; (ii), the 16S-23S rDNA intergenic spacer region exhibited complete identity to multiple *L. monocytogenes* isolates and characteristic differences to the equivalent locus from other taxa of the Listeria genus and (iii), the hly gene, encoding the Listeriolysin O toxin, was identical to other *L. monocytogenes* hly genes. In addition, upon histopathological evaluation, large numbers of bacteria adhered to the placenta and had strongly positive immunoreactivity for Listeria antigen in immunohistochemically-stained sections. Interestingly while *L. monocytogenes* is a known cause of canine abortions, it is not a common finding and while the “picture” presented here appears “classic,” the isolated strain was CAMP-negative and identified by the Biomerieux APIRListeria system as *Listeria innocua*. Additional genotypic characterization of this isolate are currently in progress.
SEROEPIDEMIOLOGY OF EQUINE LEPTOSPIROSIS UTILIZING DIAGNOSTIC LABORATORY SPECIMENS FROM 29 STATES (US) AND ONE CANADIAN PROVINCE

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An epidemiological study was conducted to assess the sero-prevalence of leptospirosis among horses in the US and Ontario, Canada using the microscopic agglutination test (MAT) on residual sera submitted to 30 diagnostic laboratories for Equine Infectious Anemia testing from July, 2010 through April, 2011. All MAT testing was conducted in the University of Kentucky, Veterinary Diagnostic Laboratory serology unit. This facility was selected because of the high volume of MAT tests run annually and the expertise of the technical staff with this method. Of the 1,495 horses tested, 561 (38%) were female, 934 (62%) were males (intact or geldings). There were no significant differences in the prevalence of a positive result between sexes for each serovar. Furthermore, 667 (44.6%) were positive (i.e., titer > 1:200) for at least 1 of 6 serovars. The serovar with the highest seroprevalence was Bratislava (31.6%; n=473) followed by Icterohemorrhagica (14.2%; n=216), Canicola (10.2%; n=153), Grippotyphosa (5.0%; n=75), Pomona (3.6%; n=54), and Hardjo (2.9%; n=44). Odds of seropositivity for some serovars differed by regions and states. Horses that were 6-10 years and > 10 years of age were significantly more likely to be positive for serovar Pomona. Finally, although the odds of being seropositive were greater in some breeds for some serovars, breed was not associated with seropositivity after adjusting for age, region, or both. Other epidemiological findings of this study too extensive to list here also will be presented. It was concluded that equine exposure to potentially pathogenic leptospiral organisms is high throughout the US and Ontario, Canada. Furthermore, this exposure may lead to abortion in mares, clinical disease in horses and foals, and may present a risk of zoonotic disease in farm workers and equine veterinarians. Serovars in vaccines generally are not considered to be cross-protective. Assuming this applies to the horse, regional serovar prevalence differences would have to be taken into consideration in the development and administration of a multivalent vaccine.
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SPECIES SPECIFICITY AND MOLECULAR Typing OF PORCINE AND EQUINE LAWSONIA INTRACELLULARIS ISOLATES *

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Lawsonia intracellularis is the causative agent of proliferative enteropathy (PE), an endemic disease in pigs and an emerging concern in horses. Enterocyte hyperplasia is a common lesion in every case but there are differences regarding clinical and pathological presentations among affected species. The objective of this study was to evaluate the susceptibilities of pigs and horses to L. intracellularis infection using porcine and equine isolates and compare the molecular typing of these and other L. intracellularis isolates. Twelve foals were divided into three groups (n=4/group) and infected with a porcine or an equine isolate and saline solution (control group). An identical experimental design was applied to 18 pigs divided into three groups (n=6/group). The animals were monitored regarding clinical signs, fecal shedding of L. intracellularis and humoral serological response during 56 days postinfection (PI). The variable number tandem repeat (VNTR) profiles of both porcine and equine isolates from this experiment and from three pig herds, 14 horse sites, and various other animal species were determined. Fecal shedding and serologic response were higher and longer in foals infected with the equine isolate compared with foals infected with the porcine isolate or with the negative-control group. One equine-isolate infected foal developed severe clinical signs and was euthanized 24 days PI. Typical lesions and marked presence of Lawsonia antigen was identified by IHC. Similarly, reduced average daily gain and diarrhea were observed in pigs infected with the porcine isolate. Only porcine isolate-infected pigs demonstrated proliferative lesions associated with the presence of specific Lawsonia antigen by IHC. Additionally, these animals showed higher and longer shedding of bacteria in the feces and serologic response compared with equine isolate-infected pigs. The VNTR typing profiles were conserved within outbreaks in horse and pig farms and slight variations were observed between porcine and equine isolates from different geographic locations. Moderate variation in VNTR types were found between isolates from horse and other animal species, with the most marked differences were found compared to pig isolates. Marked clinical signs, longer periods of bacterial shedding and stronger immune responses were observed in animals infected with speciesspecific isolates supporting our hypothesis that host susceptibilities can be driven by the origin of the bacterial isolate. The molecular typing results will further enhance our understanding of the transmission dynamics and epidemiology of PE within
and between host species. Currently, the whole genome sequencing of the porcine and equine isolates used is being conducted in order to associate these phenotypic characteristics with potential genomic variations.
TAQMAN REAL-TIME PCR ASSAY FOR THE DIRECT DETECTION OF CAMPYLOBACTER FETUS SUBSP. VENEREALIS FROM INPOUCHTM TF

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Bovine genital campylobacteriosis, caused by Campylobacter fetus subsp. venerealis (CFV), is a highly contagious sexually transmissible disease. Infection with this agent may lead to serious reproductive problems including sterility and abortion. Bovine genital campylobacteriosis is listed as category B notifiable disease in OIE, and is considered to have significant economic and public health implications, particularly with respect to the international trade of animals and animal products. Quick and sensitive identification of this agent is becoming very important to the cattle industries worldwide. Culture is normally a routine identification method for CFV, however, it is limited by several factors, such as medium selection, transport time from sampling to processing and growth conditions. In addition, the differentiation between CFV and Campylobacter fetus subsp. fetus (CFF) by culture still remains challenging. The objective of the present study was to develop a rapid, sensitive, and specific diagnostic test for the direct detection and identification of Campylobacter fetus subsp. venerealis using the InpouchTM TF system (Biomed Diagnostics) used for Trichomonas foetus collection. Using the same InpouchTM TF to directly detect both Trichomonas foetus and CFV will save money, time, and labor. A unique set of primers and a TaqMan probe for Campylobacter fetus subsp. venerealis specific PCR assay were designed from insertion sequence ISCfe1, tnpA gene, tnpB gene, metT gene, and smtA gene of CFV referenced Genbank database. The real time PCR (qPCR) assay was developed, optimized and its performance was evaluated by comparing with the conventional PCR (Hum et al., Aust. Vet. J. 1997). Limit of detection of the qPCR assay was found to be ~ 587 copies. The genomic DNAs from a total of 510 InpouchTM TF preputial wash specimens were extracted using the Kingfisher 96 MagMax nucleic acid extraction kit (Ambion). One hundred twenty specimens were found to be CFV positive by the qPCR assay. Fifty-one samples were then selected for sequencing in order to confirm the specificity of the qPCR assay. Sequencing results confirmed all samples as Campylobacter fetus subsp. venerealis. In addition, no cross-reactivity was found with forty-two close related bacterial pathogens as no amplification occurred with the genomic DNAs from these bacteria. In conclusion, the TaqMan real-time PCR method and direct DNA extraction from InpouchTM TF prepuceal wash
samples provides a rapid, reliable, and sensitive tool for direct detection of *Campylobacter fetus* subsp. *venerealis* from clinical samples.
II. C. 2. PAPERS AND ABSTRACTS

THE COMBINATION OF ABUNDANCE AND INFECTION RATES OF CULICOIDES SONORENSIS ESTIMATES RISK OF SUBSEQUENT BLUETONGUE VIRUS INFECTION OF SENTINEL CATTLE ON CALIFORNIA DAIRY FARMS

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Bluetongue virus (BTV) is the causative agent of bluetongue (BT), an OIE reportable and re-emerging arboviral disease of ruminants that is transmitted by various species of Culicoides midges (gnats). Twenty-four (likely 26) serotypes of BTV are recognized globally, four (serotypes 10, 11, 13, 17) of which are endemic in much of the western United States (US). Since 1998, ten previously exotic serotypes have been isolated in the southeastern US and eight novel serotypes of BTV invaded and spread throughout extensive portions of Europe and the Mediterranean Basin precipitating an economically devastating epidemic. One especially disconcerting aspect of this expansion of BTV into Europe included the emergence of several apparently new Palearctic vector species. Climate change has been implicated as the cause of this dramatic global event because of its potential impact on the vectorial capacity of populations of Culicoides midges. Given recent changes in the global distribution of BTV infection, we initiated an epidemiological study of BTV infection in California. The objective of the current study was to evaluate the interaction of population dynamics of C. sonorensis midges with the seasonal occurrence of BTV infection of cattle at individual dairy farms in the northern Central Valley of California. Specifically, we determined the seasonal patterns of abundance and infection rates of vector C. sonorensis midges at each farm, as estimated using different insect trapping methods (CO2 baited traps equipped with and without UV light, and mechanical aspiration directly from cows using a modified hand-held household vacuum). Further, we determined the serotypes of BTV present at each farm using a sensitive quantitative reverse-transcriptase polymerase chain reaction (RT-qPCR) assay for both midges and sentinel cattle. Evaluation of midges for BTV infection rates indicated the number of serotypes circulating differed markedly among the individual farms. More serotypes of BTV were present in midges than in sentinel cattle at individual farms where BTV circulated, and the virus was detected at each farm in midges prior to detection in cattle. BTV infection rates were remarkably lower amongst female C. sonorensis midges collected by CO2 traps with UV light than among midges collected by the other trapping methods. BTV infection rates of C. sonorensis midges that were detected earlier in the season than sentinel cattle in addition to the plurality of serotypes on individual dairy farms suggests that the midge vector
constitutes a reservoir of genetically divergent BTVs that potentially sustain the virus in seasonally endemic areas. The data suggests infection prevalence may be misrepresented when UV light traps alone, a method most often used in routine vector (C. sonorensis) surveillance. In summary, findings from this study confirm the importance of using sensitive surveillance methods for both midge collection and virus detection.
THE ROLE OF ENTERIC VIRUSES IN LIGHT TURKEY SYNDROME

Devi P. Patnayak
Veterinary Population Medicine, Veterinary Diagnostic Laboratory, University of Minnesota, St. Paul, MN

Turkey flocks with Light Turkey Syndrome (LTS) are described as having market age turkeys that are lower in body weight than the standard breed characteristics. Two studies were conducted to determine the possible role of enteric viruses in LTS. For surveillance study, fecal samples were collected at 2, 3, 5 and 8 weeks of age from four LTS and two non-LTS turkey flocks in Minnesota. Of the 80 pools from LTS flocks, 40 (50%) were positive for astrovirus type 2 while rotavirus was detected in 6 (7.5%) pools. In addition, 11 pools (13.8%) contained a combination of astrovirus and rotavirus while 1 pool (1.2%) had mixed infection with astrovirus and reovirus. In the experimental study, 2-week-old turkey poults were divided into groups A and B with 35 poults in each. Poults in group A were inoculated orally with a 10% fecal suspension from LTS flocks while phosphate buffered saline (PBS) was given to group B poults. Birds in both groups were monitored for clinical signs, feed consumption and shedding of enteric viruses. Birds in group A shed astrovirus, rotavirus and reovirus in their droppings until nine weeks of age. Birds in group B (the control group) shed only astrovirus and not rota- or reovirus. After nine weeks of age, most of the birds in both groups were virus negative. Significantly lower weight gain was seen in experimental group A birds at seven weeks of age and this lower weight gain continued until 20 weeks of age. Feed consumption was also lower in this group than in the control group. These findings suggest that viral enteritis at an early age may set up conditions for the development of light turkey syndrome in adult turkeys.
L. intracellularis is an obligate intracellular bacterium and causative agent of porcine proliferative enteropathy. Clinical disease has been reproduced using pure cultures after up to 13 passages in cell culture. Nonpathogenic strains have been obtained through multiple passages; however, there is no information regarding the number of passages necessary to attenuate a pathogenic isolate. The present study evaluated the susceptibility of pigs to L. intracellularis after 10, 20 and 40 passages in vitro. The whole genome sequencing of a pathogenic isolate (passage 10) was compared with the homologous non-pathogenic isolate (passage 60). Twenty four 3-week-old pigs were divided into four groups (n=6/group). Three groups were infected with a pure culture of L. intracellularis on passage 10, 20 or 40 and one group with placebo. Regardless of cell passage, the challenge doses were standardized to 10^9 bacterial organisms per pig. The animals were monitored for clinical signs, fecal shedding and serological response during 28 days post-inoculation (PI). Two animals from each group were euthanized on days 14, 21 and 28 PI. The levels of infection were graded by immunohistochemistry (IHC) based on the amount of positive labeled antigen in the intestinal epithelium. The whole genome of this isolate was sequenced using high-throughput IlluminaR technology. The genome comparisons between L. intracellularis isolate on passages 10 and 60 were performed using SequencherR 5.0 and TabletR software. This bioinformatics tools allowed the visualization of genomic variations present in the bacterial chromosome and its three plasmids. Animals infected with passages 10 and 20 demonstrated proliferative lesions associated with the presence of Lawsonia-specific antigen in the intestinal epithelium. Passage 40-infected pigs did not show proliferative lesions or presence of Lawsonia-antigen at any time point. There was no significant difference in the magnitude and duration of fecal shedding between animals infected with Lawsonia-antigen at any time point. However, a significant (p<0.05) lower amount and much shorter period of L. intracellularis DNA shedding was identified in the feces of pigs infected with passage 40. Additionally, serological IgG responses were observed in passages 10 and 20-infected but not in passage 40-infected animals. Based on these results, complete attenuation was observed to occur between 20 and 40 cell passages in vitro. We believe this information will be valuable for future experimental models and for studying the mechanisms involved in the attenuation of L. intracellularis virulence. The comparative wide genome
II. C. 2. PAPERS AND ABSTRACTS

analysis showed a deletion of 18,088 bp in the non-pathogenic homologous
*L. intracellularis* isolate passed 60 times in vitro. This region comprises 15
protein encoded genes including prophage DLP12 integrase. The
identification of immunogenic proteins encoded within this region may be
useful for differentiation of infected and vaccinated animals.
II. D. USAHA Membership Meetings
II. D. USAHA MEMBERSHIP MEETINGS

USAHA MEMBERSHIP LUNCHEON AND MEETING
MONDAY, OCTOBER 22, 2012
David T. Marshall, Presiding

Sponsor’s Welcome was provided by Steve Parker, Merial Ltd.

Treasurer’s Report
Annette Jones

While the United States Animal Health Association continues to operate on a sound financial basis, we did finish the 2011-12 fiscal year $43,046 over budget with a net loss of $10,029. These figures reflect the larger economic picture the nation has been facing and were absorbed using our reserve. It is important to note that the significant contributing factors to our financial condition are: lower than anticipated interest income due to low interest rates (~$10,000), lower than anticipated annual meeting registration and membership revenues (~$20,000), and no opportunity to host a symposium (~$20,000 budgeted revenue). Association management was able to proactively reduce any discretionary funding to close the year about $7,000 under our operating budget.

During fiscal year 2012, the Association earned $15,477 in interest which was reinvested into CD and Money Market reserve positions. The Association’s net worth on June 30, 2012 was $1,204,234.

The audit committee met Sunday October 21, 2012, reviewed the fiscal year 2012 Statement of Financial Position and complete audit, and found that all financial affairs of the Association are in order.

State of the Association
David T. Marshall

The following summarizes highlights of 2011-2012 activities of USAHA.

- Supported AAVLD in their NAHLN advocacy efforts through individual member letter writing and education and outreach
- Continued fostering student membership partnership with Center for Public and Corporate Veterinary Medicine (CPCVM)
  - Continued financial support for administrative coordination
  - Through AAVLD funding, assisted administering scholarships for 12 students to attend the annual meeting
    - 1 NEUSAHA and 1 WSLHA included in that – direct district support
  - Hosted a luncheon in Greensboro for 24 student annual meeting attendees
  - Currently establishing state liaison list with veterinary schools
  - Approved Power Point presentation for general outreach use
II. D. USAHA MEMBERSHIP MEETINGS

- Approved and supported USAHA Executive Director Ben Richey in serving on the AAVLD’s inaugural Executive Director search committee
- Assisted in the performance of the full five year comprehensive audit of the association’s finances
- Successful Government Relations Committee meeting in Washington, D.C. in March, with 25 attendees meeting and discussing issues with USDA –APHIS-VS, NVSL, NIFA, DHS, FDA-CVM, USDA-ARS, USDA-FSIS, AVMA, AAVMC, and the Animal Agriculture Coalition
- Reviewed and approved two new allied organization members to put forth for membership approval:
  - Professional Rodeo Cowboys Association
  - National Association of State Public Health Veterinarians
- Established two administrative policies for USAHA to assist in maintaining organizational integrity and meeting relevancy for the future:
  - Complimentary Committee Speaker Policy, offering travel support on a limited basis
  - Student Membership policy update, to limit the designation to full-time university students.
- Engaged and collaborated with AAVLD and with NEUSAHA members to evaluate and enter into negotiations with Providence, Rhode Island as a Northeast annual meeting site for 2015, overcoming significant regionally specific rate and per diem challenges and to maintain consistency with our By-Laws
- Through committee and executive committee input, provided direction, position statements, standalone letters, advocacy support, or a decision for no action on the following issues:
  - The Council of State and Territorial Epidemiologist’s position statement on Brucella canis
  - The International Elephant Foundation’s (IEF) concerns with the Committee on Tuberculosis’ “Guidelines for the Control of TB in Elephants”
  - Signatory support of an Animal Agriculture Coalition letter for inclusion of funding for the Minor Use Animal Drug Program (MUADP) in the Farm bill
  - Legislation to establish a Foundation for Food and Agricultural Research (FFAR) to support USDA’s Research, Education, and Economics mission area
  - Letter of support for inclusion of specific line item funding for the NAHNL in the Farm Bill
  - Letter to APHIS-VS requesting their advocacy to EPA on behalf of our members to secure a Section 18 exemption for the use of citric acid as an approved disinfectant for FMDv response
- Evaluated and approved merging the USAHA Committee on Food and Feed Safety with the AAVLD’s Food Safety Committee (effective 2013)
II. D. USAHA MEMBERSHIP MEETINGS

- With the process of creating digital proceedings completed, moved to expend funds to rebind the proceedings to establish a complete set of hardbound copies for the USAHA archives
- President Marshall reviewed and provided formal comments on the National Research Council’s draft NBAF assessment document, “An Analysis of the Requirements and Alternatives for Foreign Animal and Zoonotic Disease Research and Diagnostic Laboratory Capabilities”
- Inauguration of a social media presence for the organization through the launching of Facebook and Twitter accounts
- Appointed Chairs or Vice Chairs to fill vacancies on the Aquaculture, Wildlife Diseases, Biologics and Biotechnology, and Captive Wildlife and Alternative Livestock committees
- Continued exploring and expanding relationships with Public Health partner organizations
  - Direct membership recruitment of the Council of State and Territorial Epidemiologists (CSTE) (ongoing) and the National Association of State Public Health Veterinarians (NASPHV) (successful)
  - 3rd VP Dr. David Schmitt represented the organization at the NASPHV meeting in June in Omaha
- USAHA Representation on other efforts
  - Dr. John Ragan appointed as USAHA liaison and member of the FDA’s Partnership for Food Protection committee
  - Recommended representatives for inclusion on the ARS Research Review Panel
  - Nomination of Dr. Annette Jones (Whiteford) to a position on the USDA Secretary’s Advisory Committee on Animal Health (pending)
  - Appointed Dr. Aaron Hecht, Kentucky, from the Committee on Wildlife Diseases as a USAHA representative to the USDOI Fish and wildlife Service’s White Nose Syndrome Stakeholder Committee
Report of the Committee on Nominations
Steven L. Halstead

The action of the Report of the Committee on Nominations will take place at 2:05 p.m., on October 24, 2012, during the Membership Meeting.

The 2012-2013 Nominations are:

OFFICERS
PRESIDENT............................................. David L. Meeker, Alexandria, VA
PRESIDENT-ELECT................................. Stephen K. Crawford, Concord, NH
FIRST VICE-PRESIDENT......................... Bruce L. King, Salt Lake City, UT
SECOND VICE-PRESIDENT....................... David D. Schmitt, Des Moines, IA
THIRD VICE-PRESIDENT...........................Boyd H. Parr, Columbia, SC
TREASURER.............................................Annette M. Jones, Sacramento, CA

DISTRICT DELEGATES
NORTHEAST..........S. “Buzz” Klopp, Delaware; Ernest W. Zirkle, New Jersey
NORTH CENTRAL..............Velmar Green, Michigan; Howard Hill, Iowa
SOUTH.....................L. “Gene” Lollis, Florida; A. Gregario Rosales, Alabama
WEST......................Bill Sauble, New Mexico; H. M. Richards, III, Hawaii

The following committee chairs were recognized for their service:

- Charles Brown, II - Committee on Import-Export, 2006-2012
- Stephen Schmitt - USAHA Committee on Wildlife Diseases, 2009-2011
- Andrew Goodwin - USAHA/AAVLD Committee on Aquaculture, 2008-2011
- Michele Miller - USAHA Committee on Captive Wildlife and Alternative Livestock, 2008-2012
II. D. USAHA MEMBERSHIP MEETINGS

USAHA MEMBERSHIP MEETING
WEDNESDAY, OCTOBER 24, 2012
David T. Marshall, Presiding

Report of the Action of the Committee on Nominations
Steven L. Halstead

OFFICERS
PRESIDENT........................................... David L. Meeker, Alexandria, VA
PRESIDENT-ELECT................................. Stephen K. Crawford, Concord, NH
FIRST VICE-PRESIDENT............................. Bruce L. King, Salt Lake City, UT
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WEST..................Bill Sauble, New Mexico; H. M. Richards, III, Hawaii

Whereas a motion to approve the nominations was made, seconded and approved without dissent.

Passing the Presidential Gavel

David T. Marshall
President’s Address
David Meeker

(as read by Dr. David Marshall, with regrets from Dr. Meeker for not being able to attend due to conflicts with National Renderer’s Association Meeting)

My interests in and for USAHA should not and will not change USAHA or its leadership approach this coming year. I follow a series of strong and talented people who have served as president and on the EC. Every single one I have known on the EC since Jim Leafstedt (and I’m sure many more before I was on the EC), and those of you that joined the EC since, have been excellent at advancing the professionalism of USAHA leadership and dedicated to the mission of USAHA [my inner hope is simply that I don’t mess up something that has worked so well]. The fact that USAHA has a structure, through leadership foresight many years ago, to seamlessly include industry input throughout the committee and policy making activities and even leadership is demonstrated visibly by my election. This commitment to stakeholders (or “regulated industries”) is unusual among organizations—USAHA is unique with this level of inclusion.

The major commodity groups are under fire politically from activist groups, producers have serious economic challenges, and research and infrastructure support for animal health programs are severely underfunded. These are the underpinnings of our Monday morning session at the convention, but are also some of the reasons, along with commodity industry consolidations, why industry involvement at our meetings has changed and attendance from that sector has seemingly waned. I think we have made good progress with the most recent long range strategic plan in most areas. However, we need to keep thinking of new ways to engage industry so the long tradition of inclusion continues.

I will continue to give this some thought. I very much regret missing two and a half days of the meetings and the first Executive Committee (EC) meeting of my presidency. However, the EC and the entire organization will be at the forefront of my thinking all year, and will be very high on my priority list. Except for three days this October and next October, my employers have given me great schedule flexibility and a high level of support for my USAHA duties. I will do my best to attend each regional meeting this year, and attend every monthly EC conference call.

I’m honored to serve in such a great organization, and with such dedicated and talented EC members.
II. D. USAHA MEMBERSHIP MEETINGS

Recognition of Immediate Past President
Steven L. Halstead

Dr. Steven Halstead presents Dr. David Marshall with a plaque honoring him for his service over the past year as president of USAHA.

Executive Director’s Report
Benjamin D. Richey

Greetings to each of you as we near the close of this 116th Annual Meeting of USAHA. This point in the meeting always brings a sense of accomplishment for me, and also a level of excitement knowing that we will carry forward the work that has taken place over the past week. I am pleased to be in my sixth year with USAHA, it is an honor to work for each of you.

I am happy to report a very well run meeting this year. There are always hiccups, but overall we are very happy with the quality of the program and
proceedings this year. As travel budgets dwindle, we continue to see strong interest in the work of USAHA and I think that speaks to the importance that this organization. Total attendance for this year has surpassed 1,150, an increase from last year.

This meeting would not be successful without the dedicated work of Kelly and Linda, so let us take a moment to express our thanks to them.

I want to again thank Kim Sprout for her hard work over the last week, in preparation and processing of the resolutions and reports. And finally one person who works without fail to compile the daily news alerts, Karen Conyngham.

I want to express my gratitude to Dr. Marshall for his leadership, attention to detail, and unwavering commitment to USAHA – and in particular this meeting. You have been an excellent host and leader.

I look forward to the coming year with Dr. Meeker at the helm, and despite his conflict this week, he is dedicated to the coming year and assures me he will give his full attention to USAHA.

To the Executive Committee as a whole, I can’t think of a better set of bosses to work for – and more importantly, with. For this I am blessed.

The coming year brings a new horizon in our relationship with AAVLD, and I look forward to having a counterpart there in their new Executive Director. I hope that addition becomes a benefit to both organizations.

We will continue our work next week back in Saint Joseph. But I remind each of you that though we go our separate ways, I will proudly carry forward the work of the Association that has taken place this week. I thank each committee – and the chairs for all their hard work that make USAHA what it is.

I ask you to look for the meeting survey in the coming weeks, please give us your feedback on this meeting. New ideas are welcome – the good one’s we’ll try to implement. And as always Kelly and I are available to assist with any needs you may have throughout the year. Thank you.

Report of the Committee on Nominations and Resolutions*

Steven L. Halstead

The Report of the Committee on Resolutions is approved by consent calendar. Chair Halsted reported a total of 36 resolutions submitted by Committees for 2012. Halstead read through each resolution as reviewed by the Committee. The following resolutions were recommended to be combined by the Committee:

- 1 and 25
- 4, 8 and 33
- 6 and 11
- 7 and 18
- 9, 26 and 30
II. D. USAHA MEMBERSHIP MEETINGS

- 10 and 34
- 13 and 23
- 15 and 22
- 31 and 35
- 32 and 36.

Each combination was moved and seconded, and approved by the membership.

The following resolutions were held for review, with action indicated:

- Resolution 12 – Motion to disapprove and follow through as recommendation as outlined by the Committee on Livestock Identification; Motion approved
- Resolution 13 – Approved
- Resolution 15 and 22 Combined – Approved as Amended
- Resolution 21 – Approved
- Resolution 32 and 36 Combined – Approved as Amended.

All other resolutions were approved by consent calendar by the Membership.

*The full report of the Committee on Nominations and Resolutions is included in these proceedings, Section II. E.*
II. E. REPORTS OF THE COMMITTEES
REPORT OF THE USAHA/AAVLD COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT

Co-Chairs: Marilyn Simunich, ID
Nick Striegel, CO

John Adams, VA; Bruce Akey, NY; Gary Anderson, KS; Joan Arnoldi, WI; Tom Baker, CAN; Deanna Baldwin, MD; Karen Beck, NC; Tammy Beckham, TX; Lisa Becton, IA; Melissa Berquist, TX; Danelle Bickett-Weddle, IA; Patricia Blanchard, CA; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Gary Brickler, CA; Peggy Brinkman, IA; Charlie Broadus, VA; William Brown, KS; Heather C. F. Case, IL; Gregory Christy, FL; Neville Clarke, TX; Leslie Cole, OK; Stephen Crawford, NH; Tarrie Crnic, KS; Debbie Cunningham, OK; Glenda Davis, AZ; Leah Dorman, OH; Brandon Doss, AR; Cheryl Eia, IL; Leonard Eldridge, WA; Dee Ellis, TX; Francois Elvinger, VA; Betsy Flores, VA; Dave Fly, NM; James Foppoli, HI; Rose Foster, MO; W. Kent Fowler, CA; Mallory Gaines, DC; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Linda Glaser, MN; Sue Goetz, WI; Stephen Goldsmith, VA; Timothy Goldsmith, MN; Kristin Haas, VT; Jeffrey Hamer, PA; Greg Hawkins, TX; Burke Healey, CO; Carl Heckendorf, CO; Jan Hershenhouse, CA; Donald Hoenig, ME; Floyd Horn, MD; Dudley Hoskins, DC; Holly Hughes-Garza, TX; Pamela Hullinger, CA; Carla Huston, MS; Annette Jones, CA; Karen Jordan, NC; Thomas Kasari, CO; Patrice Klein, MD; Anthony Knight, CO; Paul Kohrs, WA; Charlotte Krugler, SC; Michael Langford, NY; Elizabeth Lautner, IA; Randall Levings, MD; Tsang Long Lin, IN; Mary Lis, CT; Eric Liska, MT; Frank Liu, MN; Francine Lord, CAN; Barbara Martin, IA; Sarah Mason, NC; Chuck Massengill, MO; Paul McGraw, WI; David Meeker, VA; Jessica Meisinger, VA; Samia Metwally, NY; Gay Miller, IL; Janice Mogan, IA; Alfred Montgomery, MD; Lee Myers, GA; Cheryl Nelson, KY; Sandra Norman, IN; Dustin Oedekoven, SD; Kenneth Olson, IL; Stephanie Ostrowski, CA; Kristy Paboliona, CO; Elizabeth Parker, ITA; Roger Parker, TX; William Parker, GA; Boyd Parr, SC; Ben Pendergrass, DC; Jewell Plumley, WV; Jeanne Rankin, MT; Tom Ray, NC; Renate Reimschuessel, MD; M. Gatz Riddell, Jr., AL; Kay Riddell, AL; Paul Rodgers, WV; Keith Roehr, CO; James Roth, IA; John Rowden, CA; Mo Salman, CO; John Sanders, WV; A. David Scarfe, IL; Mark Shearer, IA; Jack Shere, NC; Gary Sherman, DC; Kathryn Simmons, DC; David Smith, NY; Julia Smith, VT; Harry Snelson, NC; Rosemary Speers, VA; Diane Stacy, LA; Mike Starkey, MN; Katie Steneroden, CO; Darrel Styles, MD; Manoel Tamassia, NJ; R. Flint Taylor, NM; Todd Tedrow, SD; David Thain, NV; Belinda Thompson, NY; Jimmy Tickel, NC; Peter Timoney, KY; Jesse Vollmer, ND; Liz Wagstrom, DC; Patrick Webb, IA; Steve Weber, CO; Randy Wheeler, IA; Brad Williams, TX; John Williams, MD; Ellen Wilson, CA; Taylor Woods, MO; Gwen Zellen, CAN.

The Committee met on Saturday, October 20, 2012, at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 8:00 a.m. to 2:15 p.m. There were 70 members and 77 guests present. At the beginning of the
meeting, it was announced that Dr. Marilyn Simunich had completed five years of Co-Chair service and a search is on-going for an AAVLD member to take the Co-Chair position. Members were asked to review the mission statement printed on the agenda. Responses to 2011 resolutions were reviewed. Thirteen presentations were heard, one of which was a time-specific paper.

**Time Specific Paper**

Dr. Darrell Trampel - Professor, Veterinary Diagnostic and Production Animal Medicine, Iowa State University presented a time-specific paper on the Secure Turkey Supply Plan: Preparations for an Outbreak of Highly Pathogenic Avian Influenza. The paper, in its entirety, is included at the end of this report.

**Presentations**

**USDA-APHIS-VS Emergency Management and Diagnostics Programs Update**

Jon Zack

USDA-APHIS, Veterinary Services (VS), National Center for Animal Health Emergency Management (NCAHEM)

This presentation will provide the member of the Committee on Animal Health Emergency Management (CAEM) with an update on the activities of the Emergency Management and Diagnostics unit during fiscal year 2012. These activities include the release of many new and revised Foreign Animal Disease Preparedness and Response Plan (FAD PReP) documents; in particular, two new APHIS Foreign Animal Disease Frameworks; a revised version of the foot-and-mouth disease (FMD) Red Book; and the release of easy to read, accessible, and succinct ready reference guides that responders could quickly review. These ready reference guides cover topics ranging from the FMD Response Plan to FMD Vaccination Strategies and Movement Control. Further, in FY2012 the National Veterinary Stockpile (NVS) published its Logistics Catalog in order to provide details of NVS countermeasures to State and Tribal NVS planners on the NVS restricted website. The NVS also continues to reach out to stakeholders to assist with logistics readiness and response capabilities. In September 2012, the NVS partnered with the State of Colorado and tribal officials from the Southern Ute and the Ute Mountain Ute Tribe to conduct a full-scale logistics exercise in Brighton, CO. The exercise focused on the *Colorado National Veterinary Stockpile and Agricultural Logistics Plan* which includes logistics processes for the Southern Ute Indian Tribe and the Ute Mountain Ute Tribe within Colorado. The exercise provided a venue for the State of Colorado and tribal leaders to collaborate on emergency response requirements.

With the ongoing Veterinary Services reorganization, the Emergency Management functions currently under the responsibility of Emergency Management and Diagnostics (EM&D) will be integrated into the
Surveillance, Preparedness, and Response (SPR) unit while the Diagnostics functions will be integrated into the Science, Technology, and Analysis (STA) unit. SPR will provide planning, policy, program, regulatory oversight and implementation for VS surveillance, preparedness, and response activities in an integrated structure focused on safeguarding US animal health. SPR’s mission responsibilities will include management of the National Veterinary Stockpile, the interagency coordination and outreach activities, actions related to US animal traceability, the coordination and integration of One Health activities, and the activities of the VS Chief Epidemiologist.

**Trends in Animal Health Emergency Response Decon and Disposal**

Lori Miller  
Department of Homeland Security, Science and Technology Directorate  
Ms. Miller spoke of lessons learned from the Wide Area Resiliency and Recovery Program (WARRP) Agriculture Workshop held in July in Denver which focused on using the APHIS disposal Matrix, Decision Tree, and Checklist tools. The workshop involved providing the participants with a scenario then teaching them how to use the tools to figure out how to dispose of 20,000 head of cattle, with surprising results. In addition, she provided a brief summary of lessons learned from a cross-border tabletop workshop held in May in Detroit as part of the Fourth International Carcass Disposal symposium. That workshop focused on movement control, depopulation, disposal, and decontamination in case of a cross-border FMD outbreak between Ontario and Michigan. Critical gaps that were identified were presented.

**Outcome of Radiological Events in Japan and USA Preparedness**

Gordon Cleveland  
USDA-APHIS- Veterinary Service (VS), National Center for Animal Health Emergency Management (NCAHEM)  
Mr. Cleveland’s presentation provide information on USDA’s responsibilities during a radiological emergency and how development of the Radiological Program Analyst position at the VS’ National Center for Animal Health Emergency Management has helped identify challenges to our response capabilities and develop programs to address those challenges. There will also be a brief discussion of radiological emergency preparedness in the US animal sector in general, contrasted with the events that unfolded during the Fukushima nuclear power plant disaster.

**Foresight for Canadian Animal Health (Fore-CAN)**

Shane Renwick  
Director, Animal Health Science Foresight Canadian Food Inspection Agency  
Fore-CAN is a national foresight initiative has produced new tools to help the animal health community in Canada better prepare for future animal disease threats.
Canada is currently free of major transmissible animal diseases that fall under the mandate of the Canadian Food Inspection Agency, including foot-and-mouth disease (FMD) and serious strains of avian influenza. However, there is a critical need for all stakeholders in the animal health community to remain vigilant since such disease outbreaks can cause debilitating sickness in livestock, halt trade in animals and animal products, and threaten the food supply, public health and the livelihoods of farmers.

We need to look back only a few years to remind us why we must remain on guard. For example, the outbreak of FMD in Britain in 2001 caused more than $16 billion (CDN) in damage, with millions of animals slaughtered to prevent the virus from spreading; disruption of the food supply, trade and tourism; and severe psychological trauma and loss of livelihood to thousands of people. The outbreak of bovine spongiform encephalopathy in Canada in 2003 has cost the Canadian economy at least $5 billion (CDN). Impacts are still being felt throughout the animal industry nearly ten years later. The 2004 outbreak of highly pathogenic avian influenza in the province of British Columbia, originating from wild birds, caused $300 million (CDN) in damage to the poultry industry before it was finally eradicated, fortunately without serious human illness or loss of life.

Complacency is Not an Option

Animal diseases do not respect international borders and may appear without warning. Canada cannot be complacent. In today’s highly interconnected world, disease-causing agents could enter Canada in a number of ways. Outbreaks might result from natural incursions such as through wildlife or insect movement, or they could occur inadvertently if the virus is carried on contaminated imported products or on international travelers.

Faced with these challenges, the Canadian Food Inspection Agency (CFIA) took the lead in 2008 in developing Foresight for Canadian Animal Health (Fore-CAN), an innovative, three-year (2008-2011) multi-partner initiative that applied foresight methods to support new ways of thinking about the animal health emergency management (AHEM) system. Fore-CAN was launched in response to concerns from the animal health and welfare community that failure to anticipate and prepare for future challenges arising from new, existing or as yet unknown disease threats to healthy animal populations could lead to catastrophic consequences for the health of Canadians and Canada’s economy.

Fore-CAN was funded by the Centre for Security Science, National Defence Canada and in-kind contributions of partner organizations, including Agriculture and Agri-Food Canada; Alberta Agriculture and Rural Development; Dairy Farmers of Canada; Health Canada; Ontario Ministry of Agriculture, Food and Rural Affairs; Public Health Agency of Canada, and Canada’s five veterinary colleges. In all there were over 300 participants from the diverse animal health community, including governments, farmers, producers, food processors, aboriginal representatives, wildlife disease
experts, veterinarians, scientists, and consumers and governmental and non-governmental organizations in Canada and abroad. 2, 3

Fore-CAN's three objectives were aimed at involving the animal health community in:

1. learning about and using foresight methods to gain insights into future threats and opportunities;
2. applying the resulting insights to guide planning and investments in AHRM capabilities; and,
3. sharing and transferring knowledge gained in order to enhance the AHEM system in Canada.

In a series of foresight activities, participants explored the following focal question: How can Canada build a more effective and robust animal health emergency system for 2025 and beyond?

Participants followed a stepwise process (Figure 1) that included six foresight activities designed to encourage new ways of thinking and to build trust and understanding:

**Figure 1. Foresight for Canadian Animal Health (Fore-CAN) activities and timeline**
Shared Vision, Shared Responsibility

The convergence of perspectives that emerged from these activities enabled the participants to develop a shared vision for the AHEM system of the future, titled “Healthy Animals, Healthy Future 2025” (Figure 2).

Figure 2. Shared Vision: Healthy Animals, Healthy Future 2025

![Diagram showing the shared vision for Healthy Animals, Healthy Future 2025]

Animal health will be recognized as a key pillar in the preservation and promotion of Canada’s health and economic prosperity.

Canada’s animal health emergency management system will be anticipatory, adaptable and seamlessly integrated with human, economic and ecosystem health systems.

The shared vision reflects participants’ acceptance of, and appreciation for, shared responsibility for the AHEM system. The vision also recognizes the inextricable interconnections among the economy, the environment, public health and animal health.

Tools for Turning Insight into Action

Fore-CAN partners developed the following tools to support future thinking and achieve the shared vision.

1. Plausible future scenarios (Figure 3) were developed to challenge participants’ assumptions, explore issues and broaden shared understanding of a range of future operating environments for AHEM in Canada. The scenario development process considered all of the uncertainties and risks associated with the trends and drivers that had been identified in the scanning exercise, with particular emphasis on what participants considered to be the two critical uncertainties: societal values and the nature of infectious diseases. The scenarios developed describe four distinctly different and plausible operating environments for AHEM in 2025. Based on the characteristics they displayed, the scenarios were called “Asleep at the Wheel,” “One World, One Health,” “Safe Food Inc.” and “In My Backyard.” Each scenario stimulates further thinking about the
potential risks, threats, challenges and opportunities – and how the trends and drivers may have an impact on the AHEM system.

Figure 3. Plausible future scenarios for the future animal health in Canada in 2025

![ANIMAL HEALTH EMERGENCY MANAGEMENT SCENARIO FRAMEWORK](image)

One Health at a Glance [www.oie.int/for-the-media/onehealth/](http://www.oie.int/for-the-media/onehealth/)

2. Fore-CAN Integrated Animal Health Risk Management Framework (Figure 4) comprises four health dimensions in the shared vision (animal health, public health, economic health and eco-system health); five risk management action areas (anticipate; prevent; prepare; respond; and recover and renew); and five key capability areas (Organization and Decision-making; Science and Technology; Expertise and Personnel; Policy, Law and Regulation; and Information and Data-sharing). These dimensions and areas will need to be developed to create a more integrated, agile and adaptive AHEM system that is complementary to the “One Health” concept.
3. Fore-CAN Integrated Animal Health Emergency Management Roadmap (not shown) identifies key outcomes in the short, medium and long terms, as well as candidate initiatives that could be aligned for building the requirements of each capability area.

4. Fore-CAN Capability Assessment Tool provides a simple, systematic process to help diverse participants make an assessment of: 1) the drivers and impacts of issues across the four health dimensions; 2) where the risk management system may be vulnerable, and where gaps may exist; and 3) why the system may be vulnerable as explained by strengths and weaknesses in key capability areas.

Using the tools in a stepwise fashion is helping diverse groups of participants from science, policy and other backgrounds understand, for example, the complex forces driving the emergence of an infectious disease such as avian influenza, and how the various dimensions of health could sustain direct or indirect consequences and to what degree. If system vulnerabilities and gaps are identified, strategies and activities across organizations can then be aligned to address them, thereby strengthening the risk management system and achieving desired outcomes.

The assessment tool can assist in planning research strategies and action plans by situating research within a broader system of capabilities that need to be developed to support outcomes. For example, other system-level capabilities such as policy development, regulations, education and training and information and communication activities may require an investment in order to optimize the overall risk management system.
Managing Future Animal Challenges

During Fore-CAN, partners and participants gained an understanding of the ability of foresight activities to build relationships and trust among diverse stakeholders, to help develop shared understanding of complex issues and different points of view, and to aid in illustrating connections among processes, functions and organizations within a multifaceted system. Insights were also gained about future threats and challenges to animal health and their interconnectedness, uncertainty and volatility. The importance of ongoing partnerships and the need for a holistic approach to animal health risk management were other learnings that arose from Fore-CAN.

The systematic and collaborative foresight activities of the Fore-CAN initiative harvested the wisdom and experience of participants from over 40 organizations. According to participants, the key achievements of the Fore-CAN initiative included:

1. Recognized value of foresight
   Foresight proved to be a powerful catalyst for awareness raising, change, action and innovation. Participants have an understanding of foresight methods and how they can be used to anticipate future requirements.

2. An invigorated animal health community
   The community was integrated into the foresight process, learning new skills and building new relationships and partnerships. A network of stakeholders with a shared vision, commitment to collaboration and mutual trust has been developed.

3. A system-level, capability-based framework, roadmap and assessment tool for animal health in 2025
   A shared vision has been established along with an integrated framework for action and tools to assist decision-makers in planning and investing in capabilities to achieve desired outcomes within the animal health system. Partner organizations in Canada have already applied the products of Fore-CAN to think critically and innovatively about animal disease surveillance, emerging zoonotic disease risk assessment, anticipation and intelligence activities, new skill sets to integrate activities across health dimensions, and the role of inter-disciplinary research teams to define problems and develop solutions.

   The insights and tools developed through Fore-CAN have the potential to be adapted and used by participants challenged with working together in any complex system in order to better assess and understand issues and thereby move toward achieving common outcomes.

1. CBRN Research and Technology Initiative (CRTI) Website: http://www.css.drdc-rddc.gc.ca/crti/index-eng.asp
Secure Milk Supply Plan in Mid-Atlantic States
Charles C. Broaddus
Virginia Department of Agriculture and Consumer Services

An outbreak of Foot-and-mouth Disease (FMD) could be devastating to the dairy industry. The imposition of intra- and inter-state movement restrictions to control disease spread would prevent milk from being transported from farms to processors. Milk’s perishability and a lack of on-farm storage would cause unsold milk to be dumped, creating financial losses for dairy farmers, a loss of the raw product for dairy processors and a reduction in the dairy products available to consumers. During the initial phase of an outbreak, relatively short-term movement restrictions are likely to be imposed over large areas while the disease incidence is being investigated. Many farms would be affected and the dairy industry would suffer large financial losses. If the disease investigation identifies infected premises then control areas are put in place around these premises that cover smaller areas but these controls remain in place for a longer period. Uninfected dairy farms in these control areas would suffer large financial losses which could cause them to fail.

The Mid-Atlantic Secure Milk Supply (M-A SMS) plan will allow permitted milk to safely move from dairy farms to processing plants and thereby reduce the collateral damage caused by disease control efforts. Because large volumes of milk move from one state to another for processing, regional cooperation will help minimize market disruptions. Since infected cattle may shed the virus but not show physical symptoms for up to four days, any milk from asymptomatic herds must be treated as potentially infected and strict biosecurity measures must be in place if disease control efforts are not to be jeopardized by relaxing movement controls on milk. The plan requires biosecurity procedures on farms, for haulers, and in processing plants. This plan builds on the work of the national Secure Milk Supply initiative’s Biosecurity Performance Standards and The Red Book.

Planning ahead is necessary because there will be limited resources available during an FMD event. The M-A SMS plan requires farm premises, haulers, and processing plants to pass a pre-event audit. This is a voluntary program and the incentive to participate is that passing the pre-event audit grants top priority for a movement permit if there is an FMD outbreak and general movement controls are put in place. Businesses failing an audit get a lower priority for permitting and businesses choosing not to participate at all get the lowest priority. The inevitable delays in getting these lower priority premises into compliance would likely create financial losses for them.

Farm biosecurity measures include controlled access of vehicles and visitors to the farm, milk truck washing and disinfection both going on to and leaving the farm, and regular inspections of livestock for possible symptoms of FMD. Milk truck drivers must wear clean full personal protective equipment (PPE) while on-farm. The plan requires appropriate facilities, equipment, supplies, standard operating procedures (SOPs), and training. Milk truck drivers must also wear full PPE while in milk receiving areas at plants and
carry disinfectant and a sprayer to disinfect milk spills. Milk plants must control access, wash and disinfect trucks on entry and departure, and segregate the raw milk areas from the processing areas. All parties must report observed failures to comply with biosecurity procedures to Incident Command or the State Veterinarian.

If FMD occurs and movement restrictions are imposed, farms passing their most recent pre-event audits must also pass post-event biosecurity audits to be eligible for a permit. Farms that did not pass the pre-event audit and those that did not participate at all must come into full compliance before a permit will be issued. Livestock inspections will be conducted separately based on the availability of trained personnel and the characteristics of the disease situation. Haulers and plants that passed pre-event audits are automatically permitted but are subject to random post-event audits.

A draft of the Mid-Atlantic Secure Milk Supply plan has been completed. The next phase of the project has several components: To identify the auditors and industry stakeholders who can assist farmers to come into compliance; to develop training materials and programs; to field test the plan with pilot audits of farms, milk haulers and processing plants across the seven-state area; and to revise the plan and the training program based on the experiences from the pilot testing.

APHIS-VS Readiness and Response Capabilities, and Emergency Response Roles
Lee Myers
USDA-APHIS-VS, National Center for Animal Health Emergency Management (NCAHEM), National Veterinary Stockpile

In the summer of 2011, APHIS-VS program leaders announced the launch of the VS 2015 operational plan, including projects in 18 priorities. The projects exemplified VS’ program priorities and how the agency would work in FY11 and FY12 on the goals and objectives laid out in the Veterinary Services: A New Perspective document. Several project teams were formed that comprise three priorities primarily focused on emergency management initiatives. The VS program leaders developed the Emergency Management Outreach and Input (EMOI) project as one of 30 projects centered around 18 implementation priorities that are important programmatically to the future of VS, and its partners and stakeholders. Dr. Randall Levings, Scientific Advisor for Emergency Management and Diagnostics, is the project sponsor, and Dr. Lee Myers, State Federal Liaison for the National Veterinary Stockpile, is the project manager.

Myers explained the background of the EMOI project. The project is aligned with the VS program leadership goal four, which is to support readiness and response, thus balancing the needs of animal agriculture with the interests of people and the environment. Over 20 team members on the project represent all VS units and select stakeholders external to VS, including the AAVLD/USAHA Committee on Animal Emergency Management. The purpose of the project is to initiate the provision of ideas,
innovations, and resources (outreach) and to receive participation, contributions, and feedback (input) from APHIS-VS employees (internal) and non-employees (external stakeholders) on the readiness and response capabilities of APHIS-VS. The project was established August 2011 and will sunset December 2012.

Myers reviewed the EMOI project objectives, which are to: 1) use the VS Marketing and Communications plan to highlight the VS emergency management role and tools available to internal and external stakeholders; 2) promote VS readiness and response tools and capabilities to internal and external stakeholders; 3) develop a strategy for regular recurring meetings to discuss VS readiness and response with internal and external stakeholders; and 4) collect internal and external stakeholder input for the National Center for Animal Health Emergency Management (NCAHEM) list of damaging animal disease threats.

Myers then provided a brief status report on the progress of the EMOI project. She first discussed the review and updating of the NCAHEM list of damaging animal disease threats. The project team solicited input from internal and external stakeholders, and an updated list was provided to the VS program leaders for consideration. Myers then reviewed the development of an informational paper that captures the VS readiness and response capabilities, and emergency management roles. The project team solicited stakeholder input and is in the process of completing the final draft for the VS program leadership. Lastly, Myers requested input from Committee members on a potential strategy for recurring VS readiness and response conferences.

VS is currently in the process of reorganizing into four strategically focused business units. The proposed structure enhances the agency’s ability to operate more effectively and efficiently; to address the changes occurring in animal agriculture which bring people, animals, and the environment together; and to provide the services our customers expect. In the new VS structure the animal health emergency management responsibilities will be a component of the Surveillance, Preparedness and Response (SPR) unit. The efforts of the VS EMOI project will continue to be applied as VS moves forward with its Vision and Science initiative.

KAZOO - Kansas Agriculture Zoo Exercise
Sandy Johnson
Kansas Department of Agriculture

The Kansas Department of Agriculture (KDA) was awarded a 10K Cooperative Agreement with USDA-APHIS-Animal Care (AC) to conduct Foot-and-mouth Disease (FMD) tabletop exercises with Kansas zoo personnel. The KDA Division of Animal Health set up workshops at eight zoos and provided presentations on the federal, state and local plans for responding to outbreaks of FMD. Each zoo also presented on their facility and their biosecurity and emergency plans. The workshops included personnel from KDA, USDA (Veterinary Services and Animal Care), Kansas Department of Wildlife and Parks and Tourism, Kansas Department of Health.
and Environment, local emergency managers, extension agents, local law enforcement and zoo directors, veterinarians, and zoo keepers. The workshop presentations resulted in energetic discussion in many areas. Biosecurity, quarantine zones and their impacts, food supply, susceptible species, economic consequences, social media and notification were the primary subject areas that were discussed at each workshop.

Since there was not enough time at the workshops (scheduled for four hours), it was decided early on in the project to bring the zoos together and do one exercise. This exercise was conducted at the KAZOO meeting (Kansas zoos meet twice a year) in April. The time between the workshops and exercise ranged from four months to several weeks. Tabletop attendees reported that this time was very valuable for them to prepare for the exercise by reviewing and revising the plans and procedures they had in place. It also allowed them to train staff that they brought to the exercise.

Additional exercises are currently being scheduled with the same attendees who attended the workshops at the zoos. These exercises will be conducted with community responders and will also help local emergency managers meet new requirements to receive their funding. As a result of this project, zoo directors will be including more first responders in the exercises that they conduct on a regular basis in order to maintain their Association of Zoos and Aquariums (AZA) accreditation.

This project was highly successful in several areas. It allowed veterinarians from USDA, KDA and the zoos to interact and develop contact information that will be highly valuable in an outbreak. The workshops and exercise(s) provided insight into our current strengths and weaknesses related to foreign animal disease (FAD) planning, training, and exercise activities. Zoos tended to be a forgotten entity in state and local planning activities, this is now not the case in Kansas as a result of this project.

**Cross Border Livestock Movement Controls and Permitting**

Captain Eric Pippin  
Kansas Highway Patrol  
Major Scott Copley  
Colorado State Patrol

Disease outbreak may strike livestock rapidly and without warning. It’s important that states collaborate, communicate, and pre-plan with one another to respond to these emergency outbreaks. In 2009, Kansas and Oklahoma conducted the first bi-state exercise focused on interstate livestock movement control for a disease outbreak in a non-contiguous state. Panelists will discuss the lessons learned from this exercise, and share how the Kansas and Colorado Highway Patrol’s, Departments of Transportation and Departments of Agriculture partnered together to adopt a “share the border” approach to include cultivating a common philosophy from the policy and executive level, identifying safe checkpoint locations on state and federal highways, resource requirements, developing a standard permit,
communications plan, as well as other challenges and successes of working across state borders.

**Flu at the Zoo: A Tabletop Exercise Designed to Assist with Evaluation and Updating of the USDA Association of Zoos and Aquariums (AZA) Highly Pathogenic Avian Influenza (HPAI) Outbreak Management Plan**

Yvonne Nadler
Lincoln Park Zoo, Chicago

Zoo veterinarians and United States Department of Agriculture (USDA) have spent considerable time and resources in preparing the zoological community for Highly Pathogenic Avian Influenza (HPAI), but the opportunities to evaluate preparedness and response plans for this pathogen in the zoological community have been limited. Funded by USDA Animal Care (AC) Emergency Programs and facilitated through the University Of Illinois, College Of Veterinary Medicine, “Flu at the Zoo” was a tabletop exercise designed to assist with evaluation and updating of the USDA Association of Zoos and Aquariums (AZA) HPAI Outbreak Management Plan. This Plan was designed to be used as a guidance document for regulatory agencies when dealing with HPAI in a zoological facility. In addition, stakeholders discussed their various roles in a simulated outbreak of HPAI in zoological facilities.

Developed using Homeland Security Exercise and Evaluation Program (HSEEP) guidelines, the exercise brought together zoological personnel from 16 zoos in Indiana, Illinois and Missouri with USDA (Animal Care, Veterinary Services, and Wildlife Services) State Animal Health Officials, Public Health, academics, the poultry industry and other stakeholders. HSEEP exercise structure was chosen as it promotes a standardized set of measures for exercise evaluation.

This presentation will discuss the exercise development, structure, evaluation and highlight lessons learned. While the scenario was developed to examine HPAI preparedness and response for the managed wildlife community, this exercise fulfilled the all hazards approach to response to any infectious disease outbreak involving animals and/or humans associated with a zoological facility.

The authors would like to acknowledge the Flu at the Zoo Planning Team members and the Illinois Farm Bureau, Bloomington Illinois for their contributions to this exercise.

**Zoo Best Practices: Emergency Planning Documents and Resources**

Yvonne Nadler
Lincoln Park Zoo, Chicago

Two years ago at the 114th meeting of USAHA in Minneapolis, Dr. Yvonne Nadler of Lincoln Park Zoo, and Dr. Kevin Dennison of United States Department of Agriculture (USDA) Animal Care Emergency Programs, discussed the formation of a Best Practices working group for disaster preparedness for the managed wildlife community. A rule change to the
Animal Welfare Act had been proposed that would require the development of written contingency plans for USDA licensed facilities. In addition, any personnel required for response would need to be trained to properly carry out those plans. The Working Group was tasked with collecting information about plan development, training resources, best practices and lessons learned from actual incidents that could be used by any managed wildlife facility for drafting their own unique contingency plans.

Utilizing working group expertise, and well known references such as Federal Emergency Management Agency’s (FEMA) Comprehensive Preparedness Guide (CPG) 101, key steps to contingency planning are explained with the wildlife community in mind. Then, topic specific Annexes are provided which give checklists of elements to consider in a plan. Throughout all the documents, the importance of integration of facility plans into larger community planning is emphasized.

This presentation will introduce the USAHA community to these materials, specifically designed to assist with drafting or improving contingency plans for the managed wildlife community. The material can be accessed via the following link: http://www.zooanimalhealthnetwork.org/Home.aspx. CDs were available during the session.

**Perspective and Update on the NBAF (National Bio and Agro-Defense Facility)**
Ron W. Trewyn
Kansas State University

The NBAF mission is to protect the nation’s livestock industry, food supply, agricultural economy, and public health from natural outbreaks or intentional introductions of foreign, emerging, and zoonotic diseases. The research to accomplish this mission will be facilitated by a partnership between the Department of Homeland Security (DHS) and USDA. NBAF will replace the antiquated foreign animal disease facility on Plum Island, New York, and it will greatly enhance US biodefense capabilities by vastly increasing both the number and types of infectious disease agents that can be studied.

A rigorous site selection process was launched by DHS and USDA in January, 2006 and the record of decision naming Manhattan, Kansas as the NBAF site was finalized three years later, in January of 2009. Most of the site work for NBAF has now been completed, but construction of the 580,000 ft² laboratory has yet to begin.

A July 2012 report by a National Academy of Sciences committee validated the critical need for NBAF and it confirmed that Plum Island is incapable of meeting US agrodefense needs. Importantly, the Secretary of DHS clarified the near-term path forward for NBAF at US Senate hearings in September, so it is anticipated that construction of the NBAF central utility plant will commence soon.
Foreign animal diseases – zoonotic and non-zoonotic, currently known and emerging – will hit the US livestock industry. It’s not a question of if; it’s only a matter of when. Questions that remain to be answered include: Which foreign animal diseases will ravage the US; how many outbreaks will occur; at what frequency will these epidemics emerge; and will the introductions of non-endemic pathogens into the US be accidental or intentional?

The NBAF bottom line: The agricultural threat is real and the time to protect America is now!

USDA National Veterinary Services Laboratory Emergency Preparedness Update
Elizabeth Lautner, Director
National Veterinary Services Laboratory (NVSL), USDA-APHIS-VS

In FY 2012 NAHLN coordinated several emergency preparedness activities. A negative cohort study was conducted for detecting FMD in bulk tank milk samples with the goal of validating a real-time polymerase chain reaction (rRT-PCR) assay for FMD in bulk tank milk. An inter-laboratory comparison was completed earlier in FY 2012 to evaluate the variability between laboratories and provide information on the reproducibility and ruggedness of the assay. NAHLN also provided training to laboratory and State personnel on the implementation of VS Memo 580.4 [Procedures for the Investigation of Potential Foreign Animal Disease/Emerging Disease Incidents] as it relates to decisions and actions that affect the laboratory during a foreign animal disease investigation. A Quality Management System (QMS) Training Program was also provided that covered quality system requirements, the accreditation process, document control, internal auditing, and root cause analysis. Through collaborations with the Foreign Animal Zoonotic Disease Center (FAZD) at Texas A&M a Laboratory Capacity Estimation Program (LCEM) has been developed. This is a web-accessible software tool for laboratories to input information on processing, testing and reporting capacity. A pilot web-based exercise series was also conducted that leveraged existing tools, including the LCEM, the NAHLN Portal and VS’ Outbreak Surveillance Toolbox.

NVSL was also actively engaged in VS’ activities related to Schmallenberg virus (SBV), after identification of this disease in the European Union (EU). SBV reference antiserum and protocols for diagnostic testing were received from collaborators in Germany. NVSL subsequently initiated PCR testing to detect SBV RNA, and virus neutralization (VN) testing for SBV antibody detection at both the Ames, IA and Plum Island, NY laboratories. Submissions to date have been from sheep and cattle, with fetal tissues the primary samples for PCR and dam being tested by VN. Neither SBV nor SBV antibody has been detected in any samples submitted.

Committee Business
Three resolutions submitted by committee members were adopted.
ANIMAL EMERGENCY MANAGEMENT

Resolution #1 - Use of 840 RFID Ear Tags for Use in Identification of FMD “Vaccinated-to-Live” Livestock
Resolution #2 – Support for the National Bio and Agro-Defense Facility
Resolution #3 - Evaluate FMD Vaccine Response Policy and Capabilities

The Committee voted to support a resolution from the Committee on Johne’s Disease regarding research funding.
REPORT OF THE COMMITTEE

SECURE TURKEY SUPPLY PLAN – ISSUING MOVEMENT PERMITS DURING AN OUTBREAK OF HIGHLY PATHOGENIC AVIAN INFLUENZA

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I. Secure Turkey Supply Plan

The Secure Turkey Supply Plan contains scientifically sound sampling protocols and proven, highly sensitive testing methods which will be employed in the event of an outbreak of highly pathogenic avian influenza (HPAI). Prior to issuing movement permits for turkeys and turkey eggs in a Control Area, stringent biosecurity measures must be in place on the premises of origin for a sufficient period of time to provide a high degree of confidence that HPAI has not been recently introduced so that the flock could be infected, but undetected. In addition, turkeys must be free of clinical signs associated with HPAI and flock mortality must be within normal parameters before movement of live turkeys will be allowed. The Plan will help avoid restrictions on interstate or international trade, by providing a high degree of confidence to regulatory authorities in other states and other nations that no turkeys infected with HPAI virus will leave a Control Area. All poultry producers in a Control Area can be assured that turkeys moving under a permit issued by the Incident Command do not endanger the health of other uninfected flocks. Lastly, regulatory agencies with public health responsibilities, including the USDA Food Safety Inspection Service and the U. S. Food and Drug Administration, can have a high degree of confidence HPAI virus is absent from turkey products intended for use in animal agriculture or for human consumption.

The Secure Turkey Supply Plan will be supported by risk assessments of potential poultry health impacts and risk assessments of possible public health impacts associated with movement of infected but undetected turkeys from a Control Area during an outbreak of HPAI. A risk assessment of the potential public health impact has been completed (Interagency Risk Assessment for the Public Health Impact of Highly Pathogenic Avian Influenza Virus in Poultry, Shell Eggs, and Egg Products – May 2010; Appendix K). This risk assessment was based on detection of HPAI in the index flock in an outbreak. Future risk assessments for the STS plan will be based on detection of HPAI in turkey flocks under increased surveillance in a Control Area.

The Secure Turkeys Supply Plan Working Group — the multidisciplinary team assembled to prepare the Plan — includes members of the following organizations:
ANIMAL EMERGENCY MANAGEMENT

- Iowa State University Center for Food Security and Public Health (CFSPH);
- University of Minnesota Center for Animal Health and Food Safety (CAHFS);
- National Turkey Federation (NTF);
- Association of Veterinarians in Turkey Production; and
- The USDA Animal and Plant Health Inspection Service Veterinary Services (USDA APHIS VS) Centers for Epidemiology and Animal Health (CEAH) and National Center for Animal Health Emergency Management (NCAHEM).

The Secure Turkeys Supply Plan was created by a public-private-academic partnership and provides specific recommendations that emergency response decision makers (such as Incident Commanders) can use in assessing animal health risks in order to rapidly decide whether to provide or deny permits for the movement of turkeys during an HPAI outbreak. This plan is subject to revision as advances in science occur, the characteristics of HPAI evolve, and as risk assessments are completed. The Secure Turkey Supply Plan supports a continuous supply of turkey products for the US public, facilitates market continuity for the turkey sector and its customers, and fosters a high level of government, industry, trading partner, and consumer confidence in Foreign Animal Disease preparedness and response efforts.

II. Biosecurity Recommendations for Commercial Turkey Premises

1. Biosecurity must be in place on the premises of origin before movement permits will be issued for turkeys in a Control Area. A copy of the premises’ biosecurity plan must be provided to the Incident Command. A high level of biosecurity (Level 2) will be necessary before approval to move turkeys or turkey-related products can be given, but BIOSECURITY ALONE DOES NOT GUARANTEE APPROVAL. Before Incident Commanders approve such movement, the results of a) Active and passive surveillance; b) Geographic proximity to infected premises; and c) Other pertinent factors will be considered. The Incident Command will determine the time period for which biosecurity measures must be in place before turkey eggs or live turkeys are allowed to move.

2. Recommended (not required) biosecurity measures (Level 1) for turkey producers to implement prior to an outbreak have been developed based upon extensive input and discussion from turkey industry veterinarians, state and federal epidemiologists, university poultry veterinarians, and federal regulatory agencies. Implementation of these biosecurity measures prior to an outbreak will significantly reduce the likelihood that the HPAI virus will be introduced onto a commercial turkey premises.
   - Level 1 biosecurity measures are recommended (not required) for turkey farms prior to an outbreak of HPAI.
   - Level 2 biosecurity measures are recommended following diagnosis of highly pathogenic H5 or H7 avian influenza in a region before
turkeys can be permitted to move. The Incident Command will determine which specific biosecurity measures must be in place before turkey eggs or live turkeys are allowed to move.

III. Epidemiology Information
1. A short epidemiology questionnaire is available for turkeys moving from a grow-out house to market. A longer epidemiology questionnaire is used for movement of all other turkeys and turkey eggs.
2. Epidemiology questionnaires should be completed whenever a new infected premises is identified.
3. In the event of an outbreak of HPAI, the epidemiology questionnaire shown in Appendix D will be used by the Incident Management Team a) for infected, suspect, and contact premises and b) non-infected breeder farms moving eggs to a hatchery, and c) non-infected brooder farms moving turkeys to a grow-out facility. If turkeys are to be moved interstate, the SAHO of the destination state may require information from the epidemiology questionnaire prior to granting permission for turkeys to enter their state.
4. For infected premises, the questionnaire will assist epidemiologists to a) Assess risk factors associated with employees, wild birds, and carcass disposal; b) Determine how HPAI may have been carried onto a farm (trace back information); and c) Determine where HPAI may have traveled from a farm (trace forward information).
5. For non-infected turkey premises and hatcheries, this information will assist epidemiologists should HPAI be diagnosed at a later date on one of these premises.
6. For all premises within a HPAI Control Area, epidemiology questionnaire information will be used to help classify premises as Contact Premises, Suspect Premises, At-Risk Premises, or Monitored Premises.

IV. Pre-Movement Active Surveillance by Real-Time Reverse Transcriptase Polymerase Chain Reaction (RRT-PCR) Testing for Monitored Premises in a Control Area
1. Disease Detection Surveillance for Commercial Premises in a Control Area. Swabs shall be collected from the 5-bird pool sample(s) selected from the daily dead birds or euthanatized sick birds from each flock on each premises every other day for 14 days. Contact Premises, Suspect Premises, and Monitored Premises that test negative should then be sampled as described for At-Risk Premises. Monitored Premises may be sampled more frequently depending on the need to ship product but at the minimum must be sampled as listed above. For at-risk premises, swabs should be collected for the 5-bird pool(s) on each premises once every 5 days for the duration of the quarantine. If daily mortality exceeds 2/1,000 birds in turkeys greater than 2 weeks of age, further diagnostic activities will be initiated and the Incident Command will be notified.
a. **Number of Turkeys Sampled.** One 5-bird pooled sample must be tested by RRT-PCR for each 50 dead turkeys and found to be negative from every house on the premises for two consecutive days prior to movement of live turkeys or turkey eggs. The time interval between collection of samples on consecutive days must be at least 18 hours. If there are less than 5 dead turkeys in the house, the remainder of the samples should be taken from sick turkeys. Two 5-bird pooled samples that test negative provide a 95% level of confidence that HPAI will be detected if at least 40% of sampled turkeys are shedding HPAI virus. For products that move daily, one 5-bird pool from each house on the premises must test negative by the RRT-PCR test on each day prior to movement of eggs and turkeys.

b. A 5-bird pooled sample consists of combined samples taken from five turkeys from each flock on a premises that died of natural causes during the preceding 24 hours or sick turkeys that were euthanized during the preceding 24 hours. If there are less than 5 dead turkeys available to create a pool, remaining samples should be taken from euthanized sick turkeys.

c. A flock consists of turkeys of the same age in one building which are marketed on the same day.

d. **Time to Sample Dead or Euthanized Sick Turkeys.** Samples must be taken within 24 hours prior to movement of live turkeys (or turkey products) from the premises. If an unusual HPAI virus proves to be slow-moving, adjustments to the sampling protocol will be made. For example, if turkeys from one farm will be marketed on four consecutive days, then samples will be collected each day for four days from all barns with birds. Targeting dead and euthanized sick birds reduces the sample size required for the 99% confidence level because the prevalence of HPAI infected birds should be higher in this group than in the house as a whole.

e. **Turkeys Selected for Sampling.** Oropharyngeal swabs must be taken only from dead or euthanized sick turkeys and dead turkeys should be sampled before sick turkeys. Sick birds selected for euthanasia and sampling should exhibit clinical signs compatible with HPAI (depression or respiratory signs).

f. **Location of Sampling.** Dead turkeys from each house (flock) must be placed in a leak-proof container (such as a heavy-duty plastic garbage bag) each morning. Each container shall be labeled with the farm of origin, house of origin, number of birds found dead in the house that day, and the premises identification. Containers must be brought to a location near the premises designated by the Incident Command (IC).
g. **Sampling Procedure.** An individual authorized by the IC will sample each turkey by swabbing the oropharynx of each dead turkey in the leak-proof container. One Dacron swab is used to swab the palatine (choanal) cleft on the roof of the mouth and the trachea of one turkey, picking up as much mucus as possible. Thereafter, the swab is vigorously swirled in 1.0 to 2.0 ml of Brain-Heart Infusion (BHI) broth and as much fluid as possible is squeezed out of the swab by pressing the swab on the inside of the tube before withdrawing the swab from the BHI tube. Swabs from 5 turkeys should be swirled in one BHI tube.

h. **Disposal of Turkeys after Sampling.** After samples have been taken, farm personnel shall dispose of carcasses in accordance with an approved biosecurity protocol.

i. **Laboratory Submission.** BHI tubes containing oropharyngeal samples (5 oropharyngeal swabs/BHI tube) will be submitted as directed by the IC to an authorized State Veterinary Diagnostic Laboratory (VDL). These samples must be submitted on the day of sample collection by a State or Federal regulatory official or an IC-authorized person. The State VDL and IC will establish the time of day by which samples must be submitted to an authorized VDL (for example, by 12:30 p.m.).

j. **Laboratory Testing and Reporting.** VDL personnel performing RRT-PCR will test samples immediately upon receipt and electronically send test results to the IC by the end of each day. The IC will report test results to farm managers as soon as results are available. If the RRT-PCR test on the dead bird pool is not negative, additional diagnostic testing will be conducted.

k. **Negative RRT-PCR Results Required.** Prior to movement, all premises’ tests of 5-bird pools taken 24 hours before movement must be negative.

V. **Flock Mortality Data and Visual Inspection prior to Movement**

1. Prior to moving turkeys to any other location, turkey producers will be required to electronically submit records of daily mortality for the preceding 7 days for each turkey management unit on the premises to the Incident Command. If daily mortality is abnormally high (more than 2/1,000 birds in a flock) immediately prior to a scheduled movement, turkeys shall not move until diagnostic steps have been initiated and the cause of elevated mortality ascertained. In addition, company veterinarians or independent producers will be required to report significant unexplained changes in feed consumption, water consumption, or behavior.

2. Visual inspection of turkeys in all houses on premises within 24 hours prior to movement will be required for all premises located in the Control
Area (Infected Zone plus Buffer Zone) that wish to move turkeys. Visual inspection may be performed by a company-designated individual.

3. If 50 or more dead turkeys are present in the finishing house immediately prior to or during load-out, the Incident Command must be contacted before turkeys are removed from the house.

VI. Secure Turkey Supply Plan Data Portal

A data portal will be needed for use during an HPAI outbreak by State and Federal regulatory officials to collect mortality data, monitor production parameters, record the results of the epidemiology questionnaire, and record RRT-PCR results from all turkey farms in a Control Area.

VII. Recommended Criteria for Issuing Movement Permits

In the event of a highly pathogenic avian influenza (HPAI) outbreak, ensuring market continuity for the turkey sector will be a significant challenge. By planning prior to an HPAI outbreak, the Secure Turkey Supply Plan promotes food availability, food safety, and animal health. The Secure Turkey Supply Plan provides clear recommendations for emergency response leaders to facilitate movement of turkeys and turkey hatching eggs.

1. Avian Influenza Monitored Premises. In the event of an outbreak of HPAI, only movement of live birds from AI Monitored Premises will be considered. Monitored Premises are located in the Infected Zone or Buffer Zone, which constitute the Control Area. Monitored Premises have susceptible birds that do not have clinical signs (or other epidemiological evidence) compatible with HPAI.

2. Risk Reduction Measures. Prior to permitting, potential contact with infected and/or epidemiologically linked flocks and the biosecurity of premises containing these flocks will be assessed. Methods to reduce the risk associated with moving live turkeys or turkey hatching eggs include the following:
   - **Pre-movement restrictions** – no dangerous traffic (involving contact with manure, live or dead birds or crews or equipment) will be allowed onto the farm for 5 days before movement.
   - **All In-All Out** – all turkeys should move within a time period approved by the Incident Command (IC).
   - At the time of loading, mortality must be within normal limits and clinical signs associated with HPAI must be absent.
   - **RRT-PCR testing** for the avian influenza matrix gene is required from one 5-bird pooled sample for each 50 dead turkeys from every house on the premises for two consecutive days prior to movement of live turkeys or turkey eggs. If one or more initial samples test positive, samples will be further tested for H5 and H7 avian influenza genes.
   - If **supplemental diagnostic tests** are conducted prior to movement of turkeys, results must be reported to the IC.
• After the move, *turkeys not moving to market* (brooder turkeys to grower unit, replacement breeders to egg production unit) must be monitored as directed by the IC.

3. **Turkey Hatching Eggs.** Turkey breeder hens and toms producing fertile hatching eggs must test negative for avian influenza matrix genes by the RRT-PCR test before hatching eggs will be allowed to move from a breeder farm to a hatchery.

4. **Turkey Poult.** Movement of turkey poult from a hatchery to a brooder house is considered to pose a low to negligible risk. Restrictions on movement of poult from a hatchery to a brooder house will be limited to ensuring that the receiving facility can provide a safe environment wherein poult will not be exposed to potentially-infected older turkeys.

5. **Immature Turkeys.** Immature turkeys in a brooder house must test negative by the RRT-PCR test before they will be allowed to move to a finishing house.

6. **Mature Turkeys.** Turkeys in a finishing house must test negative by the RRT-PCR test before a permit will be issued which allows them to move to a processing plant.

7. **Public Health.** The Interagency Risk Assessment for the Public Health Impact of Highly Pathogenic Avian Influenza Virus in Poultry, Shell Eggs, and Egg Products (May 2010) has determined that the risk of transmitting HPAI virus to humans via the food supply is negligible.

8. **Permitting Guidance Recommendations.** The table below provides guidance for regulatory personnel responsible for issuing permits for movement of turkeys and turkey hatching eggs in a Control Area during an outbreak of HPAI. If the answer to all questions is “Yes,” then it is recommended that movement permits be considered.

<table>
<thead>
<tr>
<th>Permitting Guidance for Movement of Turkeys and Turkey Hatching Eggs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Level 2 Biosecurity Measures are in place?</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Traceability Information is Available (Premises ID, GPS Coordinates, other)?</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Epidemiology Questionnaire data is acceptable?</td>
<td>Yes</td>
</tr>
<tr>
<td>4. RRT-PCR tests are negative for samples collected during the preceding 24 hours?</td>
<td>Yes</td>
</tr>
<tr>
<td>5. Mortality is no more than 2/1,000 turkeys in the flock for each of the preceding 7 days?</td>
<td>Yes</td>
</tr>
<tr>
<td>6. Visual inspection is normal within 24 hours prior to movement?</td>
<td>Yes</td>
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<td></td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td>7.</td>
<td>Fewer than 50 dead turkeys are present in the house immediately prior to loadout.</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>8.</td>
<td>Drivers and trucks are biosecure; the route from the farm of origin to the grow-out house or turkey processing plant avoids poultry farms?</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>9.</td>
<td>Permit Guidance to Move Turkeys</td>
</tr>
<tr>
<td></td>
<td>Consider Issuing MOVEMENT PERMIT</td>
</tr>
</tbody>
</table>
REPORT OF THE USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS

Chair: Lisa Becton, IA  
Vice Chair: Marie Gramer, MN

Bruce Akey, NY; Debbie Barr, CAN; Karen Beck, NC; Stan Bruntz, CO; Craig Carter, KY; Neville Clarke, TX; Anita Edmondson, CA; Francois Elvinger, VA; Tam Garland, TX; Dorothy Geale, CAN; Sue Goetz, WI; Xingnian Gu, NSW; William Hartmann, MN; John Huntley, WA; Brady James, TX; Annette Jones, CA; Jamie Jonker, VA; Elizabeth Lautner, IA; Donald Lein, NY; Francine Lord, CAN; Janet Maass, CO; Kevin Maher, IA; Rodger Main, IA; Michael Martin, SC; Michael McGrath, IRE; James McKean, IA; Roger Parker, TX; Andres Perez, CA; Barbara Porter-Spalding, NC; Tom Ray, NC; Emi Saito, CO; Mo Salman, CO; A. David Scarfe, IL; Irene Schiller, CHE; Jack Schlater, IA; Dan Sheesley, DC; David Smith, NY; Katie Steneroden, CO; John Stevenson, KY; Patricia Stonger, WI; Patrick Webb, IA; Steve Weber, CO; Nora Wineland, MO.

The Committee met on October 21, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 3:00 - 6:00 p.m. There were 55 members and guests present.

Committee Business

Dr. Lisa Becton opened the meeting and welcomed attendees to the meeting. She first called for new business and new resolutions.

Editors Note: The USAHA Board of Directors approved the report with an amendment to strike “Resolution” and replace with “Recommendation” in regards to the establishment of an animal health data standards subcommittee, as noted by strikethrough and underlined insertion in this report.

Resolution Recommendation to discuss: "Establishment of a Standards Subcommittee" SOURCE: USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS. SUBJECT MATTER: ESTABLISHMENT OF AN ANIMAL HEALTH DATA STANDARDS SUBCOMMITTEE. Introduction and explanation on this by Michael K. Martin, DVM, MPH, DACVPM from Clemson Livestock Poultry Health, PO Box 102406, Columbia, SC 29224-2406, email: mmarti5@clemson.edu, talking about the need for data standards that would go on Interstate Certificates of Veterinary Inspection (ICVI) and Electronic Certificates of Veterinary Inspections (eCVI). The resolution is requesting that a subcommittee must be established to establish data standards and that USDA should assign expert people on the committee. Francois Elvinger (Virginia-Maryland Regional College of Veterinary Medicine) made a motion to approve a subcommittee formation. Motion was seconded by Mo Salmon (Colorado State University). Discussion on whether it should be called a subcommittee vs. a Task Force. Task Force is short term (in general) and subcommittee is long lasting, perennial and continual. Michael K. Martin (Clemson University) thinks it
should be a long standing subcommittee. NOTE that the Northeast District of the USAHA strongly supports this resolution recommendation as well. Motion was approved to form a subcommittee on Data Standards. Mo Salmon moved to accept the Resolution as Written and Francois Elvinger seconded. Motion was approved to accept the Resolution as Written. Vote was unanimous to accept the Data Standards Subcommittee resolution recommendation.

Resolution
State Animal Health Lab Messaging Service (SALMS). Introduction / explanation of this by Bruce Akey of Cornell. SALMS will be a router that will allow messaging electronically to connect laboratories to other laboratories, to National Animal Health Laboratory Network (NAHLN), National Veterinary Services Laboratories (NVSL), Southern Animal Health Organization (SAHO) and clients to transmit results and test requests. Motion to support this resolution was made by Michael Martin and seconded by Francois Elvinger. It was noted that the program only costs $100 per month to Cornell. The resolution was unanimously accepted.

An Update on the Status of the National List of Reportable Animal Diseases (NLRAD) and White Paper
Ellen Kasari
National Surveillance Unit (NSU), USDA-APHIS-VS

The National Animal Health Report System (NAHRS) is a reporting system used by USDA to communicate with stakeholders on OIE diseases and other important disease to animals in the USA. Ellen Kasari provided an overview of NAHRS activities for the year which included: 1) change in people on the NAHRS subcommittee; and 2) overview of the quarterly conference calls. There has been a slight decrease in the number of states that contribute to the NAHRS. The NAHRS IT may contribute to the reason, as it needs to be updated and will be done. Also some turnover of people that used to report to the NAHRS who have previously been in charge of reporting to NAHRS contribute to this decrease.

Kasari also reported on the status of development of NLRAD development and the White Paper. The white paper was reviewed by the National Assembly, APHIS-VS, and this Committee prior to the meeting. The NLRAD is not meant to replace State lists of reportable diseases. The White Paper on the NLRAD contains an executive summary and List, the Standard Operating Procedures (SOPs) for adoption, maintenance, input, and modification of the list.

A historical overview of the NLRAD was given. This included a proposed list of diseases (mostly from the OIE), case definitions, and reporting mechanisms. The NLRAD White paper went out to many stakeholders (National Assembly, APHIS-VS, Committee members, etc.) and a lot of feedback and support was received. Some feedback suggested to include the tribal nations; questions on how to include wildlife diseases (or not to);
questions on whether or not to include the exotic ticks and other vectors that may transmit diseases; questions on authorities that would implement the list or have regulatory implications of the list; questions on laboratory testing that is not done in the state of animal origin (and the authorities for that reporting), and recommendations to include other stakeholders. The case definitions for the NLRAD have been the most challenging to establish. References used to establish the case definitions include: www.fadprep.lim.org for Foreign Animal Diseases; Surveillance plans and their documents for the Regulatory Diseases, and NAHRS Uniform Methods and Rules (UM&R) on the NAHRS website; and public websites for endemic disease definitions. As diseases and host susceptibilities change, the case definitions will change, so NLRAD is a dynamic document. The NLRAD will hopefully be implemented in early 2013. To meet this timeline, these things must be done: the NAHRS UM&R must be incorporated; the reporting criteria need to be established; the web reporting tool has to be up to date; and the IT modifications that are being made need to include the NLRAD. Also, the development of web resources needs to be completed with case definitions available and also training. After the implementation of the NLRAD, the regulatory process will begin with putting or referencing the NLRAD in the Code of Federal Regulations.

Schmallenberg Virus in the EU
Francisco Javier Reviriego Godejo

Reported in cattle in Germany in August 2011; suspected bluetongue virus (BTV) new serotype coming in -because milk production decrease and cows have fever. Similar complaints were heard in the Netherlands. The Frederick-Loeffer Institute of Germany (FLI) ruled out all previously known viruses, but discovered a new virus – Schmallenberg (after the town that it was first discovered). It was not named after the lead discoverer of the virus because his name was Beer. Schmallenberg virus is a Bunyaviridae from Orthobunyaviruses, Simbu serogroup, Schmallenberg. Almost all EU countries have identified it (Belgium, Luxembourg, France, Netherlands, Germany, Spain, Italy, United Kingdom, and others). It is not known to be zoonotic. It exhibits mild transient illness in adults and severe congenital abnormalities in fetuses of sheep, cattle, and goats. The lesions to the fetuses are remarkable but the overall impact is very low. Very few flocks or herds were affected despite the virus being widespread geographically. It spread very quickly, typical of orthobunyaviruses that are spread by insect vectors. In Belgium, many registered calves are born in February, March, and April. In 2008 there was a decrease in calves born presumably due to a BTV outbreak and Schmallenberg, but when it came through in 2011, it did not cause a decrease. Both Germany and Belgium have done seroprevalence studies, the rates of positivity were 60 and 70% respectively. Schmallenberg Virus (SBV) is NOT a reportable disease in the EU so maps and prevalence may not be totally accurate. SBV does not have any trade
impacts, not for live animals nor for semen and that is typical for other Orthobunyaviruses. Also it is not an OIE disease and it is NOT a zoonosis. Therefore, there are no trade restrictions. For more information go to http://ec.europa.eu/food/sbv. Questions from the audience on SBV – What’s going on this year? EC still get reports when it is newly found (like in Finland) but the producers are not reporting any clinical disease. Are there any studies being done on banked sera? Probably. Is there any ongoing screening/testing? There may be a commercial ELISA available but it is not validated and there’s really no reason to do that on a non-reportable disease.

Development of Surveillance Programs for Animal Diseases in the EU
Francisco Javier Reviriego Godejo

The layers of the surveillance for animal diseases in EU are: 1) Compulsory (AI all MSs) vs. voluntary; 2) Surveillance is vaguely defined in general in the EU. Is surveillance an early detection system? Is it just monitoring? Is it passive vs. active? Is it a one-time survey or forever? Targeted or Random? Defining Surveillance in the EU is done by going from science to rules, getting the scientific advice and then getting agreement on the rules that especially consider cost-effectiveness and quality assurance. The European Food Safety Authority (EFSA) website has details. An example on how EU animal disease surveillance works is to look at EFSA replying on Bluetongue virus (BTV): 1) EFSA puts out very well detailed (scientific) data on BTV; 2) The Task Force on Animal Disease Surveillance (however) when replying to a BTV was more direct and simple but was able to establish some rules on how to test for BTV; 3) They then go from Rules to implementation and then from implementation to verification. Verification is done by the Reporting and Notification systems (Animal Disease Notification System) and Inspections by the Food and Veterinary Office. In the EU, they now are re-tooling the surveillance so that they can prevent disease (active surveillance) rather than cure disease (reactive surveillance). Prevention is less expensive than curing and eradication. The elements of the Animal Health Law (which is still in draft form) are: 1) early detection and notification; 2) Surveillance principles that are risk-based with caution. However the new concepts of surveillance in the EU have challenges such as: 1) establishment of interactive networks of veterinary services, laboratories, and agriculture sectors; 2) trying to incorporate One Health into the surveillance; 3) trying to deal with antimicrobial resistance information; 4) accommodation of emerging diseases and new threats; and 5) how to get buy in by all the stakeholders (large and small agriculture, pets, etc). Surveillance should be seen as a tool of veterinary services and intended for animal disease management. Surveillance should be appropriately designed so that the sampling can be harmonized, representative, able to address different diseases (endemic, vector borne, emerging), understandable, robust, and adapted for each type of disease. How to sustain surveillance? Establish the
priorities and decide who sets those priorities; determine the affordability and decide who should bear the costs of surveillance; and communicate the surveillance system to not only laboratories, scientists and researchers, but also to trading partners and farmers. Additional challenges to surveillance are many. Example: was the surveillance for Avian Influenza (AI) in the EU worth it? No answer provided. Conclusions: Animal disease surveillance is a key element of veterinary policies. We should be aware of the challenges (purpose/objectives, technical/scientific issues, sustainability), and more. Question to Francisco – What is the disconnect between the farmers and the veterinary services on surveillance? Is it because that they have different expectations? Scientists want to prove they are the best researchers and the policy makers don’t want to take advice from anyone. What networks are needed? You need to explain the roles and responsibilities to the parties involved. Perhaps if the Animal Health Law is finalized, the veterinarian can visit the farm annually and detect disease earlier. Does he think the EU will ever accept some kind of Avian Flu Surveillance that both US and EU will agree on so that trade will not be interrupted? Perhaps. Can countries in the EU design their own surveillance or will the countries be subjected to the EU Animal Health Law and all that it contains? It seems to vary country by country. EU wants to say that these are just guidelines. Some want to have just the minimum and some want to have very strict detailed rules. What is the vision of animal surveillance in EU regarding animal welfare? In the EU, it has to be less emotional, then perhaps certain events of concern need to be defined, and then you can look at those particular events. What is the EU doing about animal ID and traceability? EU is convinced registration of holdings and identification of animals is important to control disease. This is especially true in Foot-and-Mouth Disease (FMD) outbreaks because demonstration of freedom from FMD and tracebacks, etc., are impossible without animal identification (ID). EU has registration and ID of all animals in the entire EU either at the animal level, lot level, or premise level.

**Premise ID Number (PIN) Tag Pilot**

Patrick Webb
National Pork Board

Pillars of the swine health infrastructure are: 1) pre-harvest traceability; and 2) comprehensive surveillance. A swine health infrastructure is beneficial and is proven by the $55 per head profit occurring currently because the US is able to export pork. There are multiple streams to a national surveillance program. The Premises Identification Number (PIN) Tag pilot program is key for that. So, the program takes sows from the breeding farms that are going into the market for harvest, and identifies the sows. This is being done in Iowa, Illinois, Indiana, Texas and Minnesota. The Objectives of PIN are: 1) test the components of a risk-based targeted surveillance approach in the harvest stream; 2) update premises repositories; and 3) present the findings at the 2012 USAHA Meeting. A PIN is assigned by the USDA and is the US assigned number for that premise of hogs. So, there are official tags now
designed for sows going into harvest channels and the tag includes a barcode with the PIN but room on the front of the tag for state and animal IDs. The PINs are kept in the USDA and State Repositories. The project works like this ---- the sow goes to harvest with her PIN tag in. The sample from her and her tag go to the lab. The tag is scanned. If she is from a county where there are feral hogs, then the sample would be then disease tested. So, a decision is made there on whether to test or not and the feedback to the state level is not only on the disease testing but also on what farms are active in your state and are breeding pigs. This allows more conservation of resources so that you are only working with active farms. Challenges – the cost is a little more for the tag because of that bar code. Sometimes it is difficult to get premises location information. There’s debate on whether to go with a local ID (LID) or a premise identification number (PIN). The future intent is to do this on the growing pig side, so that when there is an outbreak, all the at-risk sites show up accurately. Then are those sites part of secure pork supply? Do they have traceability and biosecurity, and is there a negative disease status that can be established so that all those things can happen and pigs can move? Questions to Webb: Are the tags durable? Yes. Is the readability of barcodes long lasting? Yes, about 93% of the time and that will be improved by changing tag color to white, orange, or yellow. Is the PIN linked to Global Positioning Systems (GPS) coordinates? Yes. How do we propose to deal with feral swine? Increase hunting, keep market domestic commercial swine indoors.

USDA-Animal and Plant Health Inspection Service (APHIS) National Surveillance Unit (NSU) Overall Surveillance Update: Status of database and implementation

Ellen Kasari
USDA-APHIS-VS-NSU

What has NSU been doing this past year? Key initiatives include NLRAD; Comprehensive and Integrated Surveillance (e.g. Sow PIN Tag Pilot Project); National Animal Health Surveillances System (NAHSS) Business Process Improvement (an APHIS-wide initiative to make it faster and cheaper to deliver products and services to agency customers. As a part of this, NSU used a six-sigma approach and bovine brucellosis surveillance was the case study to learn those concepts); Enhanced Passive Surveillance (EPS) Swine Slaughter condemnation monitoring expanded; Erysipelas collaboration with swine industry; EPS Pilot Project (a collaboration with Texas, New Mexico, and Arizona); Development of EPS plans and processes (for example in cattle); Clinical practitioner observational data; Slaughter condemnation monitoring; Data management, how to use that; Pilot Project implementation; Market monitoring; Revised surveillance plans (Notifiable avian Flu); and New Surveillance Plans (Bovine Tuberculosis). NSU also released several surveillance activities and reports. Routine reports include: Cattle - bovine spongiform encephalopathy; Sheep - scrapie, Avian - Flu; Swine - classical swine fever, pseudorabies virus, influenza;
Equine - arbovirus activity, equine infectious anemia, and more. National Animal Health Reporting System (NAHRS) Management Reports include Steering committee communications, Annual Report, OIE reporting and more. A Swine surveillance meeting was held August 2012 and resulted in 35 action items. Disease case definitions were developed for NLRAD and Schmallenberg virus. National Surveillance Unit (NSU) published a manuscript “National Animal Health Surveillance Return on Investment.” Preventative Veterinary Medicine 105 (2012), 265-270. NSU did an analysis of caudal fold test (CFT) performance standards for TB. NSU assisted with the Development of Surveillance Information Technology. NSU developed business processes for useful surveillance data and information management. This included data standards and much more. Questions for Ellen Kasari on NSU activities: Did NSU look at this committee’s paper from years ago and look at cattle brucellosis with USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems (AHSIS) recommendations on cattle *brucella*? Probably, but details were not available. Did the CFT evaluations include the EU findings? No, but the US findings will be shared.
The Committee met on October 24, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 8:00 a.m. - 12:05 p.m. There were 52 members and 30 guests present. After the Chair called the meeting to order, the final agenda was approved, activity during the past year was summarized and operational procedures were reviewed. Members were referred to the USAHA website to review the 2011 resolutions and responses. The Chair then introduced the first speaker for the session.

**Time Specific Papers**

Brant A. Schumaker presented a time-specific paper on The US Pet Trade in Dogs and Contagious Disease—Animal Welfare Impacts of an Outbreak of Canine Distemper.


Both papers, in their entirety, are included at the end of this report.

**Presentations**

**Behavior—The Animal’s Commentary on Its Biological Processes and Welfare**

Joe Stookey
Western College of Veterinary Medicine, University of Saskatchewan

The functional significance of an animal's behavioral repertoire is no less important than the functional significance of an animal's circulatory, nervous or endocrine system or its musculature or skeletal structure. All these systems are shaped by natural selection and influence an animal's overall success in passing on its genes. Behavior is an animal's overt response to
stimuli, tempered by its internal motivation; as such, behavior serves as a commentary on an animal’s emotions and cognitive experiences. Therefore, changes in an animal’s environment or exposure to positive or negative stimuli will result in both physiological and behavioral responses. In some situations, measuring and monitoring changes in behavior have distinct advantages over physiological measures that can be invasive and require sophisticated laboratory tests. Changes in behavioral activities and in vocalizations help us to better understand the pain associated with routine procedures (e.g., castration, dehorning, branding) and help lead us to alternatives or better pain mitigating strategies. Recently, play behavior has been shown to represent another example of a behavior that changes following a painful experience. Moreover, animal behavior is used to assess animal welfare. Certain behaviors, such as stereotypes (repetitive behaviors with no apparent function) that we see in some confinement systems are generally accepted as indicators of poor welfare. However, the underlying cause of many stereotypes (i.e. bar biting by sows in gestation crates and stereotypes in stabled horses) is more often the result of limit feeding as opposed to confinement per se. Most recently, attempts have been made to measure an animal’s cognitive bias (whether the animal anticipates getting a reward or a non-reward following the arrival of a new and unknown test – a test for pessimism or optimism) as an indicator of the animal’s emotional health due to housing or past experiences. In the end, understanding and researching animal behavior offers us one of the best views on an animal’s commentary about its very essence and life.

What We Know (and Don’t) About Pain Management for Farmed Animals
Hans Coetzee
Veterinary Diagnostic and Production Animal Medicine; College of Veterinary Medicine, Iowa State University

At least 9 million calves are castrated in the United States annually. Furthermore, at least 4 million calves are dehorned each year (Dairy) and there are approximately 1 million lame dairy cows in the United States at any given time. Therefore, pain associated with elective management procedures and animal production is a significant animal welfare concern. Although the National Cattlemen’s Beef Association (NCBA) and the American Veterinary Medical Association (AVMA) encourage the use of local anesthetics and analgesics to minimize pain and stress associated with dehorning and castration, only 1 in 5 Canadian and US veterinarians currently report using analgesia at the time of castration. Analgesic use is required for piglet castration in the European Union, which may have implications for countries wishing to trade with Europe. Pain management in livestock is challenging for many reasons, including that: 1) pain recognition is difficult in stoic species; 2) no analgesic compounds are specifically approved for pain relief in livestock in the United States; 3) analgesic use constitutes extra label drug use (ELDU) under the American Drug Use Clarification Act (AMDUCA); 4)
there is often a time delay between drug administration and onset of activity (e.g., local anesthesia); 5) many analgesic compounds have inconvenient routes of drug administration (IV) and short drug elimination half-lives that require frequent drug administration for analgesia to be effective; and 6) the cost of analgesic compounds and the associated meat and milk withholding periods are not offset by production benefits in many cases.

There is an urgent need for identifying validated methods of pain assessment in order for analgesic compounds to receive regulatory approval. Without such approval use of any compound for pain relief constitutes ELDU and as such is regulated by the AMDUCA. Under AMDUCA, drugs for pain relief can only be used by or under the supervision of a veterinarian who is responsible for determining an appropriate meat and milk withholding period. Potential pain biomarkers include the use of electroencephalography, thermography, accelerometers, cortisol, substance P, pressure mats, algometers, heart rate, prostaglandin E2 and production parameters. Of these, substance P, cortisol, algometers, heart rate and prostaglandin E2 and some production parameters have been shown to be most susceptible to the effects of analgesic compounds.

Recently the European Union has explored a system of minimizing pain in farm animals using the three S's approach: Suppress, Substitute and Soothe. Suppression involves the removal of any source of pain, which includes the use polled genetics to reduce the need for dehorning, selection of boars for reduced boar taint, and genetic selection of cows for improved conformation to reduce lameness. Substitution involves replacing a painful procedure with one that is less painful. This may include freeze branding, as opposed to hot-iron branding; castration and dehorning at the earliest age practicable; and the use of low-stress handling techniques. Finally, soothing involves the use of appropriate analgesic interventions to alleviate pain in the target species. Taken together, these may offer a systematic approach to reducing pain in livestock.


Retailer Perspective
David Fikes
Food Marketing Institute

As the middle link in the food chain economy of supplier-retailer-consumer, the food retailer plays a unique and central role in value-laden issues such as animal welfare concerns. The food retailer’s approach to that middle position is colored by operating in a competitive atmosphere where differentiation is crucial and razor-thin profit margins allow no room for mistakes. Added to that pressure, food retailers are increasingly leaned upon to be the weighted fulcrum that tips the scales one way or the other when it comes to issues in animal agriculture. Whether retailers approach their relationship between supplier and customer as a bridge, a messenger, an
advocate or an educator, they must weigh a multitude of factors when making key decisions.

Producer Perspective
R. C. Hunt
Andrews Hunt Farms, Wilson, North Carolina

Addressing the current controversy over sow housing, Mr. Hunt described the process for how the industry moved from extensive to intensive systems and why, as well as his personal experience with both types of systems. Principle reasons for the move to intensive systems included concerns for sow heath, injury prevention and worker safety. He emphasized the importance of communication with producers to ensure that their experiences were appropriately reflected in decision-making and indicated their interest in working with retailers to ensure responsible decisions were made. He also indicated a willingness in the swine industry to consider scientific evidence to support different management systems or strategies for successful implementation of those systems in swine production.

Producer Perspective
Robert Krouse
Midwest Poultry Services, Mentone, Indiana

(Due to illness, Mr. Krouse’s written remarks were delivered by Committee Vice Chair B. Thompson)

Mr. Krouse discussed the development of United Egg Producers’ (UEP) animal welfare program, including its impetus and the creation of its independent Scientific Advisory Committee on Animal Welfare. Three objectives for the program were identified: (1) standards that respected the experience of farmers and could also be supported by the best science available, (2) inclusion of mandatory third-party audits, and (3) acceptability of the program to egg farmers and their customers, including grocery stores, restaurants, and food processors. He explained that egg farming practices are being constantly challenged by the USDA, Food and Drug Administration (FDA), customers in the grocery and food service industries, their end users and animal rights activists, and that these challenges have been targeted not at individual farmers but at the industry as a whole. The egg industry needed a program where egg farmers would know what was expected of them, would know what was being done and why, and could document compliance for their customers. He emphasized the importance of anticipating and reacting appropriately to challenges, and used UEP’s stepwise development of conventional cage, then cage-free and organic, and finally, its current work on standards for enriched colony housing as an example of how the UEP’s program has allowed them to address challenges in a positive, proactive way.

Michael David
International Animal Health Standards Unit, National Center for Import and Export, USDA-APHIS, Veterinary Services (VS)

In 2001 the OIE expanded its mandate to include animal welfare. Since that time the OIE has drafted and its Membership (the Delegates) has adopted welfare chapters on transport, humane slaughter, killing for disease control, use of animals in research and education, and stray dog control. In addition, the OIE has also adopted chapters on the transport of farmed fish, and on proper procedures for stunning farmed fish. Two key principles which guide the development of any welfare chapter are that any recommendation must be based on sound science and be outcome focused.

At its May 2012 General Session, the OIE adopted a new welfare chapter on housing and production, specifically, on Beef Cattle Production Systems. This is the first time the OIE adopted a chapter that provides basic guidelines on production practices for a livestock species. It is anticipated that for 2013, the OIE will present a chapter on the Housing and Production of Broiler Chickens, and for 2014, a chapter on Dairy Production Systems.

The OIE has also hosted several Global Conferences on Animal Welfare. The first conference was aimed at raising awareness of the existing OIE welfare chapters; the second conference was focused on encouraging countries to begin to implement the existing guidelines; and the next conference, which will be held in Malaysia in November 2012, will evaluate the effectiveness of countries in implementing the guidelines.

The OIE is aware of the challenges many countries have in implementing the recommended welfare guidelines, and has shown a willingness to work with Member countries to provide support within the framework of its capacity-building initiatives.

Committee Business

The business meeting followed the last presentation and the presence of a quorum was confirmed. One resolution entitled, “Controlled Substances Act Regulations Applying to Drug Enforcement Administration Registrants Acting Remotely for Registrant’s Principal Place of Business” was introduced and, after discussion, approved by the Committee to be transmitted to the Committee on Nominations and Resolutions.

The Committee on Animal Welfare adjourned at 12:00 p.m.
Canine distemper uncommonly affects the pet trade in the United States, in large part due to effective vaccines against canine distemper virus. The presentation described the animal welfare-related consequences of distemper affecting 24 young dogs of multiple breeds shortly after sale by two pet stores in Wyoming over a 37-day period, extending August through October 2010. To the authors’ knowledge, it was the largest outbreak of distemper in pet dogs in Wyoming within the past 20 years.

Diagnosis of distemper was established by a combination of fluorescent antibody staining (FA), reverse transcriptase polymerase chain reaction (RT-PCR), negative stain electron microscopy, and necropsy/histopathology. Sequences of canine distemper virus were obtained from two affected dogs. They were identical based on viral hemagglutinin gene sequences, and were distinct from hemagglutinin sequences obtained in 2010 from a dog diagnosed with distemper in rural Wyoming.

The breeding property from which the pups originated was located in Kansas and was quarantined by the state’s Animal Health Department. Puppies intended for sale were tested for distemper, and distemper was diagnosed on site in November 2010. At that point 1,466 dogs were euthanized to prevent dispersal of the disease through commercial channels. The disease investigation underscored the risks inherent in large-scale dog breeding when vaccination, biosecurity and other animal care practices are suboptimal.

The canine breeding facility was inspected by both state and federal agencies. Animal care and disease prevention and control problems identified included limited medical records; limited quarantine space; dogs without food; no extra food in storage; watering units at the wrong height; inadequate pen space; introduction of purchased dogs of unknown health status from multiple sources, including pet auctions; transport of dogs in inadequately disinfected crates; and recurrent contact between dogs in the breeding facility and local wildlife, such as raccoons and skunks. Although multiple, repeated violations of the Animal Welfare Act were reported, the facility was fined only twice and issued a single formal warning during its 19-year history. A 2010 audit by the USDA’s Office of the Inspector General documented problems with inspections of federally licensed dog breeding facilities in the United States. Some practical steps to prevent and control canine distemper and other diseases and improve animal welfare in similar facilities were described.
Acknowledgement: The authors express appreciation to the state veterinarians of Wyoming and Kansas, and to Paul Grosdidier, Robert M. Farr, Michael Driscoll, Lori J. Maness, Tangney Gray, and Dana Petersen
There are a myriad of opinions about what is necessary and humane handling and care of animals and what constitutes good animal welfare. These opinions are influenced by a person's values, knowledge and experiences. The American Veterinary Medical Association (AVMA) describes animal welfare as how an animal is coping with the conditions in which it lives. AVMA also suggests that ensuring animal welfare is a human responsibility that includes consideration for all aspects of animal well-being, including proper housing, management, nutrition, disease prevention and treatment, responsible care, humane handling, and, when necessary, humane euthanasia. The AVMA further defines animal well-being as the conditions in which animals experience good health, are able to effectively cope with their environment, and are able to express a diversity of species-typical behaviors. Using this framework, protecting an animal's welfare means providing for the animal's needs and includes consideration for all aspects of its well-being. Responsible use of animals for human purposes, such as companionship, food, fiber, recreation, work, education, exhibition, and research conducted for the benefit of both humans and animals, is consistent with the Veterinarian's Oath, the AVMA's Principles of Animal Welfare and AVMA policies addressing a range of issues across species. The Principles emphasize that animals must be provided water, food, proper handling, health care, and an environment appropriate to their care and use, with thoughtful consideration for their species-typical biology and behavior, and that animals should be cared for in ways that minimize fear, pain, stress, and suffering. Accordingly, it is necessary for procedures related to animal housing, management, care, and use to be continuously evaluated, and when indicated, refined or replaced. Conservation and management of animal populations should be humane, socially responsible, and scientifically prudent, and animals should be treated with respect and dignity throughout their lives and, when necessary, provided a humane death. The veterinary profession continually strives to improve animal health.
and welfare through scientific research, education, collaboration, advocacy, and the development of appropriate legislation and regulations.

Additional organizations such as the World Organization for Animal Health (OIE) (http://www.oie.int/), the American Association of Bovine Practitioners (AABP) (www.aabp.org) and the American Association of Equine Practitioners (AAEP) http://www.aaep.org/avmawelfare_principles.htm have typically supported AVMA principles and policies. The AABP has a position on animal welfare, has adopted Principles outlined at (http://www.aabp.org/public/Animal_Welfare/AABP-Prin_An_Welfare-6.2011.pdf), and states, “Humane care and handling of all animals is a key commitment made by the veterinary profession, which includes both treating animals humanely and ensuring that others do so. That the determination of what is humane and appropriate animal care should be based on science.” The AABP believes that management systems, medical practices and surgical procedures should minimize pain, discomfort and distress; utilize current scientific and expert opinion where available; and that the health, productivity, behavior, and physiological responses of the animal are reflective of its welfare. Animal production is part of the chain of food production and healthy animals are more often the most productive animals. Healthy animals have a greater ability to combat disease than those that are stressed and or immunocompromised. Producers have taken this into account, along with consumer expectations and demands in the domains of animal health, welfare and environment, and have developed good agricultural practices (GAP) as outlined in 2004 by the Food and Agricultural Organization (http://www.fao.org/prods/gap/Docs/PDF/5-GAPworkingConceptPaperEXTERNAL.pdf).

Hence, it is the authors’ belief that animal welfare is a leading issue occupying the attention of the veterinary and livestock communities, as well as that of consumers. Therefore, the evaluation of disease states, such as lameness, and the development and application of protocols to prevent them are necessary to protect animal welfare and ensure productive animals. In a study by Kossaibati and Esslemont 1, lameness was described as one of the two most costly diseases in the dairy industry due to its significant negative effects on the well-being and economic productivity of beef and dairy cattle. Lameness is highly prevalent in today’s beef and dairy industry, with reports of nearly 20% for parity one animals and almost 50% for cows that are greater than parity one 2. In a recent article by Leach et al. 3, prevalence estimates of lameness in European countries were reported to range from 19% on organic farms in Germany, to 31% in Simmental dairy herds in Austria, to 36% in UK herds. Additionally, it was stated that “…lameness is the most significant challenge for the dairy industry to overcome given obvious disruption of animal welfare and severe economic losses.” 2-5

Problems with lameness often lead to additional negative impacts on production, including reductions in milk production (through increases in mastitis and decreases in feeding) and decreases in reproductive indices in
cattle. In a recent study, cows detected with clinical lameness during the first 70 days of milk production were 25% less likely to become pregnant compared with cows that were not lame. In dairy cattle this is especially problematic due to already low pregnancy rates, approximating 18% in some herds. Lameness is known to lead to earlier culling of animals as well as lower carcass weight, conformation class, and fat cover, and lower carcass economic value. Earlier identification and treatment can improve the value of the carcass and reduce culling rates. As reported for a study by Booth et al., “Lameness was never associated with increased survival in any of the models studied,” which highlights the importance of preventing lameness.

The economic impact of lameness is significant. Each episode is estimated to cost $302 to $446 and these costs increase with the severity of the lameness. In a study by Barker et al., milk losses associated with sole ulcers and white line disease were estimated to be 574 and 369 kg/cow, respectively, per 305 days’ lactation in 30 herds. The costs of specific lesions were also determined in a recent study to be $216.07, $132.96 and $120.70, per case of sole ulcer, digital dermatitis and foot rot, respectively. The main contributors to the total cost per animal were milk loss for sole ulcer (38%), treatment cost for digital dermatitis (42%), and the effect of reduced fertility for foot rot (50%). Based on this information it was recommended that 97.3% of foot rot cases, 95.5% of digital dermatitis cases and 92.3% of sole ulcer cases be treated. Results of these studies are important information for producers that can assist them in making appropriate decisions on treating lameness, as well as create awareness of the ramifications of lameness in their herds. In another recent study by Eterma et al., decision support models were developed and utilized to predict the economic profitability of such actions. Although this kind of modeling is beneficial and important for producers, prevention of lameness is even more important than determining whether lameness is worth treating.

Prevention of lameness has been looked at from many angles because many factors affect hoof health, including genetics, conformation, diet, contagious agents, hygiene, housing systems, animal behavior, and management. It is well known that foot and leg disorders that result in lameness tend to be higher in confined management systems and at greater production levels. There are a number of studies looking at different flooring and its effects on foot health. In a recent study evaluating rubber-matted feed stalls together with asphalt walkways there were found to be reductions in claw wear (3.29 +/- 0.31 and 4.10 +/- 0.32 mm/month for lateral and medial claw, respectively). Also, in a recent study, it was shown that housing significantly impacted the strength/laxity, laminar morphology, connective tissue, and biochemistry of the sole. In this same study, sole lesions were assessed and were found to be significantly worse in heifers housed in cubicles compared with those in straw yards, and in lactating/pregnant heifers compared with maidens. Cubicle housing and parturition each increased connective tissue metabolism (and were additive in this study) and these changes in connective tissue composition impaired
the biomechanical resilience of the hoof\textsuperscript{17}. As this study would indicate, changes in the structure of the foot are able to be influenced by housing, management, and pregnancy/hormonal status of young stock. In an another study\textsuperscript{18}, housing calves in slatted pens from 3 to 7 months of age was associated with a 1.7-fold increase in culling risk, compared with housing calves in litter pens. Cows for which housing system had been changed 4 times before their first calving were at 1.4 times increased risk for culling when compared with cows that underwent 2 housing changes. These results indicate that rearing factors affect the productive life of dairy cows.

The ability of the environment to influence the development of the foot has been grossly observed in Mustangs and range cattle but has not been scientifically assessed. Range cattle and Mustangs must cover long distances to obtain food and water, and tend to have larger feet and tougher solar surfaces than cattle on small grass lots. Non-scientific examination of Mustang and range cattle feet reveals the weight-bearing surface to be greater than in animals with similar body frame size; hence, more surface to bear the animals' weight. The environment selects for better feet through "survival of the fittest" and, in turn, influences the gene pool, selecting for animals that are most able to survive these rugged environmental conditions. Accordingly, Mustangs have been bred to quarter horses and thoroughbreds to improve the feet of these breeds. Genetics is not the only player, however, as shown from results of recent studies\textsuperscript{17,18} where the environment also significantly affected the health and development of the foot. There seems to be missing information on what is necessary for optimal growth and development of the bovine foot, as well as the equine foot, so more studies are needed to determine how the environment plays a role in foot development. It has been estimated that more than 90% of lameness in cattle has its origin in their feet\textsuperscript{1,2}. Accordingly, the production of healthy functional feet is a logical starting point in the prevention of lameness. Evaluation, development and implementation of better management protocols are imperative for improving the well-being of livestock through prevention of lameness in growing and adult animals. A recent review by Cook and Nordlund\textsuperscript{16} addressed various aspects of the dairy cow's environment, including comfort of free stalls, stocking densities, and rubber flooring, and the impact of these on lameness. This study, as well as others, highlighted that changes in environment can assist in meeting the developmental needs of animals\textsuperscript{16-18}.

We are interested in more fully evaluating the use of housing and management to create positive changes in the bovine and equine foot. The positive changes being evaluated are an increase in the amount of bone resulting in more surface area to bear weight, and an increase in the size and thickness of the digital cushion. The digital cushion functions as a shock absorber and protects the structures underneath\textsuperscript{2,17,19}. Decreases in the thickness of the digital cushion in cattle have been reported to be related to contusions of the claw horn capsule and such contusions are a consequence of the lesser capacity of the digital cushion to dampen the pressure exerted
by the third phalanx on the soft tissue beneath. Also, it was shown in a study by Bicalho, et al. that the prevalence of sole ulcers and white line disease is significantly associated with the thickness of the digital cushion. Cows having a digital cushion of thickness in the upper quartile had an adjusted prevalence of lameness 15% lower than those having a digital cushion of thickness in the lower quartile.

If the characteristics of housing that produce a healthy foot could be identified (so that the foot would possess increased biomechanical resilience with more effective weight bearing), then (logically) there would be a decrease in appearance and severity of lesions. If these positive changes could be induced by implementing new housing and management protocols for calves and foals at minor cost they would be welcomed and adopted by producers and supported by consumers.

Additionally, there is growing pressure in the equine and, especially, the food animal industries to improve the welfare of animals to meet the demands of consumers for animals and products that are welfare-certified. Establishment of management practices that improve the welfare of animals often results in increased sustainability of the production system due to increases in production and longevity in the herd. The ability to reduce culling rates and retain animals in the herd for longer periods of time is economically beneficial for producers because it raises the net income of the operation. The major cost associated with herd replacements is rearing cost. For example, the replacement heifer, especially the dairy heifer, is considered to be a cost to the dairy operation and not a potential profit center. Heifers are viewed as an expense and not as an investment, so the dairy heifer grower industry was developed. Although the dairy heifer grower industry has provided opportunities, it has also presented challenges in terms of growing quality heifers. The cost of raising heifers in 2010 was found to be, on average, between $1,600 and $1,850 and these expenditures did not guarantee that the heifer would be an exceptional or even fair animal in the production system. Additionally, replacements in beef herds are not truly profitable until they reproduce and offspring are able to be raised. Therefore, management protocols that allow replacements, including breeding bulls, to maximize productive life are of economic benefit to the farmer and welfare benefit to the animal. Culling rates in dairy farming can be highly variable, ranging from 16% to 45% with a rate of 30% considered to be a goal. This says something about the rigors of the industry. For an animal to reach its full potential the needs of the animal need to be addressed.

Various factors come into play when rearing a production animal, including nutrition, housing, and prevention of disease. Adequate nutrition, starting with appropriate colostrum consumption by the foal, calf, piglet, etc., followed by meeting the nutritional needs of the growing animal, has been shown to reduce mortality and morbidity and allow for more productive replacements. Appropriate housing with attention to biosecurity to prevent disease spread, and management protocols that include vaccination and deworming are also important to reduce morbidity and mortality. To ensure
animals reach their genetic potential all factors should be analyzed and modified as necessary to produce the healthiest and most productive animal. The ability of animals to live comfortably due to appropriate foot development, whether on concrete pads or in dry lots, will result in greater: longevity in the herd (reduction in culling rates), fertility, milk production and weight gains. The bottom line being increased profit margins for the producer and producing welfare-certified products that meet consumer demands. Unfortunately, management protocols often focus on preventing one disease state, while inducing or predisposing to another so protocols need to be fully evaluated. The development of new protocols that are effective in preventing lameness, which can be adopted by the livestock industry and incorporate welfare-certified practices resulting in the production of replacement animals that can withstand the rigors of the industry, lead to enhanced productive life and is the focus of the research reported here.

A preliminary study was performed by our research group that included a total of 8 bull calves, 4 Holsteins and 4 Jerseys. The calves were randomly assignment with 4 in a control group and 4 in a treated group with an equal number of Jerseys and Holsteins in each group. The control group was reared in accord with standard practices—in calf hutches until weaning and then housing on pasture lots. The treated calves were housed in calf hutches for the first 2 weeks of life and then were allowed free access to a half-mile lane where they walked for at least 2 miles a day on rocky terrain. When all calves reached 4 months of age they were humanely slaughtered and their legs were collected and evaluated utilizing computed topography (CT) scans. The information from the CT scans was evaluated, using 2 software programs: Mimes 14™ (Materialize; http://www.materialise.com/micro-CT) and 3-D Studio Max (Discreet; www.discreet.com/3dsmax.). A three-dimensional analysis of the medial claw (including middle phalanx (P2) and the distal phalanx (P3)) and the lateral claw (including P2 and P3) of the right rear foot from each calf was performed. The surface area of the individual bones was calculated and evaluated, comparing breed and treatment status. The results of this study revealed that the surface areas of P2 and P3 for the medial and lateral claws in the treated group were increased in each calf by an average of 45mm$^2$ and 81mm$^2$ and 193mm$^2$ and 219mm$^2$, respectively. Additionally, the treated Jerseys had a greater average increase in the surface area of lateral P3 per calf when compared to Holstein controls (349mm$^2$ in comparison to 90mm$^2$).

Our preliminary study appears to suggest an environmental role in the development of the boney structures of the bovine foot. Additional studies involving more calves over a longer period of time and incorporating longer walking times may be necessary to permit maximum bone remodeling so that the environment’s impact on the bovine foot can be more fully assessed. The effect that the environment may have on the formation of other structures, such as the digital cushion, also needs to be evaluated. Ultimately, it may be necessary to expose animals to essentially range conditions in order to
maximize the ability of the environment to effect the development of the structures of the bovine foot including the phalanges and the digital cushion.

To assess the changes seen in livestock feet it is important to evaluate both boney structures and soft tissues. Lameness has been associated with pathologic changes of the lamina; bones (distal phalanx (P3), navicular bone); synovial structures, such as the coffin joint and navicular bursa; and tendons and ligaments, including the superficial and deep digital flexor tendons, and the impar ligament. However, little emphasis has been placed on the role that soft tissue structures, such as the digital cushion and the collateral cartilages of the heel region, play in lameness. It has been hypothesized that the health of the soft tissue structures of the heel plays a primary role in equine soundness especially the health of the digital cushion because it is the primary landing zone of a functional foot and provides support for distal descent of the pastern. The digital cushion in cattle is different than that of the horse, but also has recognized importance in protecting underlying structures.

Because there has been little emphasis on these structures, there has not been a complete set of physical exam parameters defined to evaluate the equine heel. Development of these parameters is important so that every veterinarian can accurately predict the anatomical characteristics of a horse’s foot as a first step toward evaluating management protocols aimed at encouraging the development of healthy ones. It was hypothesized that the anatomical characteristics of the heel region of the equine foot can be accurately predicted through physical examination and diagnostic imaging. A study was performed that evaluated 8 left front feet from Thoroughbreds aged 4 to 20 years. MRI and CT scans were performed on each foot along with a clinical examination of cadaver feet that included physical examination, ultrasonographic and radiographic imaging. The physical examination included a video of the foot. Ultrasonographic evaluation included examination and measurement of the heel region, the depth of the central sulcus, and measurements of the area and circumference of the lateral and medial parts of the digital cushion. Radiographic imaging included lateral views where a barium line was placed on the dorsal hoof wall and the medial heel tubule. A zero subject-to-film distance was used and the primary x-ray beam was centered on the solar margin of P3. Mimics® is a computer program traditionally used in human medicine to create accurate 3D models of anatomic structures and it was utilized in this study to reconstruct 3D images of the digital cushion, as well as the bony structures of the foot, from the MRI and CT scans. Specifically, raw data from the CT scan of the middle (P2) and distal phalanges (P3) and the navicular bone was imported into the program, and using a preset function, the bones were sectioned and reconstructed. Mimics® was also used for reconstruction of the digital cushion. Raw data from the MRI scan was imported into Mimics®. The digital cushion was hand traced in each slice of the MRI into a mask and then the mask was converted into a 3D image. Following 3D reconstruction, the volumes of the tissues were recorded. Volumes determined using Mimics®
allowed the feet to be ranked from highest to lowest volume of the digital cushion. Volume rankings from Mimics® and the physical examination parameters were then compared and ranked from best to worst based on prediction of digital cushion volume. Radiographic results were ranked as well, with lateral radiographs of each foot examined and subjectively ranked from best to worst by comparing heel volume. Additionally, a Mimics ranking was determined using a ratio of the volumes of the reconstructed digital cushion to distal phalanx (DC:P3) and feet were ranked from highest to lowest ratio. A ratio was used instead of the raw digital cushion volume, to standardize for size differences between horses.

Results of the rankings were combined based on physical examination findings, Mimics® volume ratios, and radiographic findings. A linear regression model was used but due to the low number of hooves examined, this study should be considered as a very preliminary screening for measures that may serve as predictor variables for digital cushion volume. A statistical analysis of the physical examination results was promising with respect to the number of fingers that fit between collateral cartilages (p=0.06, $r^2=0.47$) and the digital cushion plus frog depth (p=0.0085, $r^2=0.71$). Statistical analysis of ultrasonographic results revealed several individual parameters having statistical significance for predicting digital cushion volume: central sulcus to skin depth (p=0.02, $r^2=0.62$), lateral digital cushion area (p=0.05, $r^2=0.50$), medial digital cushion area (p=0.02, $r^2=0.58$), medial digital cushion circumference (p=0.02, $r^2=0.60$), and lateral fibrocartilage echogenicity (p=0.02, $r^2=0.60$).

Further studies of this kind that more exhaustively define physical examination parameters are necessary to accurately predict the volume of the digital cushion. This knowledge may allow digital cushion evaluation in future studies without the need for an MRI scan or dissection, which would permit more animals to be examined more economically. Additional physical and clinical examination parameters are needed to accurately evaluate collateral cartilage and digital cushion fibrocartilage characteristics. Therefore, a tool to help objectively determine the density of the digital cushion (likely associated with percentage of fibrocartilage) needs to be developed. Continued evaluation of the best methods, tools, and parameters to use for clinical evaluation of the foot, including existing technologies of ultrasound and radiographs, is imperative. Combining all parameters into a single model would be beneficial as would analysis of more feet in its development. There are animal welfare implications to consider such as prediction of hoof health as it relates to readiness for work, risk for lameness, and long-term athletic soundness. These methods can be used in preventive medical practice to prevent and/or curtail significant episodes of lameness, thereby reducing pain and improving the welfare of the patient. Such methods benefit patient and client alike in that the development of economic methods to provide a reliable prognosis for the horses in question will most likely also support earlier detection and treatment of lameness.
An overarching goal of this project was to evaluate and develop management protocols to prevent lameness. Further development of methods to evaluate boney and soft tissues of the equine and bovine foot will provide methodologies that can be utilized in evaluation of management protocols. The focus of these studies is aimed at the development of a healthy functional foot that can perform in the arena, racetrack, or dairy parlor and result in a healthy and productive animal. This project and others like it provide value to livestock producers not only in the United States but globally. Obtaining information that can be used to develop science-based management practices, which in turn facilitate maximal growth and the health of replacements so as to extend the productive life of an animal provides for increased sustainability in current production systems. In turn, producers should benefit from better economic returns due to improvements in the welfare of their replacements. Extension programs can be utilized to educate livestock producers and agricultural educators so as to facilitate adoption of welfare-friendly management protocols for livestock replacements including prevention and treatment of lameness.

Acknowledgements for the Bovine Study: Alabama Experiment Station Grant; Hatch Project
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7. Barker ZE, Amory JR, Wright JL, Mason SA, Blowey RW, Green LE. Risk factors for increased rates of sole ulcers, white line disease, and digital
REPORT OF THE COMMITTEE


The Committee met on October 20, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina from 12:30 4:45 p.m. There were nine members and 15 guests present. There were no resolutions to review from the previous meeting. Co-chair Kevin Snekvik announced that Andy Goodwin had stepped down as co-chair, taking a new appointment with the US Fish and Wildlife Service and that Lester Khoo will be replacing Andy as co-chair. There was no time-specific paper this year and the meeting was continued with items as listed on the updated agenda to the Committee.

Presentations

Update on USDA-APHIS Aquaculture Program, the National Aquatic Animal Health Plan (NAAHP) and Introduction of a USDA-APHIS Voluntary Aquaculture Heath Certification Program
Janet Whaley
USDA-APHIS

Dr. Whaley provided the background and overview of the Aquaculture Program and the NAAHP. She then led a discussion on the need for a voluntary aquaculture health certification program. Concerns brought forth included the cost to producers for the certification testing and what the benefits this would provide for the producers. This certification program would be for specific pathogens as opposed to facility certification which would be for all pathogens. Cost/benefit analysis for the industry would need to be conducted to ascertain if this program would be beneficial especially since producers are involved in either international exports or interstate commerce.
Implementation of a Surveillance Plan for Infectious Salmon Anemia Virus (ISAV) in the Pacific Northwest
Janet Whaley
USDA-APHIS

Dr. Whaley provided background and an update of the ISAV surveillance plan. The enhanced surveillance builds upon the existing State, Tribal, Federal and industry health infrastructures and activities and is in Alaska and Washington due to proximity to British Columbia, Canada. It is focused on detection of ISAV including HPR0. This surveillance involves geographically distributed biannual sampling (Summer/Fall and Spring) of Pacific salmonids native to the Pacific Northwest for two years. The coordinated screening and testing utilizes mainly molecular and to a lesser extent virus isolation. Proficiency testing lead by NVSL is currently underway. In conjunction with this plan, there are parallel research efforts including molecular analysis of samples for other orthomyxovirus.

Current Status of the Infectious Salmon Anemia Virus (ISAV) Real Time-PCR Proficiency Exam
Janet Warg
National Veterinary Services Laboratory (NVSL), USDA-APHIS

Dr. Warg provided information on the possible molecular assays for screening for ISAV and the eventual assays that were chosen. The selected assays have not been validated by the OIE reference laboratories and thus validation is being done by NVSL in conjunction with other diagnostic laboratories involved with ISAV testing in the United States. A proficiency exam (PE) is currently underway and should be completed within six months. The PE will evaluate amplification efficiency, limit of detection, and reproducibility within and between the involved laboratories. The PE utilizes both European and North American genotypes of ISAV. An overview of the testing algorithm that will be implemented in the Pacific Northwest was presented.

Integration of the Aquatic Health Testing Laboratories into the National Animal Health Laboratory Network (NAHLN)

In lieu of a presentation, there was a discussion facilitated by Barbara Martin, Coordinator for the NAHLN. She led this off with an update on the NAHLN Concept Paper that describes four laboratory types including specialty laboratories. The concept paper was open for comment and changes have been incorporated. Martin is currently working with regulatory staff and it is anticipated that it will be published in the federal register after election where there will be a call for comments followed by a propose rule and final rule. To facilitate the process, an electronic copy of the concept paper will be provided to the committee by Kevin Snekvik. Martin shared what she could provide to help to move the process forward including the NAHLN check list as well as the requirements to become a NAHLN accredited laboratory. She also mentioned that there are online modules to
aid in training and that there might be a possibility of another quality management course. Discussion within the committee led to the conclusion that NAHLN accreditation would be the way to go but it might be prudent to survey the aquatic health diagnostic laboratories since they are still interested due to economic changes.

**Update from the US Fish and Wildlife Service (USFWS) on Regulating Diseases under the Lacey Act, Including Chytrid Fungus, Batrachochytrium dendrobatidis**

Craig Martin
USFWS Branch of Aquatic Invasive Species

Mr. Martin gave background and an overview of the FWS mission in regards to injurious species to wildlife including the use of the application of the Lacey Act. Included in that information are also two pieces of pending legislation that have been introduced specifically, Invasive Fish and Wildlife Prevention Act of 2012 (HR5864 and S3606). However, these are unlikely to pass due to the upcoming elections. In the near future, there will be continued discussions on the petition from the Defenders of Wildlife within the USFWS which includes a meeting on October 30, 2012. The committee sought clarification on the petition especially if it will result in a proposed rule. Martin mentioned that the agency position on this might be forthcoming and urged that those attending the October 30, 2012 meeting request the agencies official stance.

**Committee Business**

No resolutions or other actions were brought forth at this time.
The Committee met on October 22, 2012 at 7:00 p.m. at the Greensboro Sheraton Hotel in Greensboro, North Carolina. There were 10 committee members present and 12 guests. Three of the five speakers were first time USAHA meeting attendees. No old business was opened for discussion.

Presentations

Converging Science, Medicine, and Agriculture: An Update on Executing the NADC’s ‘One Health Mission’
Kurt A. Zuelke, Crystal Loving
USDA-ARS National Animal Disease Center (NADC)

The NADC was established in 1961 to conduct basic and applied research on the livestock and poultry diseases of major economic importance to US agriculture. Now 50 years later, the NADC is the largest US federal animal health research facility focused on high-impact endemic diseases of livestock and wildlife. In 2009, we moved into new $470M state-of-the-art laboratory and animal facilities that now enable us to conduct high-level biocontainment research in a wide range of large animal livestock and wildlife species. To coincide with our transition into these new facilities, the NADC leadership team developed an ambitious five-year business plan that leveraged our new facilities with ongoing scientific advances in genomics and the life sciences to address the nation’s most pressing animal health problems. The NADC’s business focuses around four strategic research themes that include ruminant diseases and immunology; emerging diseases (most notably viral and prion diseases); zoonotic diseases in wildlife and livestock species; and, microbial ecology in food safety and animal health. NADC researchers across all four of these strategic themes are pioneering early development and integration of high-throughput genomics and systems biology platforms to yield new and exciting breakthroughs in potential molecular-based diagnostic and therapeutic technologies. For example, NADC scientists have sequenced and analyzed the genomes and expressed proteins from several strains of the causative bacteria for Johnes’s disease. Using this knowledge, these scientists recently identified highly specific protein markers that show promise in detecting early stage pre-clinical infected animals so they can be isolated and culled before shedding the
organism or developing clinical disease. Johne’s disease costs the US dairy industry over $1 billion annually, and having a reliable pre-clinical diagnostic test would be a major breakthrough for better controlling and minimizing the impact of this disease. In another example, NADC researchers are investigating the impact of gut microbial ecology to enable better management of animal and food-borne pathogens, decrease the prevalence of antibiotic resistance, discover and develop new antimicrobial agents, and optimize nutrient utilization and immune system function in livestock and poultry. Another area where NADC is seeking biotechnology partners is in the development and validation of new genomics and bioinformatics based methods to diagnose and analyze newly emerging strains of influenza virus. Since 2009, NADC’s influenza research team has conducted successful proof-of-principle research demonstrating the potential power and validity of a comparative genome sequencing-based approach to early diagnosis and analysis of newly emergent strains of influenza virus. A key challenge (and opportunity) is to now develop and validate the bioinformatics analyses that would enable rapid assembly and analysis of multiple genomes in an actual disease-response time frame. The presentation will describe these and other recent findings of NADC research addressing contemporary animal health and food safety problems in livestock, wildlife and poultry.

Selection of Broilers with Enhanced Innate Immune Responsiveness: Functional Genomic Profiling to Improve Resistance against Food-borne Pathogens
Christina L. Swaggerty1, Igal Y. Pevzner2, and Michael H. Kogut1
1USDA, Agricultural Research Service (ARS); 2Cobb-Vantress, Inc.
Economic pressure on the poultry industry has directed selection towards fast-growing broilers that have a reduced feed conversion ratio. Selection based heavily on growth could adversely affect immune competence leaving chickens more susceptible to disease. Since the innate immune response directs acquired immunity, efforts to select poultry with an efficient innate response would be beneficial. We have been evaluating the innate immune system of two broiler lines to assess their capacity to protect against multiple infections. We have shown increased in vitro heterophil function corresponds with increased in vivo resistance to Gram-positive and -negative bacteria and protozoan parasites. Additionally, there is increased mRNA expression of pro-inflammatory cytokines/chemokines in heterophils isolated from the resistant line compared to the susceptible line. The data indicate differences in innate responsiveness are under genetic control. Recently, a small-scale selection trial was begun. We identified sires within a broiler population with higher and/or lower-than-average pro-inflammatory cytokine/chemokine mRNA expression and subsequently utilized small numbers of high expressing and low expressing sires to produce progeny with increased or decreased, respectively, pro-inflammatory cytokine/chemokine profiles. This novel approach should allow us to improve breeding stock by improving the overall immunological responsiveness, and
will produce a line of chickens with an effective innate immune response, which should improve resistance against diverse pathogens, improve responses to vaccines, and increase livability. Ongoing work from this project is providing fundamental information for the development of poultry lines that will be inherently resistant to colonization by pathogenic and food-poisoning microorganisms. Utilization of pathogen-resistant birds by the poultry industry would significantly enhance the microbiological safety of poultry products reaching the consumer.

Center for Veterinary Biologics Activities and Current/Emerging Issues
Richard Hill
Center for Veterinary Biologics (CVB), Veterinary Services (VS), USDA-APHIS

Dr. Hill discussed the recent modernization efforts in the Veterinary Services, as well as those currently underway in APHIS. Recent program activities include emerging animal health issues, particularly in the area of West Nile Virus (WNV) and Epizootic Hemorrhagic Disease (EHD) in white tail deer during 2012. A new management approach is being proposed for bovine tuberculosis and brucellosis and a proposed rule and program standards are expected to be published soon.

The Veterinary Services modernization, "Vision and Science" will be implemented using a five prong approach: Transform the culture, build new collaborations, optimize animal health competencies, support readiness and response, and invest in technical infrastructure. Hill stressed in this modernization the new priorities of VS, and the CVB, will be regulatory framework, import and export, emergency management, surveillance, one health and wildlife.

In summary, Hill showed the proposed CVB budget and then compared it to funding over the last nine years. The 2012 budget is close to 16 million dollars, and in 2004 the appropriated budget was just over 15 million. A table representing the efforts of the CVB during 2010-2012 showed that there were increases in almost all categories of activities, including 6,000 submissions and 40 product licenses and permits, despite shrinking budgets.

Special mention was given to the new FMD vaccines that have been permitted or licensed; one is a foreign-manufactured killed vaccine, and the other is a domestically-produced adenovirus vector in which the capsid gene is incorporated into the virus vector genetic material. He also mentioned the in vitro test development initiative for all rabies vaccines and the international collaboration in the effort to design and implement a test which reduces animal use. Another area that was mentioned is that of labeling standards, both for organically produced products, as well as the simplified one-tier label claim being proposed for all licensed products. Hill highlighted a few key meetings that presented alternate methods to test the efficacy of a product versus using animal tests.

Hill stressed that it has been 100 years since the Virus- Serum -Toxin Act was signed in 1813. His organization is requesting anyone who may
have old photographs or materials to send a copy to the CVB for use in a presentation they are putting together to celebrate the centennial and illustrate the impact of biologics on animal health.

**Applying New Science and Technology to Improve Regulatory Testing: Recent Interagency Progress and Future Opportunities**

William S. Stokes  
Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM), National Institute of Environmental Health Sciences (NIEHS), National Institute of Health (NIH), Department of Health and Human Services (DHHS)

Recent and continuing advances in science and technology are providing new opportunities to improve the efficiency and accuracy of regulatory safety and efficacy testing for drugs, vaccines, and other products. The ICCVAM is a Federal interagency committee composed of 15 Federal research and regulatory agencies that carries out activities to promote the development, validation, and regulatory acceptance of new, revised and alternative test methods applicable to Federal agency needs. ICCVAM, together with its supporting National Toxicology Program Interagency Center for the Evaluation of Alternative Methods (NICEATM) at the National Institute of Environmental Health Sciences (NIEHS) recently released a new draft Five-Year Plan that emphasizes the role that ICCVAM and NICEATM will serve in transforming regulatory testing by promoting the application of innovative science and technology. New methods for potency and safety testing of human and veterinary vaccines are one of the four highest priorities. Recent NICEATM-ICCVAM workshops have focused on identifying promising technologies that can be used to improve the testing efficiency and accuracy for several vaccines. The regulatory acceptance and use of scientifically valid new methods is expected to provide for continued and improved protection of human and animal health while also contributing to more humane and reduced animal use.

**Controlling Wild Pig Populations: A Novel Approach to Species-Specific Immunocontraception**

Frank F. Bartol\(^1,4\), Anna M. Chochran\(^3\), Alexandre M. Samoylov\(^3\), Valery A. Petrenko\(^2,4\), Timothy D. Braden\(^1,4\), Nancy R. Cox\(^2,3,4\), Stephen S. Ditchkoff\(^5\), Tatiana I. Samoylova\(^2,3,4\)

\(^1\)Department of Anatomy, Physiology and Pharmacology; \(^2\)Department of Pathobiology; \(^3\)Scott-Ritchey Research Center; \(^4\)College of Veterinary Medicine and \(^5\)School of Forestry and Wildlife Sciences, Auburn University

Wild pigs (Sus scrofa) pose a real and growing problem on a global scale. In the US alone, the wild pig population is estimated in excess of 4 million animals. Wild pigs are omnivorous, eating plants including cultivated crops, as well as invertebrates, smaller vertebrates, eggs and even carrion. Beyond the threat posed by these animals to fragile ecosystems, damage to property and related agribusiness losses due to wild pigs in the US are
estimated to approach two billion dollars annually. Additionally, wild pigs carry and can transmit diseases such as swine brucellosis and pseudorabies to domestic pigs, other domestic animals and humans. Thus, the growing wild pig population poses a risk to both animal agriculture and public health. Controlling wild pig populations is both essential and challenging. Traditional approaches, such as hunting and trapping, while part of the solution, are insufficient to deal with a problem of this magnitude. Technologies aimed at control of wild pig populations via regulation of reproduction have great potential. However, given the highly conserved nature of mechanisms regulating mammalian reproduction, any such technology must be species-specific in order to avoid suppression or ablation of reproduction in mammalian species other than the pig. At Auburn University, phage-display technology is being employed to develop pig-specific immunocontraceptive vaccines. A filamentous phage is used as a delivery vector for immunogenic peptides. The phage vector itself contributes to vaccine antigenicity. Using this approach, one strategy is aimed at induction of immunogens that will interfere with sperm-egg interactions and block fertilization.

To this end, multiple phage-peptide constructs were generated to mimic zona pellucida (ZP)-binding peptides expressed normally on porcine sperm cell surfaces. Phage constructs were selected from a phage display library based on their ability to bind the ZP with species specificity. Domestic swine vaccinated with these phage-peptide constructs produced anti-sperm antibodies. Species specificity of anti-sperm antibody binding was evaluated using spermatozoa from pigs, dogs, bulls, cats and mice. Phage-peptide constructs were identified that induced antibodies in vaccinated swine displaying differing degrees of species specificity. Reproductive tracts obtained from immunized sows displayed no gross pathology as a result of immunization with phage-constructs. Species-specific immunocontraception, developed using phage display technology, may provide an environmentally safe and effective method for suppression of reproduction in wild pigs through interference with sperm transport and/or inhibition of fertilization.

Committee Business

In summary the meeting went very well with some 20 plus attendees. A few additional points from the speakers are noted. In Dr. Loving’s presentation it was noted that by 2050 the earth’s population will be approximately 9 billion people and that will require doubling the food supply. Animal health and one health will become increasing important. Loving showed the budgetary increases per federal government agency over the last decade or so. The NIH budget doubled since the 1990s while the USDA budget only increased a few percent. USDA will require additional funding levels to sustain the One Health initiative.

Dr. Swaggerty showed that in the US there are still three-five million cases of food poisonings per year costing an estimate of $5 to $15 billion with 30,000 hospitalizations and causing 500 fatalities.
Dr. Bartol indicated even though the research results show great promise as a means of controlling the wild pig population, no hurdles have been jumped as yet with the regulatory agencies dealing with a number of issues that will be required to use this technique in the field.

No other business was discussed and the meeting was adjourned.
REPORT OF THE COMMITTEE ON BLUETONGUE AND RELATED ORBIVIRUSES

Chair: N. James Maclachlan, CA
Vice Chair: William C. Wilson, KS

T. Lynwood Barber, CO; Charles Brown, II, WI; Stan Bruntz, CO; Joseph Corn, GA; Barbara Drolet, KS; Edward Dubovi, NY; Anita Edmondson, CA; James Evermann, WA; Robert Fulton, OK; Dorothy Geale, CAN; Robert Gerlach, AK; Paul Gibbs, FL; Chester Gipson, MD; William Hartmann, MN; Larry Hawkins, MO; Richard Hesse, KS; Linda Hickam, MO; Thomas Holt, FL; Holly Hughes-Garza, TX; Bruce King, UT; Randall Levings, MD; Francine Lord, CAN; David Marshall, NC; Daniel Mead, GA; Eileen Ostlund, IA; Charles Palmer, CA; James Pearson, IA; William Pittenger, MO; Justin Roach, OK; Mark Ruder, KS; Shawn Schafer, ND; Charly Seale, TX; Laurie Seale, WI; John Shaw, AA; David Stallknecht, GA; Susan Tellez, TX; Mark Walter, PA; Skip West, OK; George Winegar, MI.

The Committee met on October 22, 2012 at the Sheraton Hotel, Greensboro, North Carolina, from 1:00 to 5:20 p.m. There were 15 members and at least 40 guests present. James Maclachlan and William Wilson, Chair and Vice-chair, respectively, introduced the meeting. There was discussion of the previous year’s resolution that the USAHA support efforts to remove the serotypes of bluetongue virus (BTV) that have been identified since 1999 in the Southeastern United States from the Department of Homeland Security’s select agent list. Two resolutions were advanced for consideration from this year’s meeting.

Presentations

Ten Years of Experience with Bluetongue in the EU. Lessons Learned
Francisco Javier Reviriego Gordejo
Head of Sector Disease Control and Identification; European Union, Brussels, Belgium

Dr. Reviriego Gordejo presented an overview of the sequence of events that occurred in Europe during their recent outbreaks that began in the Mediterranean Basin in 1998. He then reviewed the EU response to this event, the current situation, and an analysis of its economic and production impacts.

Spatial Analysis of Bluetongue and Epizootic Hemorrhagic Disease Virus Isolations as a Model to Monitor Impacts of Climate Change
David Dargatz
USDA-APHIS-Veterinary Services (VS)

This study focuses on bluetongue (BT) and epizootic hemorrhagic disease (EHD) viruses as candidates for an animal disease model that might be sensitive to large-scale climatic conditions associated with climate...
change. Data on BT and EHD virus isolations were provided by USDA’s National Veterinary Services Laboratory (NVSL), the Southeastern Cooperative Wildlife Disease Study (SCWDS), and Newport Laboratories. Only virus isolation data were available, because records are not maintained on general serological test results for samples submitted for antibody detection. A total of 1,643 virus isolation records were obtained that had geographic information at the county level along with sample collection dates. The records used spanned 35 years (1976 - 2010) for BT virus and 30 years (1981 - 2010) for EHD virus. A total of 779 and 864 virus isolation records were analyzed for serotypes of BT and EHD viruses, respectively. For BT virus, 13 serotypes were identified with type 17 representing 51.0% of all samples identified to serotype. Three serotypes of EHD virus were found with type 2 accounting for 81.2% of all samples identified to serotype. In the temporal analysis of virus isolation records from each year, cyclic fluctuations were observed for both viruses. For BT virus isolations, a peak periodicity of about every ten years was observed; whereas, a five year peak periodicity was noted for EHD virus isolations. Virus isolation records were grouped into five-year blocks to minimize variability observed from year to year and to examine trends in virus isolation frequency, in addition to observing changes in the geographic distribution of virus isolates. Within the grouped data, BT virus isolates continued to show cyclic fluctuations in the frequency of occurrence; however, the EHD virus isolates showed a steady increase in reporting frequency beginning in the early 1990s. To assess potential impacts of climate change, the northernmost latitude of virus isolations was compared for each five-year group. Bluetongue virus isolations were found to show an increasing northward progression during the past 20 years; however, no similar trend was observed for EHD virus isolations. Geographic distribution comparisons of the accumulated BT virus isolation records showed that most virus isolations were from the southeastern US, the central Midwest, California, and the Pacific Northwest. Isolations of EHD virus were mostly from areas in the Midwest, central eastern states, and Texas. Nearly all of the endemic BT serotypes had a wide geographic distribution, except for type 2 which was only reported from Florida. In contrast, exotic BT virus serotypes were isolated from samples collected primarily from the southeastern US. All EHD virus serotypes were widely distributed geographically. Comparisons of changes in the geographic distribution of BT virus isolations for each five-year group showed that California and the Pacific Northwest had a high frequency of virus isolations over the past 35 years; however, there has been a steadily increasing number of BT virus isolations from Florida since 1991. While the overall geographic range of EHD virus isolations has changed little in the past 30 years, the frequency and density of virus isolations has increased progressively. Possible sources and mechanisms for the introduction of exotic BT viruses into the southeastern US were considered in terms of vector dispersal and animal movement. Wind dispersal of Culicoides vectors as aerial plankton has been recognized in the introduction of novel types of BT viruses into Europe. The
introduction of exotic BT viruses into the southeastern US appears to coincide temporally with patterns of hurricane and tropical storm activity moving across islands in the Caribbean. Recommendations are provided that would improve the use of BT and EHD virus isolation data in assessing the impacts of climate change on animal health.

**Anthropogenic and Environmental Drivers of BTV Infection in California**

Christie Mayo and N James Maclachlan
University of California, Davis

Our research team is addressing the critical and unmet need to incorporate biologically informative parameter estimates in epidemiological models to better quantify the risk of *Culicoides* transmitted diseases of livestock, specifically that of BTV infection in California. We are utilizing three key strategies to meet our objectives: 1.) targeted surveillance to define the biology and ecology of BTV infection among *Culicoides sonorensis* (*C. sonorensis*) midges and dairy cattle; 2.) development of practical epidemiological models informed by the parameter estimates collected from the field; and 3.) analysis of potential mitigation strategies through their incorporation into a dynamic model. In the last year we have undertaken targeted surveillance to understand the biology of *C. sonorensis* and BTV infection of dairy cattle. Previously published studies have shown dairy waste-water lagoon ponds to be a major larval habitat for *C. sonorensis* midges. However, the significance of these lagoons in determining midge abundance and subsequent BTV transmission to livestock within ecologically diverse regions such as Northern California remains conjectural. Therefore, two year-long studies were initiated in August, 2012: 1.) An entomological survey of *C. sonorensis* midges collected (using CO₂ – baited traps) along transects centered on dairy waste-water lagoons on individual dairy farms (one of which then drained the major lagoon habitat); and 2.) a spatial BTV seroprevalence survey of adult cattle throughout California. Preliminary data from our entomological studies already suggest that lagoon waste-water infrastructure likely does not serve as the sole, or even major larval habitat on individual dairy farms, meaning that other parameters that estimate/predict vector populations will need to be incorporated into our epidemiological model. Results from these field studies will be used to improve a deterministic ecological model we have constructed to quantify risk of BTV transmission among livestock. The model establishes a quantifiable framework to guide mitigation strategies and has potentially broader application to other emerging *Culicoides* transmitted diseases such as epizootic hemorrhagic disease, and to foreign animal diseases such as African horse sickness.
Experimental Infection of Cattle with Epizootic Hemorrhagic Disease Viruses
Mark G. Ruder
USDA-ARS, Arthropod-Borne Animal Diseases Research Unit (ABADRU)

A series of collaborative EHDV-6 and -7 research projects conducted at the University of Georgia were described.

EHDV-7 Studies
Infection of cattle with epizootic hemorrhagic disease (EHD) viruses (EHDV) is frequently subclinical but reports of EHD in cattle have increased in recent years. In 2006, a widespread EHDV-7 epizootic caused disease and economic loss in the Israeli dairy industry. EHDV-7 is exotic to North America, but previous studies show that white-tailed deer are potential hosts and Culicoides sonorensis, a North American vector of EHDV, is a competent vector. Our primary objective was to infect cattle with EHDV-7 and attempt to replicate disease observed in Israel. A sub-objective was to evaluate cattle with low titer viremia (<10^{2.3} TCID_{50}/ml) as a source of virus to feeding C. sonorensis. Seven, two-month-old Holstein calves were used. The virus was provided by the Institute for Animal Health, Pirbright Laboratory and was originally isolated from a cow in Israel. Three inoculation methods were used (two calves/method): group 1, baby hamster kidney (BHK) cell culture supernatant by intradermal (ID) and subcutaneous (SC) injection (1.5 ml/route; 10^{7.12} TCID_{50}); group 2: BHK supernatant by ID, SC, and intravenous (IV) injection (0.67 ml/route; 10^{7.12} TCID_{50}); and group 3: transmission by laboratory infected C. sonorensis. A negative control received non-infected BHK supernatant similar to group 2. Animals were monitored daily and blood collected on 0, 3, 5, 7, 10, 13, and 18 days post infection (dpi) for virus isolation and titration, serology, and complete blood count. On dpi 18, C. sonorensis were fed on four calves and processed in pools of five for virus isolation 10 days post feeding. All calves had detectable viremia by 3 dpi through 18 dpi (end of study). Peak viremia occurred 7-10 dpi (10^{2.63}-10^{3.5} TCID_{50}/ml). No differences in virus kinetics were observed between inoculation groups. Calves seroconverted by 10 dpi. Group 2 calves developed a transient fever (103.9 and 104.7 °F) on 1dpi and again 4-9 dpi (103.3-104.4 ° F). No other clinical or hematologic abnormalities were observed. Midges were fed on four calves on 18 dpi (viremia <10^{2.3} TCID_{50}/ml). None of the 124 midge pools processed were positive by virus isolation. This study demonstrates US-origin cattle are susceptible to infection with EHDV-7 by multiple inoculation methods; however, similar to other studies, overt disease consistent with field reports was not replicated experimentally. Midges that fed on calves with low-titer viremia did not become infected; however, only 620 midges were processed, so these animals should not be excluded as a potential source of virus to biting midges.

EHDV-6 studies
In 2006, EHDV-6 was isolated from dead white-tailed deer in Indiana and Illinois and now likely represents a third endemic serotype in the US after
isolations during each subsequent year over a wide geographic area. To better understand and characterize this novel virus, a series of experiments were initiated at the University of Georgia. Genetic characterization of the virus indicates the virus is a reassortant, with gene segments from EHDV-2 and -6. Furthermore, a previous experimental infection of white-tailed deer replicated disease observed in field cases. Here we briefly describe two studies, 1.) susceptibility of cattle; and 2.) the susceptibility of C. sonorensis to experimental infection with EHDV-6 (Indiana). Four mature Holsteins and a positive control white-tailed deer were inoculated with \(10^{6.4}\) TCID\(_{50}\) EHDV-6 cell culture (BHK) supernatant via a combination of ID and SC injection. Two of four animals had a detectable viremia: 5-10 dpi in one animal and 7-24 dpi (end of study) in a second. No clinical or hematologic abnormalities were observed. Seroconversion occurred by 10 dpi, although one animal failed to seroconvert. The positive control deer exhibited a typical clinical response.

Regarding cattle, for both the EHDV-6 and -7 experimental infections, we observed subclinical infections. This is consistent with the vast majority of experimental EHDV infections in cattle, thus a gap in our understanding remains. However, despite our inability to replicate EHD in cattle experimentally, field reports indicate that disease does occur in cattle and that EHD outbreaks can be associated with significant production loss.

In our second study, we aimed to determine if C. sonorensis is susceptible to oral infection with EHDV-6 (Indiana). Colonized C. sonorensis from Arthropod-Borne Animal Diseases Research Unit (ABADRU) (USDA-ARS, Manhattan, KS) were used. To compare the results with those of historically endemic EHDV serotypes, we similarly infected other groups of midges with EHDV-1 or -2. To infect midges, we used and artificial feeding device containing white-tailed deer blood spiked with EHDV-6, -1, or -2. The virus titer of these blood meals ranged from \(10^5\) – \(10^7\) TCID\(_{50}\)/ml. Midges were then held at 25°C and periodically sampled for virus isolation and titration over 14 days. Based on previous research with bluetongue virus (BTV) in sheep, we considered midges with a titer of \(\geq 10^{2.7}\) TCID\(_{50}\) to be potentially competent vectors. From 4-14 days post feeding, the percent of virus-positive midges was 11% (17/156), 85% (70/82), and 75% (87/116) for EHDV-6, -1, and -2, respectively. The percent of midges with a virus titer of \(\geq 10^{2.7}\) TCID\(_{50}\) was 4% (6/156), 60% (49/82), and 36% (42/116) for EHDV-6, -1, and -2, respectively. These results indicate that while C. sonorensis is susceptible to infection with EHDV-6, the rate of infection and replication to high titer is low compared to EHDV-1 and -2. The possibility that other Culicoides species are involved in EHDV-6 transmission should be explored. Additionally, transmission studies are needed to fully evaluate the ability of C. sonorensis to transmit EHDV-6.
Epizootic Hemorrhagic Disease (EHD) Outbreak in Cattle in Nebraska
Roger Dudley
Nebraska Department of Veterinary Services Agriculture

In August 2012, the Nebraska Game and Parks announced they were seeing numerous deer deaths due to EHD. The Nebraska State Veterinarian’s office discussed the possibility of EHD showing up in cattle as oral lesions and salivation; therefore, we were not surprised when on August 14, 2012, the first call from a veterinarian who was examining a cow with oral lesions was received. This started a three month stretch that resulted in 50 Foreign Animal Disease investigations. Out of the 50 investigations, we had 44 PCR positive EHD cases, three PCR positive Bluetongue cases, and two cases unrelated to arbovirus disease. The investigations mainly occurred in the north central and northeast Nebraska, but there were investigations across the state. We continue to have investigations as of October 16 and hope the cold weather that has recently occurred will eliminate the EHD investigations.

A typical investigation started with producers calling their veterinarian when they saw excessive salivation, stiff and reluctant to move, and reluctance to eat or drink in a cow. The veterinarian would then call the Veterinary Field Officer (VFO), State Veterinarians office, or USDA Veterinary Services (VS) area office to report the cases. Once a report came in from the field, the investigation was initiated with a foreign animal disease (FAD) referral number and Emergency Management Response System record. The VFO would go out to the clinic or farm to investigate the animals and collect red, purple, and green top tubes of blood and swabs of oral lesions. These samples were sent to Plum Island for evaluation. Once laboratory results were available the USDA-VS office would enter the results, classify the case status, and closeout the investigation.

Compared to other years, the cases of EHD in Nebraska this summer seemed more severe, as there was death loss associated with several of the herds. There was a buffalo herd that lost eight animals and several cow herds lost animals. We feel that the increased severity may have been due to extreme weather, which included high temperatures resulting in possible severe dehydration.

There has been some concern with anecdotal evidence of reproductive problems associated with a fall calving herd that was diagnosed with EHD. This herd has both fall and spring calving cows, and excellent records, so the local veterinarian hopes to be able to monitor the records to determine if the herd has reproductive issues with the spring calving cows as well.

With help from producers, private practitioners, VFOs, State Veterinarians office, Plum Island Foreign Animal Disease Diagnostic Laboratory, and USDA-VS area office, we were able to ensure that the oral lesions associated with EHD were not a FAD that could have devastated the livestock industry of Nebraska.
Development and Performance Evaluation of a Simple Streamlined Method for Bluetongue Virus and Epizootic Hemorrhagic Disease Virus Nucleic Acid Purification, Denaturation, and Detection

M.E. Schroeder¹, J. Meier¹, M.A. Bounpheng¹, D.J. Johnson², E.N. Ostlund², and A. Clavijo¹
¹Texas Veterinary Medical Diagnostic Laboratory (TVMDL), College Station, Texas
²Diagnostic Virology Laboratory, National Veterinary Services Laboratories (NVSL), Ames, Iowa

Bluetongue virus (BTV) and Epizootic hemorrhagic disease virus (EHDV) are members of the Reoviridae family and are transmitted by biting Culicoides midges. BTV causes disease in cattle and other ruminants resulting in significant economic loss due to treatment costs, production losses, and trade restrictions of infected animals. EHDV associated disease in cattle is less prominent, however, it has emerged as a major economic threat to the white-tailed deer (WTD) industry in many states, often causing severe debilitation and death in affected animals. The incursion of a new serotype of the virus (EHDV-6) into United States is raising additional concerns about the future economic impact of this virus on the WTD industry. The potential emergence of exotic serotypes of BTV and EHDV emphasizes the need for robust detection of all known strains and differential diagnosis. For this purpose, a streamlined workflow consisting of an automated nucleic acid purification and denaturation method and multiplex one-step RT-qPCR for the simultaneous detection of all serotypes of BTV and EHDV was developed using previously published BTV¹ and EHDV² signatures. The denaturation of double stranded (ds) BTV and EHDV RNA was incorporated into the automated nucleic acid purification process thus eliminating the separate step of dsRNA denaturation (i.e., DMSO, MMOH, or betaine, or high temperature) commonly used for enhanced PCR sensitivity. The workflow analytical sensitivity, based on Probit analysis, was < 200 BTV and EHDV target copies per reaction. The performance of this workflow was assessed by comparison with nested RT-PCR assays for BTV and EHDV conducted at the NVSL using 125 samples (originated from TVMDL). NVSL and TVMDL results showed high agreement (Cohen’s Kappa 0.86-0.89, using NVSL method as the reference standard) and support the use of this workflow for concurrent detection of BTV and EHDV in the same reaction. Approximately 1850 samples consisting of bovine, ovine, caprine, cervine blood, tissue, and semen have been tested and 251 positives (~13.5% positive rate) were identified, specifically, 72 BTV only positives, 119 EHDV only positives, and 60 BTV and EHDV positives. Interestingly, BTV and EHDV co-infections were observed at a significant rate (24% (60/251) of all positives); this observation may indicate opportunities for potential interaction between closely related orbiviruses and may be important for understanding disease clinical presentations.

References
Bluetongue Virus (BTV) and Epizootic Hemorrhagic Disease Virus (EHDV) Isolations/PCR Positives
Dianne Rodman
National Veterinary Services Laboratory (NVSL), USDA-APHIS-VS

Calendar year 2011: Bluetongue virus or RNA was detected in 30 samples submitted during calendar year 2011. The positive bluetongue virus isolation and polymerase chain reaction (PCR) test results from submissions to the National Veterinary Services Laboratories (NVSL) in 2011 are listed in Table 1.

Table 1. BT virus isolation (VI) / PCR positives, Calendar year 2011

<table>
<thead>
<tr>
<th>State</th>
<th>No.</th>
<th>Species</th>
<th>PCR</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>1</td>
<td>Cattle</td>
<td>Positive</td>
<td>BTV-17</td>
</tr>
<tr>
<td>KY</td>
<td>1</td>
<td>Deer Isolate</td>
<td>--</td>
<td>BTV-17</td>
</tr>
<tr>
<td>MO</td>
<td>1</td>
<td>Sheep</td>
<td>Positive</td>
<td>BTV-17</td>
</tr>
<tr>
<td>NC</td>
<td>1</td>
<td>*Deer</td>
<td>Positive</td>
<td>BTV-11</td>
</tr>
<tr>
<td>OK</td>
<td>1</td>
<td>**Deer Isolate</td>
<td>--</td>
<td>BTV-17</td>
</tr>
<tr>
<td>PA</td>
<td>1</td>
<td>Deer isolate</td>
<td>--</td>
<td>BTV-17</td>
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<tr>
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<td>--, Positive</td>
<td>BTV-11</td>
</tr>
<tr>
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<td>Deer isolate, deer, sheep</td>
<td>--, Positive, Positive</td>
<td>BTV-17</td>
</tr>
<tr>
<td>TX</td>
<td>1</td>
<td>Cattle</td>
<td>Positive</td>
<td>†BTV-13</td>
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<tr>
<td>WY</td>
<td>1</td>
<td>Pronghorn Isolate</td>
<td>--</td>
<td>BTV-17</td>
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</table>

*Also positive for EHDV by RT-PCR; **Also positive for EHD-2 and 6
†Typed direct on blood

During calendar year 2011, 23 samples tested positive for EHDV by virus isolation and/or PCR. The positive EHDV isolation and PCR test results from submissions to NVSL in 2011 are listed in Table 2.

Table 2. EHDV isolation (VI)/ PCR positives, Calendar year 2011

<table>
<thead>
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<th>PCR</th>
<th>VI</th>
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<td>DC</td>
<td>1</td>
<td>Deer</td>
<td>Positive</td>
<td>EHDV-2</td>
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</table>
REPORT OF THE COMMITTEE

<table>
<thead>
<tr>
<th>State</th>
<th>No.</th>
<th>Species</th>
<th>PCR</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>FL</td>
<td>3, 1</td>
<td>Deer, Key Deer</td>
<td>Positive</td>
<td>EHDV-2</td>
</tr>
<tr>
<td>NC</td>
<td>4</td>
<td>*Deer</td>
<td>Positive</td>
<td>EHDV-2</td>
</tr>
<tr>
<td>ND</td>
<td>1</td>
<td>Cattle</td>
<td>Positive</td>
<td>EHDV-2 (typing on blood; neg VI)</td>
</tr>
<tr>
<td>NY</td>
<td>3</td>
<td>Deer</td>
<td>Positive</td>
<td>EHDV-2 (2)</td>
</tr>
<tr>
<td>OK</td>
<td>1</td>
<td>Deer</td>
<td>Positive</td>
<td>EHDV-2</td>
</tr>
<tr>
<td>SD</td>
<td>6</td>
<td>Deer</td>
<td>Positive</td>
<td>EHDV-2</td>
</tr>
<tr>
<td>SD</td>
<td>1</td>
<td>Mule deer</td>
<td>Positive</td>
<td>EHDV-6</td>
</tr>
<tr>
<td>TX</td>
<td>1</td>
<td>Deer isolate</td>
<td>--</td>
<td>**EHDV-2 &amp; 6</td>
</tr>
</tbody>
</table>

*One deer also positive for BTV by PCR and VI (BTV-11)
**Also positive for BTV-17

Calendar year 2012 (January 1– October 15)

As of October 15, 2012, bluetongue virus has been identified in twenty-five samples: BTV-13 was identified from two deer samples from Illinois, one cattle sample from Nebraska and a mule deer sample from South Dakota; BTV-11 was identified from two dog isolates from Kansas and Texas; BTV-9 was identified in one sheep blood from Florida; and one cattle sample from Puerto Rico yielded an isolate that was positive for BTV-22. Serotype identification is pending on one additional BTV isolated from a South Dakota deer. BTV has also been identified by PCR in six cattle samples and seven boer goat samples from Florida; one cattle sample from North Dakota, and two cattle samples from Oklahoma. In the same time period, EHDV-1 was identified in one deer from Florida and one cattle sample from South Dakota. EHDV-2 was identified in 108 samples from the following: one cattle from Illinois; eight deer, six cattle, and one bison from Iowa; six deer and nine cattle from Nebraska; twenty deer, fifty-three cattle, two bison, and one elk from South Dakota; and one cattle from Virginia. EHDV-6 was identified in six deer and two cattle samples from Illinois, three deer samples from Iowa, two deer samples from Nebraska and one South Dakota deer.

2011 Bluetongue Serology Proficiency Test

Fifty-two laboratories participated in the 2012 bluetongue (BT) proficiency test. The panel consisted of 20 ruminant serum samples. The passing score was zero or one sample missed. Of the 52 laboratories participating in the 2012 BT proficiency test, 43 agreed with each other and with NVSL on the positive/negative bluetongue antibody status of all 20 samples. Laboratories approved to conduct official (export) bluetongue serology are listed on the website:
SCWDS Update: Hemorrhagic Disease and *Culicoides* sp. Surveillance
Daniel Mead, David Stallknecht, Jamie Phillips-Brantley, Stacey Vigil, and Joseph Corn
Southeastern Cooperative Wildlife Disease Study, University of Georgia

An overview of epizootic hemorrhagic disease viruses (EHDV) and bluetongue viruses (BTV) isolated by SCWDS during the 2011 and 2012 transmission seasons was presented. During 2011, 44 viruses were isolated from white-tailed deer samples submitted from 14 states. Viruses isolated were EHDV-2 (42), BTV-11 (1) and BTV-17 (1). So far this year, we have isolated 154 viruses from animals suspected of having HD. EHDV-2 accounts for the majority of these isolates (101) and was isolated from WTD, cattle, and alpaca. EHDV-6 was isolated from 41 WTD and EHDV-1 was isolated from seven WTD. Of the bluetongue viruses isolated, BTV-10 was isolated from a pronghorn, BTV 11 was isolated from a WTD, and BTV-13 was isolated from WTD and a bighorn sheep.

In addition, an update on surveys for *Culicoides* species in the Southeastern United States was provided. These surveys have been conducted since 2007 as part of a Cooperative Agreement for Exotic Arthropod Surveillance with USDA-APHIS-VS. Between July 2011 and June 2012, surveys were conducted at 43 sites in nine states. 17,198 Culicoides representing 35 species were collected. Surveys are ongoing in Alabama, Florida, Georgia, Louisiana, and Mississippi.
relocate to Kansas. The ABADRU has three 5-year project plans under two ARS National Research Programs: NP103, Animal Health and NP104, Veterinary, Medical, and Urban Entomology. These plans include research on bluetongue virus (BTV; exotic and domestic), epizootic hemorrhagic disease virus (EHDV) and Rift Valley fever virus (RVFV). To date, exotic BTV research progress includes testing the susceptibility of white-tailed deer and North American domestic sheep with a BTV-8 strain originally isolated in The Netherlands. In order to determine the potential origin of the new BTV serotypes recently detected in the Southeastern USA, molecular epidemiology studies using whole viral genomes are ongoing. There also have been several recent occurrences of EHDV causing disease in cattle in multiple parts of the world. One of these outbreaks occurred in Israel during 2006 and was associated with EHDV-7. More recently, EHD has been reported in numerous cattle herds throughout the Midwestern US during 2012. Full genome sequencing of recent EHDV isolates from cattle, along with 21 endemic strains, is underway to determine if changes in the viral genetics could be contributing to recent observed increased pathogenicity. The ABADRU is also actively expanding its entomology program to better understand the biology of both midges and mosquitoes that serve as vectors for the arboviral diseases listed above. Current studies include risk modeling and pesticide susceptibility experiments, which will provide alternative strategies for insect vector control. Related to this, the North American Deer Farmer's are collaborating with ABADRU to develop tools to reduce biting midge populations. In addition, ABADRU scientists are examining vectors on a molecular level, including investigations of the population genetics of two important mosquito species, several transcriptome projects for Culicoides midges, and a secretome project to identify secreted salivary proteins of midges. The ABADRU continues to be well supported, thanks to additional funding sources, such as Department of Homeland Security Science and Technology Directorate, ARS Office of International Research Projects, and the Department of State Biosecurity Engagement Program. Additionally, the unit continues to have a large number of national and international collaborations resulting in a productive research program addressing the needs of our stakeholders.

Committee Business
The Committee reviewed two resolutions as follows:
1. Vaccine for The Various Strains of Epizootic Hemorrhagic Disease In Cervids.
   This resolution was moved, seconded and passed with one negative vote.
   This resolution was moved, seconded and passed unanimously.
With no further business, the meeting was adjourned.
REPORT OF THE COMMITTEE ON BRUCELLOSIS

Chair: Jim Logan, WY
Vice Chairs: Bill Barton, ID; Tony Frazier, AL

John Adams, VA; J Lee Alley, AL; Neil Anderson, MT; George Badley, AR; Eric Barlow, WY; Bill Barton, ID; C. Black, GA; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Gary Brickler, CA; William Brown, KS; Beth Carlson, ND; Michael Coe, UT; Jim Collins, MN; Thomas Conner, OH; Walter Cook, WY; Donald Davis, TX; Leah Dorman, OH; Mark Drew, ID; Anita Edmondson, CA; Robert Ehlenfeldt, WI; Philip Elzer, LA; Steven England, NM; Donald Evans, KS; Dave Fly, NM; James Foppoli, HI; Tony Frazier, AL; Mallory Gaines, DC; Francis Galey, WY; Tam Garland, TX; Robert Gerlach, AK; Arnold Gertonson, CO; Michael Gilsdorf, MD; Linda Glaser, MN; Rod Hall, OK; William Hartmann, MN; Greg Hawkins, TX; Burke Healey, CO; Carl Heckendorf, CO; Linda Hickam, MO; Bob Hillman, ID; Dennis Hughes, NE; David Hunter, MT; Jon Johnson, TX; Jamie Jonker, VA; Mandy Kauffman, WY; Susan Keller, ND; Bruce King, UT; Maria Koller-Jones, CAN; Terry Kreeger, WY; John Lawrence, ME; Maxwell Lea, Jr., LA; Eric Liska, MT; Laurent O’Gene Lollis, FL; Christian Mackay, MT; Bret Marsh, IN; Barbara Martin, IA; Chuck Massengill, MO; Leslie McFarlane, UT; Paul McGraw, WI; Ernie Morales, TX; Henry Moreau, LA; Sherrie Nash, MT; Dustin Oedekoven, SD; Elizabeth Parker, ITA; Janet Payeur, IA; William Pittenger, MO; Valerie Ragan, VA; Jennifer Ramsey, MT; Tom Ray, NC; Nancy Robinson, MO; Keith Roehr, CO; Thomas Roffe, MT; Shawn Schafer, ND; David Schmitt, IA; Brant Schumaker, WY; Andy Schwartz, TX; Charly Seale, TX; Kathryn Simmons, DC; Daryl Simon, MN; Marilyn Simunich, ID; Robert Stout, KY; Nick Striegel, CO; Paul Sundberg, IA; Kenneth Throlson, ND; James Watson, MS; Randy Wheeler, IA; Diana Whipple, IA; Margaret Wild, CO; Richard Willer, HI; Larry Williams, NE; Kyle Wilson, TN; James Wolfram, FL; Taylor Woods, MO; Ching Ching Wu, IN; Marty Zaluski, MT; Glen Zebarth, MN.

The Committee met on October 22, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 1:00 to 6:00 p.m. There were 28 members and 19 guests present. Introductions of Vice Chairs and Subcommittee Chairs were made. An overview of the 2011 meeting and resolutions were given.

Presentations and Reports

Dr. Walt Cook presented the Scientific Advisory Subcommittee Report, which is included at the end of this report.

Dr. Joe Corn presented the Feral Swine Subcommittee Report, which is included at the end of this report.

Dr. Marty Zaluski presented the Greater Yellowstone Area (GYA) Subcommittee Report, which is included at the end of this report.
National Brucellosis Program Update
Mike Carter
USDA-APHIS-VS

Since July 10, 2009, all 50 States, Puerto Rico, and the US Virgin Islands have been classified as Class Free for bovine brucellosis. During the fiscal year (FY) 2012, national and state surveillance has identified four bovine brucellosis-affected herds; two located in Idaho, one in Montana and one in Wyoming. However, as a result of the interim rule, there was no loss of Class Free State status due to new provisions.

During FY 2012, approximately 3.3 million head of cattle under the Market Cattle Identification (MCI) surveillance program, reflecting approximately 3.3 million head of cattle tested at slaughter and approximately 478,000 head of cattle tested at market. There were approximately 3.9 million calves and approximately 16,420 adult cattle vaccinated for brucellosis and there were approximately 1,100 brucellosis certified-free cattle herds. Approximately 405,000 additional head of cattle and domestic bison were tested as a result of other surveillance activities. Three of the four brucellosis-affected herds disclosed in FY 2012 were disclosed during testing conducted as part of the State’s increased surveillance activities. The one cattle herd that was detected outside the Idaho’s designated surveillance area was detected through slaughter testing. The primary reasons for testing on-farm or ranch includes testing for movement and sale (~45%), testing associated with MCI reactor investigations and affected herd epidemiologic investigations (~13%), herd certification testing (~23%), and testing for show or exhibition (~6%).

Since the publication of the Brucellosis interim rule in December 2010, the 60-day comment period has ended and thirty comments were received from private citizens, State agencies, industry groups, animal welfare organizations, environmental groups, and Congress. The rule has been designated as significant by the Office of Management and Budget. Additional economic analysis and civil rights impact analysis were completed and in July, APHIS provided additional information to the department regarding the changes reflected in the interim rule. The final rule is currently within the review process.

APHIS continues to develop new regulations and supporting standards for the brucellosis and tuberculosis (TB) programs. Under the proposed approach, The Code of Federal Regulations will provide the legal authority for the programs while the details of the programs will be described in a program standards document.

APHIS conducted several webinars that provided additional information about the proposed regulation in FY 2012. APHIS proposed to use a national calculator to determine the fair market value for animals that are destroyed because of TB or brucellosis in the Draft Regulatory Framework published in May 2011. In response to requests from commenters, APHIS hosted two webinars in November 2011 that provided more information about the calculator and options for indemnity payments. The end result from
comments received is changes to the indemnity process will not be included in the Proposed Rule. In August 2012, APHIS presented an overview of the Proposed Rule and Program Standards for Brucellosis and Bovine Tuberculosis. The webinar presentation described the fundamental concepts underlying the proposed regulations, the content of both the Proposed Rule and the Program Standards, and significant differences from the draft regulatory framework and the rationale for these differences. Recordings of both webinars are available at: http://www.aphis.usda.gov/animal_health/tb_bruc/webinars.shtml.

USDA, Animal and Plant Health Inspection Service (APHIS) is hopeful that Proposed Rule and Program Standards will be published in Federal Register in early FY2013. Both documents are currently under Agency review. Upon publication, APHIS plans to provide an extended comment period of 90 days through the www.regulations.gov website in light of the scope of these regulations.

In September, APHIS initiated a review of Idaho, Montana and Wyoming with the goal to determine the adequacy of each State’s Brucellosis Management Plans in preventing the spread of brucellosis from the designated surveillance area (DSA). The same nine member team visited each state. The review focused on seven key questions that include:

1. Are States adhering to their best management practices (BMPs)?
2. Is privately owned bison and cattle surveillance effective?
3. Are protocols for testing used for epidemiological investigations, test and remove protocols, and quarantine release are documented and being followed?
4. Are adequate regulations in place to prevent the movement of brucellosis-infected cattle or domestic bison out of the DSA and is compliance monitored?
5. Are identification requirements being enforced and are animals traceable to the DSA?
6. Is wildlife surveillance sufficient to allow for rapid adjustment of the boundaries of the DSA?
7. Are mitigations in place that reduce exposure to infected sources and reduce the risk of infection if exposure occurs?

The National Bovine Brucellosis Slaughter Surveillance program is one element of a larger surveillance plan, entitled “National Bovine Brucellosis Surveillance Plan: October 2012.” This plan is available on the Animal and Plant Health Inspection Service Web site at www.aphis.usda.gov/animal_health/animal_diseases/brucellosis/. Slaughter surveillance is not the only brucellosis surveillance stream that is and will be evaluated to determine the national brucellosis status. Other surveillance streams — diagnostic, export, movement, and herd certification testing — will also be used to support the claim of US brucellosis freedom. Veterinary Services (VS) is also piloting enhanced passive surveillance projects that could be expanded in areas that need additional surveillance.
In July 2011, VS announced changes to the National Bovine Brucellosis Slaughter Surveillance Program. This included reducing the brucellosis slaughter surveillance samples from approximately 6 million samples to approximately 3 million samples. In 2012, due to growing budget concerns, VS evaluated the program and determined further modifications were needed to our baseline surveillance activities to improve the program’s cost effectiveness. The revised goal is to detect \textit{Brucella abortus} infection with a 95 percent confidence that the prevalence level does not exceed one infected animal per 100,000 animals and documenting disease freedom at that level. Blood samples will be collected at eight selected slaughter plants. This strategy provides a statistical sampling of 1 million to 1.2 million slaughter surveillance samples. VS will continue to evaluate the brucellosis surveillance program and will propose further changes to participating plants or number of samples collected if necessary.

The complete presentation is included at the end of this report.

Montana Report Summary
Marty Zaluski
Montana State Veterinarian
Montana implemented a designated surveillance area (DSA) shortly after reclassification to Brucellosis Class A following the detection of the second affected herd in 2008. Montana's DSA is part of four counties of Beaverhead, Gallatin, Madison, and Park and includes 264 herds that use the area either full time or seasonally. Since 2007, the state has detected a total of five herds (total of four owners) which include three cattle herds and two domestic bison herds. One of the domestic bison herds recently completed a herd test and found nine reactors which brought the total number of Montana reactors since 2007 to 28. The two domestic bison herds under one ownership remain under quarantine in Montana.

A USDA-APHIS-VS review team recently conducted a review of Montana's management plan and made the following findings.

Key strengths of Montana’s brucellosis management plan include:

- Proactive actions leading to adjustments to the boundaries of Montana’s designated surveillance area;
- Cooperative efforts between Montana Department of Livestock’s Animal Health Division and their Brand’s Enforcement Division, including the implementation and use of an electronic brands software program at the livestock markets; brand inspection plays a critical role in Montana’s brucellosis management plan;
- Wildlife surveillance activities, most notably the multiyear elk capture and surveillance project;
- Testing and surveillance requirements for domestic cattle and bison in the designated surveillance area; and
- Use of individual herd plans for herds located in the designated surveillance area.
Key recommended enhancements to Montana’s brucellosis management plan include:

- Increasing the number of herds within the designated surveillance area on approved herd plans. Risk assessments should be conducted on each herd prior to developing an individualized herd plan.
- Developing a template for a formal brucellosis-affected herd plan and a template for approved designated surveillance area herd plans detailing the proactive risk mitigation actions in place.
- Increasing surveillance on slaughter cattle coming out of the designated area, especially when going direct to slaughter.
- Continuing wildlife surveillance activities and studies to expand the knowledge base about brucellosis in elk which in turn will lead to better disease management practices and risk mitigation efforts.
- Working with APHIS to develop a state-specific (or designated surveillance area specific) slaughter cattle surveillance plan (sampling and testing pre-slaughter).
- Continuing producer education and outreach using a variety of venues through which to deliver and disseminate information about Montana’s brucellosis surveillance program.

Idaho Report Summary
Bill Barton
Idaho State Veterinarian

The 2009 Idaho affected herd was released from quarantine on March 2, 2012. Idaho changed its Brucellosis rules during the 2012 legislature. The following changes were made to the rules:

- Mandatory official identification is required on all sexually intact cattle, regardless of age, that spend time in Idaho’s DSA.
- All sexually intact cattle, 18 months of age or older, that have been in Idaho’s DSA between January 1 and June 15 of the calendar year are required to be tested for brucellosis within 30 days prior to change of ownership, interstate movement or movement outside of the DSA.

Idaho State Department of Agriculture (ISDA) identified two new brucellosis affected herds in early 2012:

- A domestic bison herd tested due to known elk/bison interaction identified two reactor animals.
  - Both were slaughtered and Brucella Biovar 4 was cultured.
  - Herd is under quarantine with a herd management plan in place.
  - Three negative whole herd tests will be required for release of quarantine.
- A small beef herd was identified as a result of an MCI trace. A whole herd test found five reactors and one suspect.
Animals were slaughtered or spayed and culture results identified *Brucella* Biovar 1.

Herd is under quarantine and a herd management plan is in place.

Three negative whole herd tests will be required for quarantine release.

USDA-APHIS-Veterinary Services conducted a review of Idaho’s brucellosis program in September 2012. The review team identified the following strengths and recommendations relative to Idaho’s program:

**Strengths:**
- Good utilization of individual herd management plans for producers within or using Idaho’s DSA.
- Mandatory testing required for cattle herds with known elk/cattle interaction.
- Rules prohibiting the private feeding of big game animals.

**Recommendations:**
- Expansion of Idaho’s DSA to include area around recently identified positive cattle herd.
- Work with the Idaho Department of Fish and Game to enhance wildlife surveillance in areas around Idaho’s DSA.
- Enhance enforcement of movement testing requirements for cattle leaving the DSA.
- Enhance public outreach regarding brucellosis risk mitigation.

**Wyoming Report Summary**

Jim Logan
Wyoming State Veterinarian

Wyoming currently has one herd of domestic bison under quarantine for Brucellosis. This herd was initially placed under quarantine after finding two positive animals in a routine, change of ownership test in the fall of 2010. All suspect/positive animals have either been sold for slaughter or are under strict isolation and are spatially separated from the rest of the herd until they can be fed and conditioned for slaughter. This herd is within the boundaries of Wyoming’s Designated Surveillance Area (DSA).

Wyoming recently released the quarantine on an affected cattle herd which was identified in the fall of 2011. This herd was found on routine change of ownership testing and released following three negative herd tests and post calving testing. An assurance test will be done in the fall of 2012.

Wyoming requires calfhood vaccination statewide, and all sexually intact female cattle that inhabit the DSA must be calfhood or adult vaccinated. From July 1, 2011 to June 30, 2012, 198,572 head of cattle were vaccinated – this includes calfhood, adult and yearling booster vaccinations. There are 52 herds conducting adult and/or yearling booster vaccinations, which account for 9,581 of the total head vaccinated statewide. The Wyoming
Livestock Board (WLSB) also has a statewide identification requirement whereby all sexually intact female cattle 12 months of age and over must be officially identified prior to any change of ownership. Additionally, all sexually intact female cattle regardless of age that are in the DSA at any time must be officially identified prior to moving from the DSA.

All female cattle from the Wyoming DSA sold for breeding purposes (regardless of age) and all females over 18 months of age are required to be tested within 30 days prior to change of ownership, movement from the DSA, and interstate movement. Between July 1, 2011 and June 30, 2012, 36,023 animals were tested. Of that number, 110 tested positive (all but three of these were from the previously mentioned bison herd), and six were suspects. We expect to find occasional cases of Brucellosis among our cattle herds as long as there is a wildlife reservoir of the disease in our state. Our test and identification requirements provide good surveillance, traceability, and early detection. The WLSB Brucellosis requirements are well enforced through brand inspection since any change of ownership or inter-county and interstate movements must include a brand inspection clearance. There are currently 272 herds located or grazing in the DSA with partial or whole herd tests done. The total state cost for surveillance testing and vaccination is $218,989.50.

There are 432 producers in the DSA, of which, 162 have herd plans. This equates to approximately 37.5% of DSA producers.

Wyoming, along with Idaho and Montana, underwent an APHIS review in September, 2012. Recommendations for Wyoming’s Brucellosis management/prevention/surveillance were: 1) Continue slaughter surveillance; 2) Assure commuter herd compliance; 3) Increase the number of herd plans; and 4) Lowering test-eligibility age. Commendations from the review team were: 1) Buffer zone built into the DSA; 2) Brand Inspection system enhances compliance; 3) Laboratory capacity and function; and 4) Wildlife agency surveillance, risk mitigation, and cooperation with animal health officials is good.

**Consortium for the Advancement of Brucellosis Science**

Walt Cook  
University of Wyoming

To further the goal of promoting brucellosis vaccine and diagnostic research, the state of Wyoming has provided seed funding for a scientific approach, the Consortium for the Advancement of Brucellosis Science (CABS). This consortium consists of stakeholders and scientists from around the country who have identified gaps in current research, secured some funding and conducted outreach for the advancement of brucellosis science worldwide. For full vaccine and diagnostic test development, CABS or some other entity must receive large-scale funding so complete research on those candidates can be conducted.
The CABS Scientists’ Meeting occurred on June 14, 2012 at the Horse Barn Theater, Wyoming Territorial Prison in Laramie, Wyoming. Presentations were heard from:

- Brant Schumaker from the University of Wyoming (UW) who discussed RB51 Safety Studies. This study had three groups:
  1. Calfhood vaccinates without any subsequent vaccination (Controls);
  2. Calfhood vaccinates with adult vaccination (AV) while pregnant (AV); and
  3. Calfhood vaccinates with booster vaccination (BV) and AV while pregnant (BV+AV).

Animals were bred in the Fall of 2011 and monitored for signs of reproductive loss. Preliminary results indicate that losses were minimal.

- Jeff Adamovicz, also from UW discussed RB51 Immunology Studies. His team is looking at CMI (T cells) to determine if cattle boosted with multiple doses of RB51 have a greater T-cell response. They are also attempting to work with Steve Olsen to challenge these cattle in Ames.

- Gerry Andrews of UW explained his Subunit vaccine and diagnostic studies. They are using outer proteins of *B. abortus* for potential vaccines and a lateral flow device for diagnostics. He has done rodent studies for different subunit vaccines – several look promising. They are hoping to start goat trials soon. The lateral flow device is feasible, but still needs work optimizing it.

- Don Davis discussed Texas A&M University (TAMU) studies. There is not much work being done on *B. abortus* at TAMU. Allison Fitch has a microencapsulation laboratory that can do some vaccine work. Oral delivery seems to offer better protection especially if an abrasive is added.

- Dr. Davis also discussed the role genetics plays in susceptibility to *Brucella*. Some bulls are naturally resistant to infection as are their offspring. This may offer producers another mechanism to prevent infection in their herds.

- Walt Cook led a *B. suis* in cattle discussion. In the southern United States and other countries, this is a big problem. Cattle are a dead-end host for *B. suis*, but infection causes major diagnostic (and thus regulatory) problems.

- Nathan Sriranganathan of Virginia-Maryland presented on Chronic Brucellosis: *Immunomodulation and B. suis: Immunocontraception*. Schurig and Sriranganathan and others are evaluating a strain of RB51 that over-expresses SOD and WBOA to see if it increases protection. Results are promising. They are also looking at cross-protection against *B. suis*, *B. melitensis*, and swine influenza with RB51 leuB and pN54; preliminary results indicate some cross protection against other *Brucella*, not against flu. They are also using
BRUCELLOSIS

A B. *suis* vaccine with over-expression of GnRH vaccine as immunocontraceptive and *Brucella* vaccine for swine; the results are quite promising.

- Jack Rhyan of APHIS discussed GonaCon and other studies. He discussed the Yellowstone National Park (YNP) bison quarantine project that was able to successfully eliminate *B. abortus* from these bison. Bison went to Ted Turner and Indian reservations. GonaCon (GnRH vaccine) has been shown to be effective in bison. The idea is to vaccinate *Brucella* positive bison so they don’t calve/abort and thus do not shed.

- Valerie Ragan of the Virginia-Maryland Regional College of Veterinary Medicine Center for Public and Corporate Veterinary Medicine discussed international issues. Internationally *B. abortus* is a major human health problem. Many countries would be willing to collaborate in conducting research. She believes with international data on candidate vaccines, we should be able to get a conditional license. The Center for Veterinary Biologics requires safety and reasonable assumption of efficacy of vaccines for such a license.

- Steve Olsen gave an Agriculture Research Services (ARS) research update. He believes we still have a chance at getting *B. abortus* off the select agent list. It will be up for review in the next year. He has found that repeated vaccination with RB51 in bison (e.g. 4 doses in a year) does not improve protection. He also discussed ARS facilities; they have modest capacity, but a long waiting list to use them.

- Todd Cornish of UW mentioned the Wildlife/Livestock Disease Center. This will be a great place for collaboration.

- Brandon Scurlock of Wyoming Game and Fish Department (WGFD) reviewed Strain 19 in elk studies. The bottom line: after decades of Strain 19 vaccination on the feedgrounds, there are no data to indicate that doing so is reducing prevalence.

- Phil Elzer discussed research at Louisiana State University (LSU). Select agent issues got so bad that they destroyed their entire inventory of *Brucella*. Their facility has been decommissioned so they can no longer do challenge studies. They use Strain 19 as a model (for field strain infection) in goats. They are also doing work on a human vaccine.

- Jim Logan (Wyoming State Veterinarian) and Phil Elzer then led a discussion on Latent Heifer Syndrome and Don Evans joined by phone. There is concern that heifers exposed in utero may test negative until the time of calving/abortion and thus expose other animals. Now that herds are no longer being depopulated, this is a hypothetical way that brucellosis may get out of the Greater Yellowstone Area (GYA). Many state veterinarians are quite concerned about this.
The following day the stakeholders group met to review scientific progress and discuss ways to find increased funding for *Brucella* vaccine and diagnostic research.

The US Senate version of the Farm Bill (S. 3240) Title XII – Subtitle B – Section 12101 “Wildlife Reservoir Zoonotic Disease Initiative” provides for funding of vaccine and diagnostic tests for Brucellosis, Tuberculosis and other zoonotic diseases with significant wildlife reservoirs. While the Bill would not guarantee funding for CABs, it would allow CABS to compete for funds for which it has been ineligible to compete in the past. When the two versions of the Farm Bill go to conference committee, we may ask for support of the Senate Version.

**Mexico Brucellosis Update**

Jose Alfredo Gutierrez  
SAGARPA, Mexico

This report in its entirety is included at the end of this report.

**ARS Brucellosis Research Update and Select Agent Information**

Steve Olsen  
ARS

This report in its entirety is included at the end of this report.

**Brucella Diagnostic Research – Lipidomics of Various *Brucella* and *Yersinia***

Torsten Eckstein  
Eckstein Diagnostics, Inc.

Brucellosis is a zoonotic infection transmitted from animals to humans caused by *Brucella* sp. including *B. abortus*, *B. suis*, and *B. melitensis*. Brucellosis is a serious livestock disease that has significant animal health, public health, and national and international trade consequences. Unfortunately, current diagnostics detect mostly false-positive animals and reduce the speed of success for the ultimate goal of the national brucellosis program to establish a national disease-free designation.

The mostly trusted diagnostic test for brucellosis is the fluorescence polarization assay (FPA), although several other tests provide good to excellent sensitivity. The unacceptable low specificity is probably due the cross-reactivity with *Yersinia* infection in tested bison. Although most tests identify all brucellosis animals, from an eradication-standpoint, false-positive animals do not reduce the efficiency of the eradication process. It definitely affects bison and elk farms and the reason for high costs for the eradication program.

Recently, the detection focus moved partly to dairy products derived from unpasteurized milk that seemed to be imported to the US. The key evidence for dairy products containing live *Brucella* ssp. is the cultural identification of this pathogen. However, due to the classification as a group B select agent, the cultural identification of *Brucella* ssp. is restricted to few, BSL-3 level
approved laboratories and thus, additional detection methods are necessary for screening dairy samples without growing the pathogen. The detection of parts of the pathogen seems to be the most reliable detection method and among those molecules lipids are the most promising pathogen-specific molecules.

We have identified eight *Brucella*-specific lipids that have the capability to serve as diagnostic tools. At least of these lipids was further structurally characterized and identified as ornithine lipids. We were able to synthesize a similar lipid that has excellent reactivities in serological ELISAs with sera from infected cattle. We also demonstrated that the lipid profiles of *Brucella* ssp. could be used to differentiate between *Brucella* from marine mammals and *B. abortus*, *B. suis*, and *B. melitensis*. Finally, we demonstrated that the *Brucella*-specific lipids could be used to detect the pathogen in milk and/or dairy products.

The Role of Host Genetics in Differential Susceptibility to *Brucella abortus*: A Bovine Model
Chris Seabury
Texas A&M University

Differential susceptibility to brucellosis in domestic cattle is known to be genetically controlled. A total of 66 historic DNA samples representing cattle that were previously experimentally challenged with 10^7 CFU of live *Brucella abortus* strain 2308 (conjunctival administration) and also evaluated using *in vitro* macrophage challenge assays were available at Texas A&M University for a genome wide association study (GWAS) that employed the new Illumina BovineHD Assay (777K). Nearly all of the genotyped cattle were Angus crossbreds derived from 15 sires and 40 dams. The classification of cattle into “resistant” (n = 32) and “susceptible” (n = 34) phenotypes was based on post-challenge serological titers, abortions, bacteriologic cultures of 50 unique tissues harvested at slaughter, and/or *in vitro* macrophage challenge assays. For the *in vivo* experimental challenge, the “susceptible” phenotype was defined as any cow or bull for which *B. abortus* was cultured from at least one investigated tissue, whereas the “resistant” phenotype was only assigned to those cattle for which zero *B. abortus* were cultured from all investigated tissues. This phenotyping strategy essentially created a binary trait classification scheme that included one extreme category (i.e., resistance), because recovery of even a single *B. abortus* colony from one tissue was interpreted as an indication of susceptibility. Importantly, even through susceptible cattle display a spectrum of bacteriological phenotypes ranging from one colony forming units (CFU) derived from a single tissue, to many CFU recovered from multiple tissues, the resistant cattle represent a uniform and extreme disease phenotype. Therefore, because resistance to brucellosis in domestic cattle is under genetic control (*in vivo* and *in vitro* challenges), with resistant cattle representing a true phenotypic extreme, we hypothesized that the disease classification strategy would essentially create significant disparities in the distributions of alleles and genotypes for loci.
modulating resistance, thus enabling detection of those loci with very few samples. To test this hypothesis, we used several inheritance models in conjunction with logistic regression and the correlation trend test with principal component (PC1 and PC2) correction for stratification. Collectively, using 66 samples, we detected at least 5 potential autosomal signatures of association that surpass the minimal unadjusted $P$-value for moderate evidence of association ($5 \times 10^{-5}$), as recommended by the Wellcome Trust Case Control Consortium. No associations were detected on BTAX.

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### Bovine Brucellosis Latency/Latent Heifer Syndrome

**Don Evans**

**USDA-APHIS-VS**

This is a review of literature on the issue of latent brucellosis infections and diagnostic testing in cattle. This presentation also includes some insight and information from years of managing brucellosis affected herds as a Designated Brucellosis Epidemiologist.

**Dictionary definitions:**

- **Latent period** – “The incubation period of an infectious disease.”
- **Recrudescent** – “To break out again after a dormant or inactive period.”

There are some good literature reviews on the issue of latent carrier cattle written by Ray in 1977, Nicoletti in 1980, Sutherland in 1980 and Sutherland and Searson in 1990.

The latent period is directly related to *B. abortus*’ ability to survive for prolonged periods in relatively low numbers within the host. After being phagocytized by macrophages, the bacteria are transported to tissues in the lymphoid system where in some animals, they are able to survive or evade the host’s immune system. The pathogen’s ability to persist undetected by the host immune system results in latent carriers. The occurrence of latent carriers among cattle (heifer syndrome) is widely accepted (Plommet et al. 1973, Lapraik et al. 1975, Crawford, et al 1986), Latency associated with *B. abortus* is problematic for disease management because infected reproductively immature animals can test negative on serologic tests but shed *B. abortus* when reproductively mature. One experimental cattle study found approximately 18% (4 of 22) of calves born to experimentally infected mothers, were latently infected (Plommet, et al. 1973). These heifers were separated from their dams at birth without nursing; bottle fed separately until weaning; and then after breeding, kept in isolation until calving or abortion (Lapraik et al. 1975). A thorough epidemiological study conducted by Wilesmith (1978) estimated that 2.5% of heifer calves born to serologically positive dams reacted in early adulthood and constituted a risk to newly
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established herds. In a group of thirty-seven heifers from serological reactors in three Texas affected herds, two heifers (5.4%) were found to be shedding *B. abortus* at parturition – (Crawford, et al 1986). One heifer in this study was not serologically positive until two weeks prior to parturition, but the other was serologically positive on the first post-weaning test. Two additional studies found none of fifty-one and none of ninety-five heifers born to serologic reactors in affected herds to be culture or serologically positive at parturition (Dolan, L., 1980, Ray, et al, 1988). There is one report (Lapraik and Moffat, 1982) in the literature where *Brucella* shedding and seroconversion was delayed for nine years following calfhood exposure. Nagy and Hignett (1967) fed heifer calves large numbers of *Brucella abortus* every day for the first 15 days of life and re-exposed them at 7 months. They concluded that the neonatal infection led to a degree of immunity against subsequent exposure. Two of four calves not exposed until 7 months of age, became permanently infected.

The incubation period for bovine brucellosis is highly variable ranging from ten days to years – typically one to seven months. Some of the major variables influencing the incubation period include previous exposure or vaccination and genetic resistance which tend to lengthen the incubation period. Incubation will vary by exposure dose, virulence of challenge strain and stage of gestation at exposure. Prepubescent heifers and male cattle seem to be more resistant, thus will likely have longer incubation periods.

During a study of 181 brucellosis affected herds in Louisiana from 1989 to 1992, based upon assessment by field veterinarians, the sources of infection to the herds were found to be: purchased additions in 43% of the herds; recrudescence or latent infection in 31% of these herds; adjacent or contact exposure in 22% of the herds; undetermined in the remaining 4% of the herds. During this time period, vaccinated heifers were allowed to leave affected herds without restriction and quarantines could be released after testing negative six months following the removal of reactors. Many of the herds with a purchased source of brucellosis were found to have acquired brucellosis by purchase of heifers that originated from herds under quarantine.

Dr. Don Cheatham, former USDA-APHIS-VS Area Epidemiology Officer in Alabama (retired), presented data in 1993 where 25% of newly infected herds in Alabama and Tennessee were the result of recrudescence or seropositive animals identified after quarantine release that had exposure during previous herd quarantine.

These variables in incubation period and the acknowledgement of latent brucellosis infections, lead to the recommendations in the 1997 Brucellosis Emergency Action Plan to put an emphasis on depopulation of affected herds. It was recommended that herds not depopulated be maintained under quarantine until having all negative tests over a twelve month testing period. It was further recommended that heifers should not be retained except under dire circumstances.
Attempts to be able to determine which animals have been latently infected have been ongoing for years. Tacken (1964) suggested that vaccination with Strain 19 or a killed adjuvant vaccine would produce stronger and longer lasting antibody levels on the Complement Fixation test in infected heifers. Using this technique he identified 35 heifers out of 554 head on 75 farms but did not provide further data to support this hypothesis.

Anamnestic responses following vaccination with a killed Strain 45/20 vaccine were evaluated by several investigators as a technique to detect latent infections. (Cunningham, 1968; Cunningham and O'Connor, 1971; Reid and Harvey, 1972; and Nicoletti, 1977) - Conclusions from these studies are that the Coombs and Complement Fixation tests can be used post vaccination with killed Strain 45/20 to identify an anamnestic response and in one study they were able to isolate *Brucella* from 24% of the Complement Fixation positives and 19% of the Coombs test positive animals. Nicoletti (1977) found in 5 herds studied for an anamnestic response, that no further infected animals were found in one herd upon further testing, but the other four herds had a significant percent of animals seroconvert afterwards. Strain 19 vaccinates were found to have a similar anamnestic response as infected animals, which complicates the use of the anamnestic test in vaccinates, Strain 19 vaccinates will exhibit an antibody response to the Strain 45/20 vaccination.

Weynants, et al (1995) conducted a study that demonstrates the difficulties in detecting exposed animals with multiple testing techniques. They challenged ten animals (six nonpregnant and four in the first weeks of pregnancy) with $6 \times 10^7$ viable *B. abortus* strain 544. The ten challenged animals were necropsied on day 80 with selected tissues cultured. The complement fixation and serum agglutination tests were positive for three animals at day 25 with only one positive by day 77. The Rose Bengal test found two positive by day 20 and detected nine out of ten by day 35, but only one was positive by day 77. The ELISA test performed probably the best by detecting ten out of ten for days 45 through 60 and nine out of ten by day 77. The gamma interferon test detected seven out of ten from days 25 through day 55 and was positive for all ten animals by day 77. When compared with culture results on day 77 the standard serologic tests only detected one of six infected animals, ELISA, DTH (Brucellin) and gamma interferon were positive on all culture positive animals. The ELISA was positive for three of four culture negative animals, the DTH was positive for two out of four and the gamma interferon was positive for four of four culture negative animals. None of the tests identified all of the exposed and potentially latent animals throughout the study period. The authors noted that the gamma interferon test would probably not be able to distinguish Strain 19 vaccinates from infected animals.

In summary, latent brucellosis infections have been recognized for years at rates of from zero to eighteen percent. Multiple variables are involved that determine the likelihood of an animal being latently infected or incubating the
disease. No one test has been found that can detect all animals with a latent infection. Vaccination may interfere with an accurate diagnosis with some of our current tests and tests under development, although I was unable to find any studies exploring how Strain RB51 vaccinates would respond to the above mentioned tests for latent infections. Until a test is found that can detect a high percent of vaccinated animals that have been exposed to an infective challenge dose of *Brucella*, or a vaccine is developed that is efficacious in preventing infection, exposed animals should be restricted until current testing provides a high probability that the animal is not latently infected. This means intact heifer animals should at least be restricted until they have had a negative post-calving test.

**Literature Cited**


Hignett, P. G. and Nagy, L. K., Effect of exposure on very young calves to virulent *Brucella abortus* on their serological response to re-infection by the same organism at 6 months of age, *Nature (London)*, 201, 204, 1964.


REPORT OF THE COMMITTEE


BRUCELLOSIS


Committee Business:

Two resolutions were brought before the committee for discussion:

1) Use of RFID in Brucellosis Vaccinated Cattle; Waiver of Tattoo Requirement; Consistency in Ear Placement; Continued Funding of Ear Tags.
   This resolution was tabled until next year’s meeting.

2) Brucellosis in the Greater Yellowstone Area.
   This resolution was passed and forwarded to the Committee on Nominations and Resolutions.
REPORT OF THE COMMITTEE

REPORT OF THE SCIENTIFIC ADVISORY SUBCOMMITTEE ON BRUCELLOSIS

Walt Cook, Chair
University of Wyoming

Introduction of sub-committee members.
Members present: Don Evans, KS; Steve Olsen, IA; Val Ragan, MD; and Walt Cook, WY.
Members absent: Jack Rhyan, CO; Don Davis, TX; and Phil Elzer, LA.
Numerous visitors from various countries, industry, federal, state, etc. attended the joint meeting.

Review of Data for the Ability of Western Blot to Discriminate Yersinia from Brucella in Cervids

Neil Anderson led this discussion based on data previously provided. In addition, Terry Kreeger discussed a controlled experiment conducted by the Wyoming Game and Fish Department. Steve Olsen mentioned that in the controlled experiment when elk were initially exposed to Strain 19 and subsequently exposed to Yersinia, they exhibited an anamnestic response; this did not occur when exposed to Yersinia followed by Strain 19.

After reviewing the data, the Subcommittee agreed that there is no way to reliably discriminate Brucella vs. Yersinia infection using currently available serologic tests. When serologic titers to brucellosis are found in areas where exposure is not expected, we recommend an epidemiologic investigation be used to determine actual status. This may require additional sampling.

Review of response to last year’s resolutions

#24: Use of Buffered Acid Plate Antigen (BAPA) and Fluorescent Polarization Assay (FPA) in Cervids and # 26: Calfhood Vaccination of Bison up to 24 months of Age). Both of the responses to these resolutions were positive. APHIS-VS agreed to incorporate the BAPA and FPA as official tests. However, APHIS-VS believes that safety and efficacy of RB51 vaccine in bison up to 24 months of age needs to be evaluated. They requested the Subcommittee to evaluate relevant data.

There are currently little controlled experimental data on the efficacy of RB51 in older bison. However, Steve Olsen is conducting such an experiment which will be completed in 2014. The subcommittee agreed to evaluate that data when it is available.

Council of State and Territorial Epidemiologists (CSTE) recommendation to develop a B. canis test for humans. The Council of State and Territorial Epidemiologists is recommending that the Centers for Disease Control and Prevention, the National Institutes of Health, and Food and Drug Administration aid in the development of a reliable assay to detect B. canis
antibodies in human serum and that data generated from the use of such a
test be shared with state health departments and departments of agriculture.
CSTE is asking for our support of this recommendation.

The subcommittee urges the Brucellosis Committee to support this
recommendation for several reasons:

1. It fits the notion of “One Health”,
2. Public health funds will be used and should not detract from
funds used for veterinary Brucella work,
3. \textit{B. canis} is a rough strain and we need better serologic tests
to distinguish rough from smooth strains,
4. Antigens used for \textit{B. canis} serology in animals are no longer
being produced. If a human assay is developed, perhaps
antigens could be shared.

In addition, the subcommittee recommends that when humans are found
to have titers to brucellosis, an effort will be made to determine the species.
We further recommend that anytime a human is determined to be infected
with brucellosis that information should be shared with the veterinary side
and an epidemiologic investigation conducted to determine the animal
source.

\textbf{Bovine adult vaccination-induced titers to CF/FPA (continuation of last
year’s discussion)}

There is concern expressed by some producers in the Greater
Yellowstone Area that adult and booster vaccination with RB51 may
subsequently result in cattle with titers on serologic tests. The subcommittee
agreed that such an occurrence is a very rare event as RB51 lacks the O-
side chain that would cause such titers. We feel that it is important for
producers to recognize that occasional titers on screening tests is to be
expected whether cattle are vaccinated or not. This is why we rely on
confirmatory tests and, if necessary additional follow-up. There are an array
of factors which may cause nonspecific reactions on serologic tests
(including exposure to Yersinia and other non-Brucella organisms). The
probability of adult/booster vaccination causing titers is very low.

\textbf{Application of novel antigenic proteins of \textit{Brucella abortus} as
diagnostic targets and sub-unit vaccines}

Gerry Andrews of the University of Wyoming gave a presentation to the
subcommittee and guests on his work examining the above.
Dr. Joseph Corn, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia, provided an update on the National Feral Swine Mapping System (NFSMS). SCWDS began producing nationwide feral swine distribution maps in 1982 by working directly with state and territorial natural resources agency personnel. In 1982, 17 states reported feral swine in a total of 475 counties. With support from USDA-APHIS-Veterinary Services (VS) the SCWDS developed and implemented the National Feral Swine Mapping System (NFSMS) in 2008. The NFSMS is an interactive data collection system used to collect and display current data on the distribution of feral swine in the United States. The feral swine distribution maps are produced using data collected from state and territorial natural resources agencies, USDA-APHIS-Wildlife Services (WS), and other state/federal wildlife and agriculture agencies. The map is available to be viewed by the public on the NFSMS home page. Distribution data submitted by agency personnel are evaluated by SCWDS on a continual basis, and the distribution map is updated with verified additions on a monthly basis. Feral swine populations and/or sightings are designated either as established breeding populations, or as sightings, but only established breeding populations are included on the map and in the total of the number of states with feral swine. Over 500 additions have been made to the feral swine distribution map through the NFSMS since January 2008. The NFSMS is accessed via the internet at http://www.feralswinemap.org/. Additional data are provided to state/federal agencies and universities on request. Although the distribution of feral swine continues to increase in the United States, feral swine were recently eradicated from Nebraska. Established feral swine populations were reported in 37 states in 2011, but currently in 2012 are reported as present in 36 states.

Dr. Troy Bigelow, USDA-APHIS, Veterinary Services (VS), National Center for Animal Health Programs (NCAHP), gave a presentation on USDA, APHIS swine health activities including activities in Pseudorabies, Swine Brucellosis, Classical swine fever (CSF), Swine Health Protection Act, Trichinae and Flu Surveillance. Major items discussed included the Swine Brucellosis and PRV concept paper. The paper is drafted and is proceeding through the clearance process prior to publication. USDA explained that FY 2012 indemnity funds were used to purchase three pseudorabies virus (PRV) infected herds and three herds for swine brucellosis. Additionally, USDA is currently drafting a proposed interim rule to modify the definition of swine brucellosis validated free state to allow flexibility and surveillance options. All surveillance samples tested in FY 2012 were negative for CSF. Swine Health Protection Inspection activities continued in FY 2012. A total of 125 non-
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licensed feeders were found out of 36,366 searches performed. USDA collaborated with other regulatory agencies in Flu Surveillance. In FY 2012 nearly 300 people have documented illness traced to exposure to swine events. Events include fairs and exhibitions. Most cases occurred in pig exhibitors and have occurred after close contact to swine. USDA continues to participate in flu surveillance activities. These activities allow the USDA to identify the common flu viruses circulating in the swine population. The USDA also continues to monitor disease occurring in other regions of the world including monitoring the occurrence of African swine fever (ASF).

Dr. Tom Ray, North Carolina Department of Agriculture and Consumer Services gave a presentation on feral swine control efforts in North Carolina. The 2009 General Assembly passed an Act to create a Feral Swine Study Committee to Direct the Department of Agriculture and Consumer Services to study issues related to the importation of feral swine in North Carolina, including associated risks, economic impact, population estimates, disease risks, enforcement issues and penalties for the illegal transportation of feral swine into and around the state. Background was provided relative to the importance of agriculture in general to the state and the swine industry in particular, and on the economic impact of introduction of a foreign animal disease (FAD) into commercial swine resulting from interactions with feral hogs. Control measures that the Study Committee considered and discussed were presented along with the final recommendations that came out of this Committee. The resulting legislation aimed at controlling feral swine in the state was provided in detail along with early results from those efforts.

Dr. Tom Gidlewski, USDA, Wildlife Services (WS), National Wildlife Disease Program (NWDP) gave an update on FY 2012 monitoring of feral swine diseases. In FY 2012, serum samples were collected from 2891 animals in 29 states. Diseases monitored were CSF, PRV, Swine Brucellosis, SIV, Hepatitis E, Trichinellosis, Toxoplasmosis, and Leptospirosis for part of the year. CSF testing was done at Foreign Animal Disease Diagnostic Laboratory (FADDL) and the Texas A&M Veterinary Diagnostic Laboratory. No CSF exposure has been found. PRV testing was done at two NAHLN laboratories, using the gB ELISA test. Prevalence appears to be about 18%. Swine brucellosis testing was done at the Kansas State-Federal Laboratory until July, 2012, when the Kentucky Brucellosis Laboratory took over all brucellosis testing. All samples are tested by the Fluorescence Polarization Assay (FPA). Apparent prevalence is 6-7%. Over the past two years, over 200 tonsils from swine in eight states have been cultured for brucellosis. Of these, 21 have been culture positive, and all Brucella suis. SIV testing is done in-house using ELISA. Prevalence is about 7%. Matching nasal swab samples from seropositive swine are tested by rtPCR at the NVSL. Trichinella and Toxoplasma testing has been done by the ARS in Beltsville, MD, most recently on FY 2011 samples. No FY 2012 samples have been tested yet. Prevalence of Toxoplasma is about 15%, while Trichinella exposure is about 2%. Tongues of swine from counties with high prevalence of seropositive animals are tested for Trichinella larvae, and
Toxoplasma tachyzoites. For leptospirosis, serum and kidney samples were collected for part of the year, in a study that will continue into FY 2013. Diagnostic testing is being done at Colorado State University. Results are pending. In a retrospective study, serum samples were sent to the North Carolina NAHLN laboratory (Rollins) to screen for porcine reproductive and respiratory syndrome (PRRS) and porcine circovirus type 2 (PCV2). Both were present in feral swine, with PCV2 more common than PRRS. But feral swine appear to be spillover hosts that don’t sustain PRRS, and probably not PCV2.
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REPORT OF THE SUBCOMMITTEE ON GREATER YELLOWSTONE AREA (GYA)

Marty Zaluski, Chair
Montana State Veterinarian

The Subcommittee met on October 21, 2012 with Chair, Marty Zaluski calling the meeting to order at 12:30 p.m. The subcommittee meeting was held in conjunction with the Scientific Advisory Subcommittee and the Feral Swine Brucellosis and Pseudorabies Subcommittee.

Subcommittee members present included: Terry Kreeger, Jim Logan, Dave Hunter, Bill Barton, Michael Gilsdorf, Neil Anderson and Marty Zaluski. Subcommittee members absent included: Chuck Massengill, Rick Wallen, and John Belfrage, and Mark Drew. Susan Keller attended part of the session.

Neil Anderson, Montana Department of Fish, Wildlife and Parks (FWP) presented on factors affecting elk group size and impacts on brucellosis seroprevalence in Montana’s GYA. Spatial variations in elk density and aggregation patterns across the Montana portion of the GYE (Greater Yellowstone Ecosystem) were used to generate predictions of elk to elk disease transmission risk. These predictions were validated using current estimates of brucellosis seroprevalence. Snowpack, vegetative cover type, and elk densities affected elk group sizes and percent grasslands within the winter range and elk density affected the proportion of the population aggregated in large groups (>300 elk). Increasing elk herd density not only increased predicted average group size and proportion of the population aggregated in large groups, but increasing elk density also strongly increased the size of the largest elk aggregations. The study found no evidence that wolf predation risk, measured as an annual wolf-to-elk ratio, affected mean group size or the proportion of the population aggregated in large groups.

Brant A. Schumaker presented on a study that evaluated three RB51 vaccination regimens based on their reproductive effects on cattle. A herd of cattle (N=616) was randomly divided into three treatments groups: 1) Calfhood vaccinates without any subsequent vaccination (Controls); 2) Calfhood vaccinates with AV while pregnant; and 3) Calfhood vaccinates with a booster vaccination as non-pregnant yearlings, followed by AV while pregnant (BV+AV). Pregnancy losses were estimated as the difference in the number of pregnant animals during fall pregnancy checks and the number of previously pregnant cattle without live calves one week after parturition in the spring. All animals were treated as a single population with no differences in management. The overall pregnancy success of the herd was high (98.4%) with only ten calves lost. Due to the management practices of the herd, tissue samples from only two of ten live-born calf carcasses were available for analysis. Test results from these specimens did not indicate RB51 or an infectious cause for death. No meaningful or statistically significant
differences were seen between treatment and control groups (Control: 3/207 lost; AV: 4/204; BV+AV: 3/205). We conclude that adult vaccination with RB51 did not result in detectable decreases in the proportion of calves born live.

Bill Barton, Jim Logan, and Marty Zaluski presented on the recently completed Brucellosis Management Area review of Idaho, Wyoming, and Montana by USDA. The report was not finalized prior to the USAHA, but a draft was made to the three states for review.

The meeting adjourned at approximately 2:30 p.m.
The Committee met on Tuesday, October 23, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 8:00 a.m. – 12:30 p.m. There were 34 members and 41 guests present.

Presentations and Reports

Update on the Chembio DPP VetTB Assay Applications
Konstantin Lyashchenko
Chembio Diagnostic Systems, Inc.

Serologic immunoassays constitute an attractive alternative to the existing methods of testing for tuberculosis, such as the intradermal tuberculin tests. Using Dual Path Platform (DPP) technology, an animal-side test, DPP VetTB, was developed for rapid detection of tuberculosis-specific antibodies in various host species. In recent evaluation studies, this assay showed 100% accuracy for elephants and variable diagnostic performance for cervids (sensitivity 65-81%, specificity 96-98%) depending on the species. In elephants, DPP VetTB assay detected antibodies years prior to culture-based diagnosis. In cervids, DPP VetTB assay detected Mycobacterium bovis infection in both skin test reactors and non-reactors, thus suggesting that a combined use of these tests may provide a more sensitive diagnostic algorithm. Differential antigen recognition was found when comparing...
antibody responses measured by DPP VetTB assay in different cervid species or in experimental versus natural *M. bovis* infection of white-tailed deer.

**Update on Activities of USDA-APHIS-AC**
Chester Gipson
USDA-APHIS-Animal Care (AC)

Dr. Gipson presented an update on the activities of USDA-APHIS-AC, including Elephant Tuberculosis (TB) and notice to adopt the 2010 Guidelines, Dangerous Animal Concerns, and activities involving enhanced compliance and enforcement of the Animal Welfare Act. Proposed and final rules that are being worked include: contingency plans, traveling exhibitor itineraries, marine mammals, live importation of dogs, retail pet store definition, and the Horse Protection Act. The rule involving rats, mice and birds is currently on hold.

**Evaluation and Interpretation of Rectal Mucosa Biopsy Testing for Chronic Wasting Disease within Four White-Tailed Deer Herds in North America**
Bruce V. Thomsen
USDA-APHIS-VS, National Veterinary Services Laboratories (NVSL)

An effective live animal test is needed to assist in the control of chronic wasting disease (CWD), which has spread through captive and wild herds of white-tailed deer in both Canada and the United States. Rectal biopsy sample testing for CWD has shown promising results in previous studies and rectal biopsy sample testing has also been utilized successfully as a live animal test to diagnose the closely related disease, scrapie in sheep. This study compared the test results of postmortem rectal mucosa biopsy samples to those from conventional postmortem samples of the brainstem at the obex; the medial retropharyngeal lymph node; and the palatine tonsil in four CWD-infected, captive white-tailed deer herds. Three of the herds were located in Canada and one of the herds was from the United States. The effects of age, sex, genotype at prion protein (*PRNP*) codon 96, and stage of disease progression were evaluated as possible factors that might influence test performance. Test sensitivity for CWD on rectal biopsy samples in white-tailed deer ranged from 63% to 100% in the four herds within this study. Test performance was influenced by genotype at *PRNP* codon 96 and by stage of disease progression. Test sensitivity was the highest for 96GG deer and lower for 96GS deer. Rectal biopsy test sensitivity was 100% for deer in the later stages of disease progression, as evidenced by abundant immunohistochemical staining for PrP<sup>CWD</sup> in sections of brainstem. Rectal biopsy test sensitivity was reduced for deer in the earlier stages of disease. Selective use of this test, in conjunction with conventional testing postmortem testing, could provide valuable information during disease investigations of CWD suspect deer herds.
Captive Wildlife and Alternative Livestock

Review and Updates of the USDA-APHIS Veterinary Services (VS) National Chronic Wasting Disease (CWD) Program

Patrice Klein
USDA-APHIS-VS

CWD Rule Update

CWD Interim Final Rule was published on June 8, 2012, establishing a national voluntary CWD herd certification program (HCP) and consistent minimum interstate movement requirements. The rule became effective on August 13, 2012. Enforcement of the interstate movement regulations is delayed until December 10, 2012 to give States time to apply to APHIS to become an Approved State CWD HCP.

After reviewing the public comments, the APHIS will issue a final rule, and if needed, incorporate any changes made in response to comments on preemption. Comments received on other topics will be held for future rulemaking.

The goal of the CWD Program is to assist States, Tribes, and the cervid industry to prevent and control spread of CWD in farmed and wild cervid populations through establishment of a national CWD HCP and interstate movement requirements.

APHIS provides federal oversight of the voluntary national CWD HCP with program activities conducted by the Approved State CWD HCPs. APHIS will serve in an advisory capacity to Approved States for epidemiological investigations on CWD positive findings, development of herd plans, and assist (where possible) with herd inspections and inventories.

APHIS will continue to fund confirmatory testing on any presumptive CWD-positive samples from farmed and wild cervids, conducted by the National Veterinary Services Laboratories (NVSL).

Farmed/captive cervid surveillance testing

Through FY2012, CWD surveillance testing was conducted on approximately 22,585 farmed/captive cervids by the immunohistochemistry (IHC) standard protocol. This reflects testing that was funded by APHIS through December 2011 and the transition to these laboratory costs paid directly by the cervid owner beginning in January 2012 as a result of CWD program budget reductions in FY2012.

Farmed/captive cervid CWD status

To date, 60 farmed/captive cervid herds have been identified in 13 states: Colorado, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, New York, Oklahoma, Pennsylvania, South Dakota and Wisconsin. Forty were elk herds, 19 were whitetail deer (WTD) herds, and one was the red deer herd. At this time, 15 CWD positive herds remain – seven elk herds in Colorado, three elk herds in Nebraska, three WTD herds in Iowa, one WTD herd in Pennsylvania, and one red deer herd in Minnesota.

On October 11, 2012, Pennsylvania reported a CWD positive three and one-half year old female white-tailed deer (WTD) in a farmed cervid herd in Adams County, Pennsylvania. NVSL conducted the confirmatory CWD testing and this represents the first report of CWD in PA. The index herd is...
under state quarantine, and an epidemiological investigation and trace outs are in progress to identify epidemiologically-linked premises in Pennsylvania and other states.

In July, 2012, Iowa reported a CWD positive six year old male WTD in a hunt facility in Davis County, Iowa that was sourced from a deer breeding farm under the same ownership in Cerro Gordo County, Iowa. Trace outs identified several other premises that purchased deer from the index herd. CWD testing of the traced out animals has begun. To date, one CWD positive doe was identified in the source herd that had direct contact with the index animal, and four additional CWD positive deer (including two purchased deer) have been identified on separately owned premises.

In May 2012, Minnesota reported CWD in a two and one-half year old male red deer from a breeding farm in Ramsey County, Minnesota. This represents the first report of CWD in red deer (*Cervus elaphus*) in the United States. During the epidemiological investigation, 56 pen mates (cohorts) were tested and CWD was not detected in any of those animals. No point source of introduction yet has been determined. The herd remains under state imposed quarantine which is allowing for some animals to be transported directly to a slaughter facility. All slaughtered animals have been CWD tested and reported as ‘not detected’.

**Wild Cervid surveillance**

In FY2011, cooperative agreements were awarded to 46 State wildlife agencies (approximately $4.2 M) and 34 Native American Tribes (approximately $340,000). The Native American Fish and Wildlife Society received approximately $175,000 to support CWD outreach and education activities. Cooperative agreement funds were eliminated in FY2012 due to federal budget reductions.

FY2010 funding supported surveillance in approximately 74,900 wild cervids in 46 cooperating States. Wild cervid CWD surveillance totals are pending for FY2011 due to seasonal surveillance activities and completion of final cooperative agreement reporting to APHIS. To date, approximately 60,890 wild cervids have been tested in fiscal year 2011.

**Budget: Commodity Health Line Structure**

In FY2011, APHIS received approximately $15.8 million in appropriated funding for the CWD Program. In the FY2012 budget, livestock commodities regulated by USDA were organized into ‘Commodity Health Line’ structures or groupings. APHIS’ Equine, Cervid and Small Ruminant (ECSR) Health line supports efforts to protect the health and thereby improve the quality and productivity of the equine, cervid and small ruminant industries. In FY2012 approximately $1.925 million of ECSR funding was allocated for CWD program activities to provide Federal oversight of the national CWD herd certification program (HCP). The President’s FY2013 budget proposes further funding reductions.
Flu in the Zoo  
Jeanie Lin  
USDA-APHIS-AC  
Dr. Jeanie Lin presented “Flu in the Zoo” which addressed contingency plans for zoos. The goal was to have better emergency preparedness for zoos. Through a series of workshops and planning exercises, state, local, zoo, and other agencies that have resources available to help before, during, and after an emergency or disaster at a zoo or exotic animal facility can plan to become acquainted and coordinated in planning how to deal with these potential situations. Having a contingency plan in place and becoming familiar with the local resources will provide zoos with better coordination to potentially transport, deal with media, and address escaped animals during these stressful conditions if a disease or natural disaster event were to occur. Under the Animal Welfare Act (AWA) contingency rule, it will be important for zoos to have a draft plan in place. There are many resources available to contact both locally and nationally.

The Death Warrant of Three African Antelope  
Charly Seale  
Exotic Wildlife Association  
Mr. Charly Seale, representing the Exotic Wildlife Association (EWA), presented a brief history of the exotic wildlife industry in Texas. In the 1960’s with less than 500 animals left worldwide, a global conservation effort was undertaken. Private ranches have focused on three African antelope species, the Scimitar horned oryx, Dama gazelle, and Addax antelope, donated from zoo populations. From an original population of less than 1200 Scimitar Horned Oryx (SHO), Addax and Damm Gazelle in 1975, numbers increased to 1246 SHO, 449 Addax, and 369 Dama by the mid-1990’s when these species were virtually extinct in their native countries and placed under the protection of the Endangered Species Act (ESA). In 2005, US Fish and Wildlife Service (USFWS) exempted Texas ranchers and these species from the ESA to reduce governmental permitting restrictions. A lawsuit by Friends of Animals against USFWS resulted in removal of the exemption with a ruling against the 2005 USFWS rule. An appeal was made by EWA, USFWS, and Safari Club International (SCI) which was dropped with administrative changes within USFWS. A new petition was filed to delist the species based on a current census: 11,032 SHO; 5112 Addax; and 894 Dama gazelle. USFWS published a new rule which will place the three species under the ESA in January 2012 which took effect in April 2012. Populations have decreased by 50% after the new rule was proposed and the value dropped by 50-60% due to the difficulty of permitting. Legislation pending the House of Representatives would move the status back to the 2005 exemption. The delisting suit settled with EWA will make a determination on delisting by May 2013. They have published for comment in the Federal Register that delisting may be warranted for these species.
REPORT OF THE COMMITTEE

Committee Business:
There were five resolutions presented and passed by the Committee, and forwarded to the Committee on Nominations and Resolutions. The resolution titles are as follows:

- Chronic Wasting Disease (CWD) Control
- Funding for Chronic Wasting Disease (CWD) Testing
- Funding for indemnity of CWD positive or exposed animals.
- Chronic Wasting Disease Program Standards.
- Vaccine for the various strains of epizootic hemorrhagic disease in cervids.

The Committee adjourned at 12:30 p.m.
The Committee met on October 20, 2012 at the Sheraton Greensboro Hotel in Greensboro, North Carolina, from 1:00 to 5:00 p.m. There were seven members and 25 guests present. The meeting included several presentations pertinent to the committee’s purpose.

**Presentations and Reports**

The following presentations were given during the meeting, with associated summaries included at the end of this report.

- Summary of recommendations from the National Research Council’s study entitled, "Workforce Needs in Veterinary Medicine" - Bonnie Buntain DVM, MS and Gay Miller DVM, PhD
- NAHLN’s Capacity and Ability to Respond to Animal Disease Outbreaks - Ms Barbara Martin
- Report on the First Government-wide Federal Veterinary Workforce Assessment - Michael J Gilsdorf DVM, MS
- New Job Horizons for Veterinarians - Stacie Pritt DVM, MS, MBA, CPIA
- Vet-LRN - FDA’s Cooperative Agreement with Diagnostic Laboratories - 2012 Projects Update - Renate Reimschuessel VMD, Ph.D
- New Approaches to Preparing Veterinarians for Public Practice - Valerie Ragan DVM.
Committee Business

The Committee reviewed their resolutions. No resolutions were modified, and no new resolutions were presented.

Recommendations by the National Academy of Sciences Committee Report: Workforce Needs in Veterinary Medicine Public Practice

Bonnie J. Buntain, MS, DVM, DEABVP, DACVPM, University of Calgary, Canada, and
Gay Y. Miller, DVM, PhD, Professor, Epidemiology and Preventive Medicine, University of Illinois

Key Overarching Issues from the National Research Council (NRC) Report Impacting Public Practice

The US veterinary medical profession contributes to society in diverse ways, from developing drugs and protecting the food supply to treating companion animals and investigating animal diseases in the wild. In a study of the issues related to the veterinary medical workforce, including demographics, workforce supply, trends affecting job availability, and capacity of the educational system to fill future demands, a National Research Council committee found that the profession faces important challenges in maintaining the economic sustainability of veterinary practice and education, building its scholarly foundations, and evolving veterinary service to meet changing societal needs.

The committee found that increasing student debt associated with a veterinary education is one factor that undermines the inclination of graduates to pursue jobs in public practice. Partnerships between industry, government and academe could better expose DVM students and faculty to public health sciences, research and public practice careers. Joint academic-government programs that involve public practice veterinarians could help to emphasize the important work that can and is accomplished in public service.

“Colleges and schools of veterinary medicine face a precarious situation. They are in desperate need of trained graduates for faculty positions in structural biology, physiology, pharmacology, pathology, clinical pathology, infectious diseases of animals and zoonotic diseases, virology, microbiology, food safety, epidemiology, and nutrition. In the near future, the profession will experience major setbacks if veterinary schools lack a sufficient number of experts to serve as faculty. Unfortunately, the trends suggest that the academic veterinary community will not meet its own needs, let alone those of state diagnostic laboratories, federal research and regulatory agencies, or the pharmaceutical and biologics industry.”

“The veterinary profession should expand its capacity to address complex global problems, such as those associated with food security, by encouraging interactions between US veterinary graduates and other disciplines and cultures, particularly in the developing world, where the profession has an opportunity to leverage its expertise in One Health and lead advances in food-animal husbandry and welfare, water safety and security, and the health of wildlife and ecosystems.” These are areas where
public practice veterinarians can and do significantly contribute their expertise.

As the NRC Veterinary Workforce Committee explored the demand for public practice veterinarians, the committee concluded that a long-term persistence of openings for veterinarians in some federal agencies may indicate that other factors are influencing the ability to fill positions; for example, the lack of political will to increase the hiring of veterinarians (by raising salaries or offering incentives); the inability to make the working conditions more attractive; and the existence of internal and external competition for a limited number of candidates, such as those with advanced degrees or specialized knowledge and skills such as pathology.

**Description of the Veterinary Public Practice Workforce**

Public practice veterinarians employed in local, state, and federal government agencies work to ensure food safety, safeguard animal and human health from diseases and toxins, conduct biomedical research, and facilitate trade. Recent questions have been raised about the ability of the government to achieve its missions to ensure food safety and prevent and respond to infectious diseases of animal and humans. The Veterinary Medical Officer (VMO) is the most common position for veterinarians in the federal government. The official specialized foci of a VMO can include: epidemiology, import/export, laboratory animal medicine, pathology, product development, public health, toxicology, wildlife, zoological animal medicine, and clinical care. It is difficult to obtain a firm number of veterinarians employed in the federal government because there are many positions held by veterinarians that are not classified as VMO. In a recent study, the GAO found 13 major units of the federal government that reported employment of veterinarians. Several agencies expressed concerns to GAO that too few veterinarians were involved in carrying out the agency’s mission, but none indicated that new positions were being created. The GAO’s review of veterinary positions in the government concluded that, in addition to current vacancies, an impending wave of retirements, and the absence of a comprehensive assessment of federal veterinary workforce needs, the government is likely to miss recruitment opportunities, use veterinarians inefficiently, and experience an insufficient workforce during critical disease outbreaks (GAO, 2009).

The last element of the GAO critique—an insufficient workforce during critical animal and human disease outbreaks—is particularly worrisome in light of the declining numbers of veterinarians engaged in private food animal practice.

**Recruitment and Retention Programs in the Federal Government**

The USDA is the largest employer of veterinarians in the Federal public practice sector with mean salaries in the $80,000 range. FSIS is the largest employer of food safety public practice veterinarians and is using several effective recruitment incentives, as are some other Federal agencies, depending on yearly budget allocations. Below is a brief listing of recruitment incentives offered on and off over the past few years:
Recruitment Bonus: for all newly hired veterinarians FSIS as well as other agencies can offer an additional 10% of the base salary. Additionally in select areas that are difficult to fill, FSIS offers a “tiered recruitment incentive for up to an additional three years.”

Direct Hire Authority: the federal government grants direct hire authority to Federal agencies and positions nationwide where jobs are considered essential to protect the nation. For example, the Office of Personnel Management (OPM) granted FSIS this authority for Veterinary Medical Officers where there is a “critical hiring need in severe shortage locations and these positions play an important role in protecting the nation’s food supply.” The advantage of this authority to veterinary recruits can be hired relatively quickly.

Credible Service for Annual Leave Accrual: is a recruitment incentive that will allow new employees to receive hiring credit that can be added to vacation time for work that was performed outside the federal government or during active uniformed service duty. FSIS is using this incentive for all newly hired Public Health Veterinarians.

Loan Repayment Program: Some Federal agencies have awarded veterinarians repayment of loans (depending on the Federal budget) to facilitate recruitment of food animal veterinarians for positions designated as hard-to-fill in food safety and supply, especially in rural communities. For example, in 2009, USDA-FSIS budgeted $250,000 for the program to make about 25 awards to veterinarians. To qualify for the FSIS loan repayment program, a veterinarian must be a newly hired veterinarian. Under this program, an individual with qualifying student loans receives payments of up to $10,000 per year for two years, for a total student loan payment of up to $20,000. The amount, minus any applicable taxes, is applied to the student loan debt directly. Veterinarians participating in the program must be new to the Federal government or have had a break of Federal service of at least 90 days. Additionally, veterinarians must sign a three-year service agreement.

Public Health Human Resource System (PHHRS): is being implemented through Demonstration Projects in the federal government. In 2009 the USDA-FSIS became one of these projects that will last 5 years and requires an evaluation to determine if the new procedures of paying employees results in improved Federal personnel management. The key features of this system is that it is “results-based, competency-linked, pay-for-performance system and related innovations will produce successful results in a Public Health regulatory environment with distinct working conditions and an ever-present concern for food defense and security.” According to the OPM:

“In the 21st Century, national concerns and challenges are very different. Within the next 10 years, up to 50% of the Federal workforce is eligible to retire. Personnel challenges vary from mission to mission within the Federal government, and the need to recruit and retain a stellar workforce is paramount to Agencies fulfilling those missions so that they may serve and protect the American people. The current GS system is often too inflexible to achieve these goals, so because of this, Demonstration Projects, like
PHHRS, allow us to test new HR policies, including new pay systems, to better address the challenges of Civil Service in the 21st Century."

A part of this PHHRS system in pay banding which lumps several more rigid pay grades form the GS system into broader band of pay scales. The advantage proposed is that candidates can be hired at different rates and possible higher salaries depending on their qualifications. Within a pay band employees can move to higher pay non-competitively. Pay for performance means that all employees with a performance rating of fully successful or higher will receive an increase in their salary. Employees performing below fully successful will not receive a pay increase. For more information about demonstration projects and other performance-based pay systems in the federal government, visit http://www.opm.gov/aps/demoproject/index.aspx.

Residency Program: In 2008, the CDC started a two-year residency program designed to address a shortage of veterinarians working in biomedical research. The program is a partnership with Emory University's Robert W. Woodruff Health Sciences Center, and includes 200 hours of academic coursework at Emory University.

Training in Pathology: To encourage the development of veterinarians in biomedical sciences, the National Cancer Institute’s Center for Cancer Research, in collaboration with the National Institute of Allergy and Infectious Diseases, the National Institute of Diabetes and Digestive and Kidney Diseases, The National Heart, Lung, and Blood Institute have established graduate education partnerships with several Colleges of Veterinary Medicine. The program includes a residency and PhD training support for those with a DVM/VMD in comparative pathology (NCI, 2010).

Other Programs: Throughout the Federal government, specific agencies have developed various recruitment and retention incentives for jobs which veterinarians can apply. The key to remember is that not all jobs with these associated tools will be labeled as specifically requiring a veterinary degree; therefore it is important for veterinarians to seek mentors and networks in public practice to avail themselves of new opportunities.

The Federal Talent Management Advisory Council

In 2011 the Government Accountability Office (GAO) published a report concerning Strategic Human Capital Management High Risk Areas. As in the 2009 GAO report, the federal veterinarian workforce was identified as an area that needed to be strengthened.

According to the GAO, “There is a growing shortage of veterinarians at agencies, such as the Food Safety and Inspection Service, who oversee the slaughter and handling of livestock and poultry.” The GAO reported in 2009 that this shortage has the potential to place human health, the economy, and our nation's food supply at risk. GAO recommended that agencies, such as USDA and other agencies with food safety responsibilities, “conduct assessments of their veterinarian workforces to identify current and future workforce needs, while also taking into consideration training and employee development needs, and that a government-wide approach be used to address shortcomings.” In response, OPM and relevant federal agencies created an interagency forum and developed a strategic workforce plan to

In addition, the departments "must identify core competencies and skills required by the veterinary workforce in various federal agencies as well as study the authorities and flexibilities available or lacking within the federal government affecting recruitment and retention of veterinarians conducting essential emergency and routine duties."

**Recommendations from the NRC 2012 Report on Public Practice Workforce Needs in Veterinary Medicine**

Three key areas need to be better defined according to the NRC Report:

1. Creating innovative and coordinated approaches to recruiting and hiring students, mid-career professionals, and retirees to meet agency needs;
2. Streamlining the hiring process to create a positive experience for applicants and managers; and
3. Implementing programs and initiatives that will encourage current VMO employees to remain within Federal service.

The Committee also was concerned with reductions in Federal and state support of colleges of veterinary medicine and related research programs to advance animal and human health. Over the past 20 years greater than a 40% drop in Federal funding for animal related research and programs such as the USDA Food Animal Residue Avoidance Databank (FARAD) had had a negative impact. The Report concludes:

"The current level of priority for issues related to the veterinary care of animals and research on animal health seems incongruent with the potential consequences of continuing vulnerabilities in both animal and public health. The committee concludes that the current national investment in veterinary research and training for public health veterinarian is inadequate….It is encouraging that OPM has formed a Task Force to begin to develop a strategic plan for the federal workforce. The committee is hopeful that federal agencies will be able to clearly articulate the full value of the veterinary medical profession to their missions, and take steps to support a coherent plan to strengthen their role in research, food safety, animal welfare, and public health."

**References:**


Recruitment Incentives for Public Health Veterinarians, How to Apply for a Job, Careers, USDA FSIS,


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NAHLN's Capacity and Ability to Respond to Animal Disease Outbreaks

Barbara Martin
National Animal Health Laboratory Network (NAHLN), USDA-APHIS-VS

In 2002, two USDA agencies, APHIS and the National Institute of Food and Agriculture (NIFA - formerly known as CSREES), in collaboration with the American Association of Veterinary Laboratory Diagnosticians (AAVLD) formed the National Animal Health Laboratory Network (NAHLN). Our goal was to increase this country's capability and capacity to address adverse animal health events.

Initially, the NAHLN was comprised of 12 laboratories representing 12 States across the US. Today, we've grown to include 57 State and university diagnostic laboratories and five Federal facilities (Department of Defense Food Analysis and Diagnostic Laboratory, Fort Sam Houston, Texas; Department of the Interior Laboratory in Madison, Wisconsin; the Food Safety and Inspection Services Laboratory in Athens, Georgia; and the National Veterinary Services Laboratories [NVSL], Ames, Iowa and Plum Island, New York campuses), for a total of 62 laboratories in 40 States.

The State/University laboratories in the NAHLN perform routine diagnostic tests for endemic animal diseases as well as targeted surveillance and response testing for foreign animal diseases. State/University laboratories also participate in the development of new assay methodologies.

Networking these resources provides an extensive infrastructure of facilities, equipment, and personnel that are geographically accessible no matter where disease strikes. The laboratories have the capability and capacity to conduct nationwide surveillance testing for the early detection of an animal disease outbreak. They are able to test large numbers of samples rapidly during an outbreak and to demonstrate freedom from disease after eradication.

NAHLN reaches a significant milestone this year; we're turning 10! In our next several issues, we will share our accomplishments over the past decade.

There are currently 161 people trained and proficiency tested for classical swine fever (CSF) and foot-and-mouth disease (FMD) through the Train the Trainer program, 146 (91%) were trained. There are currently 211 people trained and proficiency tested for avian influenza (AI) and Newcastle disease (ND), 197 (93%) were trained through the Train the Trainer program.

The purposes of NAHLN is for early detection with targeted surveillance based on population density and risk; rapid response with surge capacity to test outbreak samples; and appropriate recovery using large numbers of samples tested to show freedom.

On June 11, 2012 a new testing algorithm for swine influenza surveillance (SIV) surveillance was implemented across the NAHLN laboratories. The changes in the algorithm are designed to broaden the SIV efforts to better monitor the ecology of the viruses in the US.

Below are summaries of NAHLN models, projects, and studies that are planned or in process:
Laboratory Capacity Estimation Model summary:
- Collaboration between NAHLN, FAZD and AAVLD
- Software tool for evaluating/monitoring NAHLN capacity
  - Allows for laboratories to define their specific processes and identify their rate limiting steps
  - Allows for estimation of network capacity and sample allocation during an outbreak

NAHLN Diagnostic Development and Validation Projects Summary:
- Collaborative projects with FADDL and NAHLN laboratories:
  - FMD Penside: Negative Cohort study– completed in January 2012
  - FMD Serology: Negative Cohort study – Fall 2012
- Collaborative projects between FADDL, NAHLN laboratories and FAZD include:
  - FMD polymerase chain reaction (PCR) in Milk: Inter-laboratory Comparison study- completed in Spring 2012
  - FMD PCR in Milk: Negative Cohort study –Currently underway
  - FMD Penside Negative Cohort study– Winter 2012
- Developing processes and policy for deployment of CSF and FMD ELISAs to NAHLN laboratories for preparedness
- We have developed processes for implementing these studies, which include open communication with the stakeholders and approval by each participating state’s State Animal Health Official (SAHO)

NALHN Planned Studies for 2013 Summary:
1. Developing processes and policy for deployment of CSF and FMD ELISAs to NAHLN laboratories for preparedness
2. FMD serology and penside negative cohorts continued
3. Lumpy skin disease PCR
4. Inter-laboratory comparison and negative cohort
5. Contagious bovine pleuropneumonia PCR
6. Inter-laboratory comparison and negative cohort studies
7. African swine fever (ASF) PCR additional sample validation work
Federal veterinarians are an integral part of our United States health professions and biomedical sciences workforce, and fill one of the occupations deemed mission critical across all agencies. The authorities and resources afforded to recruit, develop, assign, and retain this workforce affects our Nation’s Health Security as well as its essential Agricultural, Defense, Environmental, and Public Health Systems Infrastructures. This includes the detecting and researching the emerging and introduced diseases of animals that may also affect the safety and well-being of human populations – especially in the areas of food/water safety and nutrition; defense against intentional acts of terror; response to natural disasters; and the prevention and control of naturally occurring communicable diseases as well as chemical and radiation exposures.

In February 2009, the Government Accountability Office (GAO) issued GAO-09-424T, describing testimonies before the Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia, Committee on Homeland Security and Governmental Affairs, US Senate. The title of the GAO report is Veterinarian Workforce: The Federal Government Lacks a Comprehensive Understanding of Its Capacity to Protect Animal and Public Health. Additionally, a March 11, 2009, letter from Senator Akaka and Senator Voinovich to the Office of Personnel Management (OPM) Acting Director Whipple suggests that OPM consider the prospect of starting an ongoing, collaborative “veterinary community working group” to address critical Federal workforce shortages, such as with the veterinarian workforce, in an effort to develop a more proactive, government-wide approach.

OPM has facilitated and supported the formation and function of the Veterinarian Medical Officers (VMO) Talent Management Advisory Council (TMAC) by providing guidance and administrative support. The success of the TMAC relies on the interest, passion, and competence of the veterinarian professionals who are designated representatives or highly interested volunteers for improving the effectiveness of the Federal veterinarian community.

There are 26 federal agencies that employ veterinarians in a variety of job series. Fourteen agencies have sent designated representatives to the TMAC and are actively involved. The TMAC established a government wide Veterinary Medical Officer (VMO) strategic workforce plan in 2011. Three work groups were formed to develop processes and procedures for responding to the GAO report recommendations and the Senate requests in three areas: workforce planning, emergency management, and recruitment/retention. The recruitment/retention group developed a white paper on incentives needed to maintain and effective federal veterinary workforce. The Emergency management group worked with USDA-APHIS-
VS running models of foot-and-mouth outbreak scenarios to determine veterinary workforce capacity needs. The workforce planning group designed, developed and implemented the first government-wide VMO workforce assessment. The workforce assessment was completed by the federal agencies and by over 1100 federally employed veterinarians in July of 2012. Analysis of the data will be completed in October 2012. Preliminary data from the veterinary workforce assessment is summarized below:

**The assessment was designed to collect:**
- Workforce characteristics (grade, occupations, locations, etc.)
- Workload (functions and activities)
- Challenges (current and anticipated)
- Emergency response experience and capabilities
- Skills and Competency Assessment (Technical, Leadership and Emergency)

**The assessment was designed to address:**
- Understanding/identify the VMO Workforce
- VMO impacts on the workforce and work
- Government-wide VMO workforce gaps
- Recommended strategies to close those gaps

Veterinarians in 31 occupations, working under ten pay plans, across nine Departments responded to the assessment. Some of the preliminary workload functions and activities that were included are:

**Functions:**
- Animal disease surveillance and eradication
- Ensuring food safety (inspections)
- Public Health
- Import/Export
- Humane animal handling
- Regulatory inspections

**Activities:**
- Administrative (email, paperwork, meetings)
- Inspections (Ante-mortem, Imports)
- Export Certifications
- Communications (Industry, customers, partners)
- Data management (analysis, reporting)

Veterinarians also identified current impacts on the workforce, skills assessments information, proficiency and training needs, and emergency response workforce capacity information. The next steps will be to complete the analysis in the next two months and prepare a report that will be discussed with the federal agencies and stakeholders. The expected outcome of the report is that workforce gaps will be identified and recommendations proposed to address those gaps in order to maintain an effective and highly trained workforce that has the capacity and knowledge to protect animal health in the US and response to animal disease outbreaks and other emergencies.
New Job Horizons for Veterinarians
Stacie Pritt, DVM, MS, MBA, CPIA
Veterinary Medical Association for Women Foundation

Dr. Stacy Pritt’s presentation is based on the experiences she has had as an industry veterinarian, who transitioned out of private practice over ten years ago. Based on her knowledge of corporate job requirements and feedback from veterinarians and veterinary students over the years, she presented information related to what potential new job horizons are for veterinarians, ideas for students and veterinarians seeking such jobs, and where efforts can be directed to help recruit veterinarians into non-clinical positions.

Potential job horizons are those non-clinical jobs for veterinarians found in government, industry, non-profit organizations, and non-governmental organizations (NGOs). Additionally, veterinarians can forge their own paths through consulting and entrepreneurship. Pritt conducted an informal, non-scientific survey of 66 veterinarians currently employed in non-clinical positions. Over 55% of the veterinarians have been out of veterinary school over 21 years. Over 80% of these veterinarians had additional degrees or certifications including a PhD (20%), MS (20%), and MPH (14%) degree. Most of the respondents do not have the word “veterinary” or “veterinarian” in their job title. Approximately 52% identified program or project management as their main job responsibility. Other highly ranked job responsibilities included people management, budget/finance management, writing, and business strategy. Overwhelming, the main skills for success were written and oral communication, followed by project management then participating in/leading teams. Most respondents felt that a DVM degree was essential to their position, but over 60% were not in a position to actively recruit for other veterinarians. No one avenue for finding the respondents current positions stood out and answers indicated that there was no hidden job market.

When asked for recommendations to give to students, many answers indicated that students have many options and that they should persevere. Concrete recommendations revolved around finding mentors, gaining experience, developing non-veterinary skills, being able to relocate, networking, and pursuing advanced degrees.

Veterinarians looking for non-clinical positions, either within industry or public practice, should use search terms such as “animal health,” “life science,” “preclinical,” “research,” since many of these jobs do not advertise for veterinarians. Jobs can be found in the animal science, animal health, environmental science, human health, teaching, agriculture, and biology job sectors.

Recent market studies for veterinarians have missed crucial opportunities for developing veterinarians for non-clinical jobs. The National Academies of Science (NAS) report focused almost exclusively on obtaining a PhD and little mention of the benefits of an MBA or MPH degree. There was no discussion on obtaining an MBA or MPH degree after graduation, especially online, which today is a viable and acceptable option. The North
American Veterinary Medical Education Consortium (NAVMEC) focuses on non-clinical skills, but communication skills are focused on clinical settings and there is no mention of program/project management.

Several potential disconnects may exist when communicating non-clinical job opportunities to students and veterinarians. This includes the need to gain experience, obtain advanced degrees, develop non-clinical skills, relocate (potentially), leverage and translate existing skill sets, and realize that clinical skills will not be the basis of a veterinary career.

In conclusion, better data is needed on veterinarians practicing in non-clinical job sectors. Better messaging on non-clinical careers is needed when talking to both veterinarians and veterinary students. Veterinarians also need to focus on how they can make themselves more attractive for such positions.
Vet-LRN - FDA's Cooperative Agreement with Diagnostic Laboratories - 2012 Projects Update
Renate Reimschuessel VMD, Ph.D.
Food and Drug Administration, Center for Veterinary Medicine

The Veterinary Laboratory Response Network (Vet-LRN) program started in 2010, coordinates facilities, equipment and professional expertise of government and veterinary diagnostic laboratories across the country and Canada in response to high priority chemical and microbial feed/drug contamination events. The network provides the means for rapid response to reports of animal injury and establishes protocols to facilitate veterinary diagnostic reporting to FDA.

The Food and Drug Administration’s Center for Veterinary Medicine (CVM) provides grants/contracts/cooperative agreements to veterinary diagnostic laboratories to further FDA’s response capacity. Vet-LRN works with the veterinary diagnostic laboratories to document, investigate and diagnose animal feed or drug related illnesses. These efforts contribute to overall food safety as animal feed events could signal potential issues in the human food system.

Vet-LRN, during the past two years, has grown from an idea to a functioning network comprising 30 laboratories. With this growth, it is necessary to allocate resources to help conduct the work of the network and its program office.

During FY2011:
1. Vet-LRN held its first stakeholder meeting in March, and by August 2011 we had 16 Vet-LRN laboratory partners.
2. Vet-LRN awarded 11 cooperative agreements (V-CLASP) to conduct a study “Evaluation of Salmonella in Symptomatic and Asymptomatic Pets.”
3. Vet-LRN collaborated with six FERN laboratories to test animal feed products.
4. Vet-LRN collaborated with three FERN FSIS laboratories to optimize methods and test pig tissues for triazine contaminants.
5. Vet-LRN awarded a feed survey contract which helps CVM prioritize efforts.
6. Vet-LRN program office participated in and helped plan one NLE exercise.
7. Vet-LRN conducted five in depth case investigations and multiple case evaluations.

During FY-2012
1. Vet-LRN maintained communications with 30 member laboratories via monthly calls, email newsletters and website updates.
2. Vet-LRN managed the 11 V-CLASP project. This involved having the group harmonize documents including: a pamphlet describing the study goals for animal owners, patient definitions, sampling protocol, health history questionnaire, format for reporting results and FAQ information sheets for veterinarians and owners of positive animals.
Our laboratories were able to assist CDC by testing pet samples from households with human patients during the *Salmonella infantis* outbreak 2012.

3. Vet-LRN initiated a proficiency testing program in collaboration with the Moffett Center and University of Iowa. We conducted three proficiency tests, one for copper and two for *salmonella* which demonstrate ruggedness of the harmonized V-CLASP method and documented individual laboratory performance.

4. Vet-LRN continued collaboration with FERN testing animal feeds for pathogens.

5. Vet-LRN continued collaboration with FERN testing pig tissues for triazines.

6. Vet-LRN awarded 23 cooperative agreements to Vet-LRN laboratories to provide infrastructure funding for Vet-LRN activities including testing during investigations.

7. Vet-LRN program office participated in and helped plan one NLE exercise.

8. Vet-LRN became a member of the ICLN and participated in one NLE exercise.


10. Vet-LRN began to lead the Center’s testing program to investigate the root cause of pet jerky treat associated illness.
New Approaches to Preparing Veterinarians for Public Practice
Valerie Ragan, DVM
Virginia-Maryland Regional College of Veterinary Medicine

Dr. Valerie Ragan presented information on approaches for training veterinarians for public practice. Most state and federal veterinarians came into their positions in some manner other than a planned pathway to their current positions. Very few knew of their positions or planned to be in those positions when in veterinary school. A 2009 GAO report predicted shortages in the veterinary workforce. Although the current economic conditions have resulted in fewer available federal veterinary positions, there are still predictions that there'll be shortages in the long term. Additionally, the skills of the veterinary profession can be applied to many potential positions besides those routinely classified as veterinary positions. However, veterinary students are not normally well-trained for positions in public practice, nor are veterinarians in private clinical practice who wish to transition to public practice careers. The Center for Public and Corporate Veterinary Medicine (CPCVM) at Virginia-Maryland Regional College of Veterinary Medicine (VMRCVM) trains veterinary students through the public corporate career track specifically for careers in veterinary public practice. Courses include training in veterinary public policy, global veterinary medicine, problem solving in public practice, and other such courses. The CPCVM has also partnered with USAHA and AAVLD to provide increased opportunities for learning, networking, and potential future employment for veterinary students. However, VMRCVM is the only veterinary college with full time faculty working to train veterinary students specifically for veterinary public practice. The CPCVM has also conducted a number of career transition workshops for over 150 practicing veterinarians who are interested in transitioning into public practice. The CPCVM has prepared a White Paper proposing scaling up the CPCVM to a National Center of Excellence, capable of providing distance learning to veterinary students in other schools and to create certificate or graduate programs in public practice. The White Paper proposes working with the American Association of Veterinary Medical Colleges (AAVMC) to develop a business model with veterinary colleges to create “space” in each college’s curriculum, share resources, and recover the costs for curriculum development and delivery. This should result in the development of well-trained veterinarians who will be more valuable to federal and state agencies, thus limiting the long and costly learning curve for veterinarians newly hired into government agencies and the public sector.
REPORT OF THE USAHA/AAVLD COMMITTEE ON ENVIRONMENT AND TOXICOLOGY

Co-Chairs: Wilson Rumbeiha, MI
Larry Thompson, MO

David Ailor, DC; A. Catherine Barr, TX; Karyn Bischoff, NY; Tim Evans, MO; Francis Galey, WY; Tam Garland, TX; L. Wayne Godwin, FL; Ramesh Gupta, KY; Jeffery Hall, UT; Jeffrey Hamer, PA; William Hare, MI; Brent Hoff, CAN; Steve Hooser, IN; Laurent O'Gene Lollis, FL; Travis Mays, TX; David Meeker, VA; Gavin Meerdink, IL; Sandra Morgan, OK; Michelle Mostrom, ND; Eileen Ostlund, IA; Gary Osweiler, IA; Robert Poppenga, CA; John Rathje, IA; John Reagor, TX; Jane Robens, MD; Nick Schrier, CAN; Lori Smith, KY; Patricia Talcott, WA; Gary Weber, MD.

The Committee met on Saturday, October 20, 2012 from 3:30 - 6:30 p.m. at the Sheraton Hotel, Greensboro, North Carolina with 27 members and guests.

Dr. Wilson Rumbeiha opened the meeting by welcoming current and new committee members as well as guests. Agendas were distributed and attendance sheets passed around. Rumbeiha announced that at the close of the meeting Dr. Tim Evans of Missouri would assume the AAVLD Co-Chair position. Dr. Larry Thompson continues as USAHA Co-Chair. Rumbeiha also announced Dr. Cynthia Gaskill of Kentucky as the new committee scribe and expressed appreciation for the filling of these positions.

Report of the Proficiency Testing Subcommittee (PTS)
Steve Hooser
Purdue University

The PTS has collaborated with the Food and Drug Administration (FDA), Center for Veterinary Medicine (CVM) Veterinary-LRN (Laboratory Resource Network) to complete an initial Proficiency Testing (PT) for copper. The committee announced plans for a PT of lead in bovine liver, a matrix generated by Dr. Jeff Hall of Utah. Plans for the distribution of PT samples were made. Dr. Renata Reimschuessel of Vet-LRN agreed to finance containers and mailing costs for the PT. The results of the PT would be both shared with FDA-CVM as well as posted on a public website. Additional PT studies were considered including anticoagulant rodenticides in liver, which would be collected and supplied by Dr. Bob Poppenga and colleagues at the UC-Davis diagnostic laboratory. Additional analyte/matrix combinations were discussed.

The report on the State reporting requirements for toxicological diseases was not given because Dr. Jeff Hall could not attend the meeting. Discussion on this topic included information from Dr. Brent Hoff of Ontario on the new requirements set forth in Canada, the verbiage of which was discussed as possible models for those states without requirements.
Dr. Renata Reimschuessel, FDA-CVM, gave an update of the VET-LRN system activities and proposals for future work, including the major topics of Salmonella contamination of feed and analysis of chicken jerky treats.

The program on Drought-Related Toxicology Topics began with Dr. Deon van der Merwe presenting information on Water Quality for animals, including an extensive review of blue-green algae poisoning in animals and the diagnosis and evaluation of water samples for blue green algae.

Dr. Tim Evans of Missouri presented a fascinating review of nitrate/nitrite poisoning of ruminant animals during drought conditions.

Dr. Michelle Mostrom of North Dakota presented the current status of mycotoxin problems in the Midwest.

Individual member laboratories reported on their experiences and results of testing for mycotoxins, which have been especially variable due to the drought of 2012 and the widely varying growing conditions throughout the country.

Committee Business

There were no resolutions to be forwarded from this Committee. The Committee adjourned with no further business.
REPORT OF THE COMMITTEE ON FOOD AND FEED SAFETY

Chair: Bonnie Buntain, CAN
Vice Chair: John Ragan, MD

David Ailor, DC; Deanna Baldwin, MD; William Ballantyne, CAN; Marilyn Balmer, MD; Joseph Blair, VA; Richard Breitmeyer, CA; Deborah Brennan, GA; Kevin Custer, IA; Glenda Davis, AZ; Ignacio dela Cruz, MNP; Linda Detwiler, NJ; Tracy DuVernoy, MD; Reta Dyess, TX; Kathy Finnerty, NY; Mallory Gaines, DC; Robert Gerlach, AK; Eric Gonder, NC; William Hare, MI; David Harlan, MN; Larry Hawkins, MO; Jay Hawley, IN; Jan Hershenhouse, CA; Christine Hoang, IL; Donald Hoenig, ME; Kristin Holt, GA; Clyde Hoskins, SC; Danny Hughes, AR; John Huntley, WA; Susan Keller, ND; Barry Kelly, CA; Jennifer Koeman, IA; Daniel Lafontaine, MD; Dale Lauer, MN; Elizabeth Lautner, IA; Tsang Long Lin, IN; Laurent O'Gene Lollis, FL; John MacMillian, AR; John Mahoney, MN; Bret Marsh, IN; David Marshall, NC; James McKean, IA; Katherine McNamara, VT; David Meeker, VA; Nicole Neeser, MN; Kenneth Olson, IL; Stephanie Ostrowski, CA; Gary Osweiler, IA; Elizabeth Parker, ITA; Lynn Post, TX; M. Gatz Riddel, Jr., AL; Jane Robens, MD; Nancy Robinson, MO; Mo Saif, OH; John Sanders, WV; Joni Scheftel, MN; Irene Schiller, CHE; David Schmitt, IA; Craig Shultz, PA; Kathryn Simmons, DC; Harry Snelson, NC; Bruce Stewart-Brown, MD; Stan Stromberg, OK; H. Wesley Towers, DE; Bob Tully, KS; Gary Weber, MD; Larry Williams, NE; Nora Wineland, MO.

The Committee met on October 21, 2012 at the Sheraton Hotel, Greensboro, North Carolina, from 1:30-5:00p.m. During the presentations there were approximately 70 attendees. At the 4:30 p.m. Committee meeting there were 15 members and 12 guests present.

Presentations

There were no time specific presentations but all presentations were delivered according to the agenda. The following presentations are included at the end of this report.

- CAST Report - The Direct Relationship between Animal Health and Food Safety Outcomes - Dr. Lowell Midla, President-elect, Council for Agricultural Science and Technology (CAST), Assistant Professor-Clinical, College of Veterinary Medicine, Ohio State University
- Animal Production Food Safety- Perspectives from the Livestock Marketing Association - Dr. Tim Starks, President, LMA
- Market Cow Tissue Residue Surveillance in the United States - Dr. Craig Schultz, Director, Bureau of Animal Health and Diagnostic Services, Pennsylvania Department of Agriculture
- Animal Production Food and Feed Safety Programs in the Pork Industry – Dr. Steve Larsen, Director, Pork Safety, National Pork Board
- Food Safety Inspection Modernization Models -Dr. Bonnie Buntain, Public Health Professor, University of Calgary Faculty of Veterinary Medicine, Canada
Committee Business
The following was discussed by Chair Bonnie Buntain with members and guests in attendance. Lisa Ramsey, AAVLD Co-Chair, reviewed their discussion of the formation of the joint Committee and reported that they support this move by the Presidents:

Recommendation to the Presidents of USAHA and AAVLD:
To combine the AAVLD Food Safety Committee and the USAHA Committee on Food and Feed Safety into a single joint committee, the USAHA/AAVLD Committee on Food and Feed Safety.

Background Information:
After much consideration and review of the meeting activities of both committees over the past several years, the Executive Committees of both organizations believe combining these two committees into a joint committee would be an excellent idea, and that both committees would benefit. The AAVLD Food Safety Committee and the USAHA Committee on Food and Feed Safety have a common primary focus: food safety. Even the topic of feed safety, included in the USAHA committee, can be and often is relevant to food safety in addition to being relevant to animal health. The topics discussed at the meetings of each of these separate committees would be of interest to the members of each committee. A review of the purpose of each of these committees reveals that the missions of each are similar, compatible, and complementary (see the mission statements of each committee below), and that a combined purpose would not significantly change the purpose of either, but would instead enhance the purpose to the benefit of all the members.

It is recommended that the joint committee meetings occur with the same schedule on Sundays as the current USAHA Committee on Food and Feed Safety meetings. The USAHA Committee has more than twice the number of members than does the AAVLD Committee, and keeping the meetings on Sundays would be the least disruptive to the majority of members of the new joint committee. The combined Committee will begin in 2013. The Committee would be co-chaired and vice chaired by members of each organization for the first year to enhance coordination and direction of the newly formed joint committee.

The following are the current separate committee mission statements:

**USAHA Committee on Food and Feed Safety Mission Statement:**
The purpose of the Committee on Food and Feed Safety is to serve as a focal point for consideration of food safety and feed safety issues within USAHA. The Committee should recommend food/feed safety policies to protect animal and human health and be active in all areas of food/feed safety concerning foods of animal origin. Further, the Committee should provide a national forum for debate on minimizing chemical, microbial and physical contamination in the feed of food producing animals and provide specific
recommendations, using the latest available knowledge to enhance the safety of animal feeds.

**AAVLD Food Safety Committee Mission Statement:**
The AAVLD Food Safety Committee provides a national forum for the discussion and exchange of information pertaining to the food safety testing performed in Veterinary Diagnostic Laboratories. The committee members review and discuss issues and activities related to the safety of animal derived food with the goal of further integration of prevention, preparedness, response, and recovery plans between federal, state, and agriculture animal industry partners. In addressing issues and concerns that may affect animal emergency preparedness or response, the committee may make recommendations to influence policy or government, academic, research, or industry groups by proposing actions to reduce the potential of adverse effects of animal emergencies on the US animal agriculture industry.

**Proposed new mission statement of the USAHA/AAVLD Committee on Food and Feed Safety:**
The purpose of the joint USAHA/AAVLD Committee on Food and Feed Safety is to provide a national forum to discuss current and emerging issues and information pertaining to all aspects of food and feed safety and related veterinary diagnostic testing of foods of animal origin. The Committee should recommend food and feed safety policies to protect animal and human health.

The USAHA Committee on Food and Feed Safety also supports this initiative by the Presidents. The following advice was provided by the membership:

- Engage both committees in conference calls to discuss the process
- Create a joint subcommittee to create the mission statement
- Create a joint subcommittee to plan the next meeting agenda and implement the program
- Ensure that there is agreement on the length of terms of the Co-Chair and a process for succession planning
- Begin with the Chair and Vice/Co-Chairs for the initial planning for perhaps the first one to two years

**Other business: Recommendations for next year’s joint meeting topics**
- Food Safety Modernization Act (FSMA) update, regulatory impacts state, local, national and international
- Discuss on conference calls with joint committee members the upcoming 2013 program
- Update from Food Safety Inspection Service (FSIS) on non-0157 Shiga Toxin-producing *E.Coli* (STECs) and testing
REPORT OF THE COMMITTEE

- Food source attribution update - Steve Larson volunteered to assist
- Food security regarding continuity of business operations for continuity of food supply
- FDA’s and industry’s response to pet foods, including pet jerky treats; public health concerns (since 2007)
- Dairy food safety concerns – fancy foods, artisanal, raw milk, organic food safety and practices
- VetLRN update - animal foods and feed surveillance, regulation, etc.
- Food safety concerns with BP oil spills, veterinary laboratory network, food safety concerns –include FDA, NOAA, etc.

Resolutions

None were presented to the Chair by the membership. With no further business the meeting was adjourned.
CAST Report - The Direct Relationship between Animal Health and Food Safety Outcomes

Lowell Midla
President-elect, Council for Agricultural Science and Technology (CAST), College of Veterinary Medicine, Ohio State University

Dr. Midla stated that many groups in society, including politicians, activists, scientists, and stakeholders are advocating significant changes to livestock production practices. These changes include modification of stocking densities, limitations on antimicrobial use, and requirements for outdoor animal “experiences.” Such changes may affect animal health, productivity, and food quality. It is critical that decision makers understand the relationship between animal health and food safety, which is a complex association requiring careful evaluation of many variables. He presented qualitative and quantifiable impacts that animal health has on public health risk due to foodborne illness from meat, milk, eggs and poultry through examples of research. He identified the factors that impact animal health that are described in the CAST report and highlighted specific research needs. He explained the direct and indirect impacts that animal health may have on public health, such as directly through diseased or dead animals entering the food chain, and indirectly such as subclinically ill animals likelihood of contaminating the food chain through adhesions breaking and allowing contents to spill over into the carcasses causing an increase in the levels of Salmonella and Campylobacter. He presented evidence that about 7% of healthy appearing pigs had internal adhesions at slaughter and according to their model that could increase human illnesses. More research is needed for quantitative risk models that provide data on subclinical illnesses in livestock and carcass and product contamination rates. He referred the audience to the website for the complete report: www.cast-science.org
The Committee was pleased to have an update from the LMA whose 1,200 members handle about 70% of the regular selling livestock markets in the US. These members move about 33 million cattle, nine million hogs, and three million sheep a year. His key points were:

- LMA members play a key role in food safety by meeting regulatory and guideline requirements of multiple government agencies including EPA, OSHA, US Department of Labor, USDA, and State Departments of Agriculture
- Licensed veterinarians inspect all animals and provide health certifications
- LMA worked with the cattle identification (ID) group to develop a grassroots identification system that they presented to the USDA and was integrated into the government’s new approach to ID
- LMA members are more likely to adopt programs in food and feed safety when they recognize the economic benefits, such as the Beef Quality Assurance programs and humane handling practices
- LMA plays a big part in animal disease surveillance and disease control efforts
Structure of the National Residue Program

Verification of the slaughter industry’s control of chemical and animal drug residues is performed by the USDA, Food Safety and Inspection Service (FSIS) through its participation in the National Residue Program (NRP). Other Federal agencies that cooperate in National Residue Program activities are the Food and Drug Administration (FDA) in the Department of Health and Human Services and the Environmental Protection Agency (EPA). The FDA’s Center for Veterinary Medicine is responsible for veterinary drug approvals, establishing food animal drug tolerances, control of animal drug residues in milk, and enforcement activities when violative drug residues are detected in animal tissues at slaughter. The control of violative residues in slaughter populations under the NRP is performed by USDA, FSIS. This activity includes two programs: the National Scheduled Sampling Plan and the National Residue Surveillance Plan (also referred to as Inspector-Generated Surveillance). The National Scheduled Sampling Plan is a directed sampling program and determines the effectiveness of FSIS residue control activities. Samples are collected from inspected and passed carcasses and tested for a variety of specified chemical residues, including animal drug residues. The National Residue Surveillance Plan is an inspector-generated sampling plan in which animals are selected for testing based on the identification of high violation risk ante mortem and post mortem conditions as well flock/herd history. This testing serves to verify control of residues under the regulated slaughter establishment’s hazard analysis and critical control point (HACCP) system. Plants that receive residue-violative animals are responsible for declaring residues as a hazard reasonably likely to occur in their hazard analysis and implementing measures to reduce this hazard, ultimately to an undetectable level.

Ante Mortem Conditions and Residue Violation Risk

Both ante mortem and post mortem observations are used by inspectors to identify animals that are candidates for residue screening. These conditions are described in FSIS Directive 10,220.3. Ante mortem conditions that result in animals being declared suspects include inflammatory conditions, lameness, dehydration, conditions of the jaw (actinobacillosis/mycosis) and ocular conditions (especially ocular squamous cell carcinoma). In the past, large numbers of residue screens were performed on non-ambulatory cattle. With the banning of down-cow slaughter in December 2003 due to concerns over bovine spongiform encephalopathy this source of ante mortem suspect cattle disappeared. Cattle that present “slow”, dull, dehydrated, depressed, or severely lame on ante mortem inspection are at higher risk for animal drug residue violation. Cows with actinobacillosis/mycosis are at low risk of residue violation but are made ante
mortem suspects because of the similarity of “acti” lesions with those of bovine tuberculosis. Cattle with ocular squamous cell carcinoma are also low risk for violative residues but are suspected because of the risk of metastatic neoplasia resulting in carcass condemnation.

Cattle identified by inspection personnel as ante mortem suspects are sequestered in a designated suspect area in the slaughter facility away from cattle that pass ante mortem inspection. Identification devices and all examination findings are documented by the ante mortem inspector. An official US suspect tag is applied to the animal’s ear. Suspect cattle are moved to the slaughter floor as specific lots and each carcass receives an individual post mortem inspection, designation for residue screening if indicated, and disposition by a USDA veterinarian.

**Post Mortem Conditions and Residue Violation Risk**

Animals passing ante mortem inspection may be identified on post mortem inspection with lesions associated with increased risk of animal drug residue violation. High violation risk post mortem conditions are described in FSIS Directive 10,220.3. Animals with active inflammatory conditions including mastitis, metritis, peritonitis, nephritis, cellulitis, and pneumonia as well as certain metabolic conditions such as abomasal disease in cattle are at increased risk of violation. Data collected between 1997 and 1999 at a large Northeastern US slaughter establishment demonstrated the importance of post mortem conditions as triggers for residue screening. Comprehensive screening of all cattle with high violation risk ante mortem and post mortem conditions during that period demonstrated 85% of residue violations identified were associated with post mortem conditions. Selecting animals for residue screening based on ante mortem conditions, primarily non ambulatory cattle, was conventional in FSIS field inspection for many years prior to 2004.

Residue violation risk is inversely proportional to the chronicity of inflammatory lesions identified at slaughter. Active sub-acute to acute inflammatory lesions are most likely to be associated with a violative animal drug residue. Similarly there is no strong correlation between the extent of chronic inflammatory lesions and residue violation. Many sub-acute to acute inflammatory conditions are localized and can be trimmed allowing salvage of the unaffected portions of the carcass however residue screening is indicated in such cases.

In an attempt to identify targeted post mortem conditions most likely associated with residue violation, incidence of violations for each of the common ante mortem and post mortem triggers for testing was compared for all violations occurring in calendar year 1999 in a large Northeast US market cow slaughter facility. The results of this comparison demonstrated a relative uniformity of violation risk across the categories with only two categories slightly lower than one standard deviation from the mean incidence (abomasal disease and peritonitis). Carcasses condemned as a result septicemia and pyemia findings at post mortem inspection had a significantly higher risk of residue violation (>2σ).
Selecting Cattle for Residue Screening in Large High Line Speed Slaughter Establishments

Suspect cattle identified during ante mortem inspection are examined, documented and sent to the slaughter floor in specified suspect lots. On arrival at the slaughter floor suspect carcasses are subjected to routine inspection procedures and then presented to the veterinarian for final post mortem inspection. A disposition is performed and tissues are collected for residue screening on suspect cattle with high violation risk conditions whether the carcass is passed or condemned. Even though a carcass is condemned, if a residue screen is positive and a violative residue is identified, FSIS will report the violation to FDA and an investigation will ensue. All documented ante mortem findings are available to the veterinarian performing the post mortem disposition. Ante mortem suspect cattle that are passed on post mortem inspection with negative residue screening results are released to the edible channel. Condemned carcasses are discarded and enter the inedible/ rendering channel.

Cattle that pass ante mortem inspection are sent to the slaughter floor in lots identified by source (auction market, individual producer, dealer, broker, etc.). Once routine slaughter floor post mortem inspection procedures are completed there are three potential outcomes: 1) no significant post mortem lesions are identified, the carcass is passed and enters the edible channel; 2) localized high residue violation risk conditions are identified, the carcass is retained, and tissue samples are collected for screening; and 3) more extensive pathology with the potential for carcass condemnation is identified and the carcass and associated parts are held for final veterinarian-performed disposition. Once examined, these carcasses may be passed for edible use, retained pending residue screening results, or condemned and discarded to the inedible rendering channel. Once again, condemned carcasses with high residue violation risk conditions are subjected to residue screening and if found violative will be subject to an FDA investigation.

In-Plant Residue Screening Methods

Various antimicrobial drug residue screens have been employed by FSIS during the approximate 40 year history of the National Residue Program. For adult cattle these screening methods included the swab test on premises (STOP), the fast antimicrobial screening test (FAST), and the kidney swab inhibition test (KIS)™. The KIS™ test is a commercially available screen that was introduced to the FSIS field in 2008 and is now recognized as the official FSIS in-plant residue screening method. It is considered to have greater specificity for violative levels of β-lactam antimicrobial drugs and greater sensitivity for sulfa compounds that the FAST. It also provides a shorter turn-around time compared to the FAST.

Handling of Residue Screen-Positive Cattle

Retained carcasses that test negative on the residue screen are released to the edible channel. Carcasses that test positive have kidney, liver, and muscle samples collected and submitted to a federal laboratory for quantitative and qualitative residue analysis. These carcasses remain in
retention pending results. To minimize losses, large establishments debone, freeze, and hold meat under retention pending outcome of the residue analysis. There are considerable handling costs and other losses to industry associated with holding results-pending carcasses.

**Disposition of Carcasses and Organ Tissues Based on Laboratory Results**

Once laboratory results are received a final disposition of retained carcasses is performed. Since tissue tolerances are established for most animal drug residues, fate of the product depends on whether or not tissue levels exceed FDA-established tolerances. Depending on the animal drug and its distribution in various tissues, condemnation may be restricted to specific tissues (e.g. liver or kidney) or the entire carcass and all associated organs may be condemned. When the FAST was the principal screening test used, of all in-plant screen positive carcasses, approximately 20% were violative, 60% were positive for a residue but below tolerance, and 20% were negative with no residue identified. Carcass meat that is condemned for violative animal drug residues is not eligible for use as pet food and must be discarded appropriately, in most cases to an approved landfill.

**Trace-Back of Residue Violations**

Once a violation is confirmed, plant management is notified and must produce source information for the violative animal. In the case of market dairy cows which are often individually sourced through auction markets trace-back procedures can be complex. Large plants maintain fairly accurate tracking of animals on the slaughter line through the use of lot and position numbering systems correlated with a bar-coded sequence number for each carcass entering the slaughter line. In addition, identification devices are collected, bagged, sequenced by lot and position and saved. These tag collections are maintained for compliance with the USDA Market Cow Identification Program (MCIP) under the Federal Brucellosis Eradication Program. Additional federal requirements for tag collection and retirement at slaughter plants are under consideration as the National Animal Disease Traceability final rule is about to be published. Collected and sequenced identification devices can be retrieved and saved by inspection personnel in the event of a positive residue screen or if a suspect lesion for bovine tuberculosis is identified.

When trace-back information is obtained by FSIS it is entered into the Residue Violation Information System (RVIS) database. This is a shared FSIS-FDA database. FDA uses this trace-back information to initiate a violative tissue residue investigation.

Animal trace-back could be significantly enhanced through the use of electronic animal identification systems allowing real-time source identification of carcasses on a slaughter line. In addition to improving the accuracy of violative residue traces, this technology would provide numerous benefits to public health, in the event of a meat product-associated food borne outbreak or animal disease outbreak.
Animal traceability is complicated by the convoluted movements and changes of ownership of slaughter animals in the marketing system. As the number of transactions increases during the marketing phase, traceability declines. Under the proposed Federal Rule addressing livestock traceability current methods of animal identification may change. Back tags for slaughter animals may be phased out changing some established paradigms in slaughter animal tracing. Identification device recovery and retirement at slaughter and rendering plants will be important to the traceability process and incentivizing industry to perform these functions may be challenging.

**Addressing Violative Residues Under Hazard Analysis and Critical Control Point-Based Inspection**

HACCP based inspection has existed in large US slaughter establishments since 1998. In the performance of a hazard analysis, slaughter establishments receiving violative animals in their slaughter populations are required to address animal drug residues as a hazard reasonably likely to occur, establish critical limits for the hazard, and take measures to reduce the hazard to an undetectable level. A positive outcome of the HACCP Rule with regard to violative residues has been a more direct approach with producers who deliver violative animals. Under HACCP, once a violation is confirmed the slaughter establishment takes responsibility to notify the producer and obtain assurance of corrective and preventive measures from that producer within days of confirmation. Regulatory investigations by FDA may require months to complete. The impact of timely direct contact by the slaughter plant purchaser of the violative animal with the responsible producer has been very effective in reducing the violative animal drug residue problem. Critical in the feedback loop is a sufficient level of surveillance that identifies a high proportion of the violative animals in the slaughter population. Otherwise violative animals are missed reinforcing marginal residue avoidance practices by producers.

**Risk-Based Residue Surveillance Intensity**

Risk of violative animal drug residues varies depending on slaughter animal quality, age, production type, condition, and class. Based on these variables, the expected incidence of high violation risk animals in a slaughter population can be estimated and used as a regulatory performance parameter in identifying plants with inadequate regulatory surveillance applications. In every slaughter establishment there is a high violation risk segment of the slaughter population. In slaughter classes such as finished steers, heifers, and market hogs this segment may comprise a mere fraction of a percent of the total population. Other higher violation risk slaughter populations such as dairy cows may have as many as 15% of the animals in the high violation risk category. Verification of the establishment’s residue control effectiveness can only be achieved by comprehensively screening this high risk segment of the population.

Using an estimate of the expected incidence of high violation risk animals in a slaughter population (based on slaughter class, quality and other factors) a slaughter surveillance rate can be determined by expressing the
actual number of animals tested as a percentage of the expected incidence of violations. As surveillance rate increases, the actual number of violations rises and levels off as expected incidence of high violation risk animals is approached. As surveillance rate declines there is a point at which the number of violations falls to zero (the surveillance threshold). In plants with very low surveillance rates it is possible to give the false impression of a zero incidence of violative residues when actually the surveillance threshold has not been reached.

**Consistent Surveillance of Slaughter Populations**

Successful residue avoidance requires strict adherence of producers to principles of the Animal Medicinal Drug Use Clarification Act. Simply associating a pre-slaughter withhold period to a specific animal drug without regard to dosage, duration of dosage, route of administration, and condition of the animal does not equate to a successful residue avoidance strategy. Additionally, consistent slaughter surveillance that identifies a high proportion of violative residues is essential to reinforce best management practices in residue avoidance. Risk based methods of inspector-generated slaughter surveillance must demonstrate that an acceptable level of residue control has been achieved. Surveillance rates across slaughter classes in the FSIS field are inconsistent based on regional violation rate comparisons and plant-to-plant comparisons within specific slaughter classes. Some of these variations may be attributable to regional differences in animal quality and management, but this should be verified by a level of surveillance sufficient to demonstrate the accuracy of current data. Improved data collection on surveillance testing activity and continued correlation of FSIS in-plant personnel on residue-associated ante mortem and post mortem conditions are necessary to address this problem.

**Use of Food Animal Drugs and “One Health”**

The use of veterinary drugs, particularly antibiotics, in food animals is likely to change in the near future. Negative perceptions among federal regulators of antimicrobial drug use in healthy animals are becoming more intense. Limitations on growth promotion use may extend to disease prevention and control applications and this could have a serious negative impact on animal health. Balancing policies on agricultural antimicrobial use with sound public health policy remains a challenge considering the reality of therapeutics in food animal production environments. Food safety concerns over multi-drug resistant food borne pathogens bring further scrutiny on food animal antimicrobial use. Consumer demands for products free of these pathogens are likely to increase. Food animal tissue residues are not likely to produce antimicrobial resistant strains of human pathogens because tissue residue tolerances are sufficiently low to avoid generation of drug resistant pathogens in the human gut. However, demonstrating compliant use of veterinary drugs is critical to maintaining consumer confidence in food animal products and defending use of antimicrobials as therapeutic agents in food animal medicine.
FOOD AND FEED SAFETY

Animal Production - Food and Feed Safety Programs in the Pork Industry

Steve Larsen
National Pork Board

The National Pork Board:
- 15 Member Board
  - Nominated by importers and producers
  - Voted on by Pork Act Delegate Body
  - Appointed by the Secretary of Ag
  - At least 12 states represented
- Pork Act Delegate Body
  - Return-to-state funding (how much each state receives – 43 state associations)
  - Checkoff rate
  - Election of National Pork Board nominees to US Secretary of Agriculture
- Checkoff Revenue ($70 - $80 million)
  - 40 cents per $100
- Everyone Pays/Everyone Benefits
- Oversight
  - Ag Marketing Service (AMS) of USDA
- Pork Act Purpose
  - Promotion
  - Research
  - Education
  - No lobbying or influencing government
- 75 staff members
  - 12 Field Staff
- 2012 budget of $80 million – Forecast
  - DM, Producer Relations, Communications, Science Technology
- $16.5 million returned to the states
- $63 million for national programming
- Supplementals - $2.5 million
- Safety
  - Pre and Post Harvest
  - New Temperature!
- Quality
  - Consumer Taste and Preference
  - Retail Benchmark
  - Fat
- Human Nutrition
  - Lean Pork in a Healthy Diet
  - Addressing the Negatives
Dr. Larson described the Pork PQA Plus, which will soon undergo new updates. The Pork Industry and the Pork Quality Assurance Plus (PQA Plus) program is comprised of two main elements - food safety and animal well-being. Food safety refers to the practices that minimize physical, chemical or biological hazards that might be injurious to consumers. Animal well-being encompasses producer responsibilities for all aspect of animal well-being, including proper housing, management, nutrition, disease prevention and treatment, responsible care, humane handling and when necessary, humane and timely euthanasia. Food safety and animal well-being have become concerns for consumers, both domestic and foreign. The PQA Plus program has these distinct components:

- Individuals can become certified through an education program; This is achieved through the completion of reviewing the 10 Good Production Practices.
- Producer farms can receive PQA Plus site status designation through an on-farm site assessment; and
- As part of a third-party verification process, sites will be randomly selected to participate in an on-farm survey. Results will track the program's progress and determine opportunities for continuous improvement.
- There has been a growing interest among food-chain customers and the general public with the way food is produced.
- Recognizing that they must address these concerns and better position the industry’s track record of responsibility, pork industry leaders launched the We Care initiative. The We Care initiative seeks ongoing improvement in the pork industry’s production practices, building upon and promoting to those outside the industry its strong record of responsible farming.
- PQA Plus is the cornerstone of the We Care initiative and is a clear demonstration of the industry’s commitment to responsible farming and continuous improvement.
- At the heart of this commitment is a statement of ethical principles which asks each and every producer to commit to:
  - Produce safe food
  - Protect and promote animal well-being
  - Ensure practices to protect public health
  - Safeguard natural resources in all of our practices
  - Provide a work environment that is safe and consistent with our other ethical principles
  - Contribute to a better quality of life in our communities
  - The HACCP system focuses on identifying, preventing, eliminating or reducing hazards to safe level in food. HACCP is designed to be a preventative and systematic approach to promoting food safety. An important aspect of the HACCP system is that all individuals involved in a process understand
their role and fulfill their responsibilities. An error by one segment can affect the entire system and its success.

- FDA Compliance Policy Guide (CPG) 7125.37 – Proper Drug Use and Residue Avoidance by Non-Veterinarians outlines the practices and procedures the FDA would expect to see as part of the operation’s standard operating procedure for using animal-health products. Treatment records also can be useful as a management tool.

- The Federal Animal Medicinal Drug Use Clarification Act (AMDUCA) in 1994, established by which FDA-approved drugs could be legally used in food producing animals in a way other than expressly directed on the label. AMDUCA extends the privilege of extra-label use of drugs only to veterinarians and only when “the health of an animal is threatened or when suffering and death may result from failure to treat the animal.”

Dr. Larson reviewed each component of the PQA and then discusses feed hazards. The biggest challenge facing producers is getting the mixture right. Of eight potential feed hazards to address, animal drugs and pesticides are of most concern. Seventy percent discuss with or visit their feed company to determine feed safety procedures. Feed companies and vets are leading information sources about feed safety. For the most part, producers do not consider the NPB as a resource and the NPB is looking at ways to improve this. Of their surveyed producers, 27% are interested in an on-farm program for feed safety training and 15% would volunteer to participate in feed safety pilot training program.
REPORT OF THE COMMITTEE

Food Safety Inspection Modernization Models

Bonnie Buntain
Public Health Professor, University of Calgary Faculty of Veterinary Medicine, Canada

Due to a speaker cancellation, Chair Buntain volunteered to share her experiences studying the Quad countries (Australia, New Zealand, Canada and the USA) as they undergo food inspection reforms.

Why modernize food inspection systems?

- The way that food is produced and distributed has undergone fundamental changes in recent decades.
  - More complex, driven by widespread changes in methods of food production and processing, coupled with rapid increases in global food trade
  - Consumer demands for more diverse and innovative food choices (e.g., ready-to-eat meals)
- The food processing industry has also become more technologically advanced
- Industry is seeking to remain competitive by developing new products and accessing new markets.

What is involved with regulatory reforms for modernization?

- New Acts and authorities for government
  - Food Bill, Safe Foods for Canadians Bill, Food Safety Modernization Act FDA, etc.
  - Improved alignment with new food legislation
- Regulatory reviews prior to legislation action
  - Compliance costs
  - Regulatory international practices
  - Consistency, equity of new regulatory requirements
  - Risk based versus prescriptive regimes
  - Trade impacts
  - Resources required
- Extensive consultation process

What are some of the key areas that governments are addressing to enable this change?

- Clarification of national standards for all foods sold within and exported from the country
- Provide key risk management tools under new Acts
- Shift onus of responsibility from government to food business operators
- Determine that governments are not good at managing a large human resources business, but can be very good at managing knowledge and ensuring compliance through regulatory oversight
- Enhanced imported food regime
FOOD AND FEED SAFETY

- Move away from lot by lot inspection and towards greater reliance on the system (dependent on foreign country requirements, agreement);
- Expand recognition of foreign country food inspection systems to potentially reduce level of oversight required by government on imported products.

- New registering requirements for food businesses – import and domestic
- Improvement of penalty provisions
- Improvement of enforcement regimes
- Improved cost recovery strategies
  - Public good versus private business gain
- Replace old regulations with new risk-and-outcomes based regulations- flexibilities for industry
- Devise ways that industry shares food program control data immediately with government, pays for testing, and in return receives good service

What are some key features of risk-based inspection?
- Apply different levels of risk and appropriate government oversight according to the food business and compliance history
- High risk food production - more regulatory control and costs to the business
- Government conducts risk based audits of the effectiveness of regulated party’s controls:
  - This would require an ability to identify, understand and verify inter-related processes as a system and their inter-dependencies and understand the impact of deficiencies through the system

What is entailed in a modern inspection verification system?
- Verification – the act of determining the food business is complying with the regulatory tool that is applicable to that business; operator demonstrates they are using the regulatory tool to deliver safe/suitable food
- Performance based verification to reward businesses with good compliance and food controls
- Third party verification programs that operate as recognized government representatives
- Government or quasi-government verification agencies/organizations
- Change in inspection from prescription, task based verification to outcomes based verification is a cultural and training/educational shift
- Verification Skills and Knowledge
  - Communicate with regulated party at all levels
REPORT OF THE COMMITTEE

- Assess compliance by conducting interviews, observation and inquiry, and review of documentation and records
  - Analyze, verify and consolidate evidence
  - Prepare compliance verification reports in plain language with follow up plans and conclusions
  - Professional behaviour and leadership
  - Problem solving
  - Critical thinking, analytical skills, and objectivity
    - Know sources of risk in a food operation or with a product; assess whether the regulated party’s control is adequate (valid) and effective; and, whether compliance has been achieved
  - Root cause analyses
  - Business and organizational practice
  - Analyse information to support decision-making

Summary:
- Modern food technologies are evolving quickly
- Consumer demands for safe, affordable and convenient foods are growing
- Industry needs flexibilities to be innovative to remain competitive in the global food arena
- Governments seek effective and efficient use of its resources in domestic, export and imported arenas
- Verification, auditing, risk-based, and outcomes based regulatory regimes are emerging and driving changes in food inspection systems globally
REPORT OF THE COMMITTEE ON FOREIGN AND EMERGING DISEASES

Chair: Paul Gibbs, FL
Vice Chair: Tammy Beckham, TX

Helen Acland, PA; John Adams, VA; L. Garry Adams, TX; Bruce Akey, NY; Gary Anderson, KS; Joan Arnoldi, WI; George Badley, AR; Karen Beck, NC; Lisa Becton, IA; Melissa Berquist, TX; Bob Bokma, MD; Philip Bradshaw, IL; Richard Brettmeyer, CA; Deborah Brennan, GA; Becky Brewer-Walker, AR; Charlie Broadus, VA; Corrie Brown, GA; Dawn Bueschel, NM; Jerry Callis, NY; Jon Caspers, IA; Nancy Chapman, MD; Gregory Christy, FL; Jeein Chung, MN; Neville Clarke, TX; Leslie Cole, OK; Thomas Conner, OH; Joseph Corn, GA; Paula Cowen, CO; Stephen Crawford, NH; Debbie Cunningham, OK; Donald Davis, TX; Glenda Davis, AZ; Ignacio delac Cruz, MNP; Thomas Deliberto, CO; Linda Detwiler, NJ; Leah Dorman, OH; Brandon Doss, AR; Barbara Drolet, KS; Edward Dubovi, NY; Anita Edmondson, OK; Dee Ellis, TX; Francois Elvinger, VA; Conrad Estrada, TX; J. Flanagan, FL; James Foppoli, HI; Rose Foster, MO; W. Kent Fowler, CA; Richard French, NH; Mallory Gaines, DC; Tam Garland, TX; Cyril Gay, MD; Dorothy Geale, CAN; Robert Gerlach, AK; Colin Gillin, OR; Linda Glaser, MN; Stephen Goldsmith, VA; Timothy Goldsmith, MN; Jeffrey Hamer, PA; James Mark Hammer, NC; Cathleen Hanlon, NY; William Hare, MI; David Harlan, MN; Greg Hawkins, TX; Larry Hawkins, MO; Rudolf Hein, DE; Jan Hershenhouse, CA; Richard Hesse, KS; Linda Hickam, MO; Rick Hill, IA; Donald Hoenig, ME; Thomas Holt, FL; Floyd Horn, MD; Dennis Hughes, NE; Holly Hughes-Garza, TX; Pamela Hullinger, CA; John Huntley, WA; Carla Huston, MS; Annette Jones, CA; Thomas Kasari, CO; Gary Kinder, WV; Paul Kitching, BC; Patrice Klein, MD; Anthony Knight, CO; Charlotte Krugler, SC; Elizabeth Krushinskie, DE; Elizabeth Lahtner, IA; John Lawrence, ME; Randall Levings, MD; Tsang Long Lin, IN; Linda Logan, TX; Francine Lord, CAN; Margie Lyness, GA; Janet Maass, CO; John Mahoney, MN; Edward Mallinson, MD; Bret Marsh, IN; David Marshall, NC; Barbara Martin, IA; Michael Martin, SC; Sarah Mason, NC; Todd McAloon, MN; Thomas McKenna, WI; David Meeker, VA; Shelley Mehlenbacher, VT; Gay Miller, IL; Frank Milward, GA; Igor Morozov, KS; Lee Myers, GA; Thomas Myers, MD; Gene Nemechek, NC; Sandra Norman, IN; James Novy, TX; Stephanie Ostrowski, CA; Kristy Pabilonia, CO; Lanny Pace, MS; Charles Palmer, CA; Elizabeth Parker, IITA; Roger Parker, TX; William Parker, GA; Boyd Parr, SC; Barbara Porter-Spalding, NC; Tom Ray, NC; Anette Rink, NV; Keith Roehr, CO; James Roth, IA; Emi Saito, CO; Mo Salmon, CO; John Sanders, WV; A. David Scarfe, IL; Shawn Schafer, ND; Jack Schlater, IA; David Schmitt, IA; John Shaw, AA; Kathryn Simmons, DC; Marilyn Simunich, ID; Jonathan Sleeman, WI; Tom Smylie, CAN; Harry Snelson, NC; Rosemary Speers, VA; Katie Steneroden, CO; Nick Striegel, CO; David Swayne, GA; R. Flint Taylor, NM; David Thain, NV; Belinda Thompson, NY; Beth Thompson, MN; Brad Thurston, IN; Peter Timm, CA; Peter Timoney, KY; Alfonso Torres, NY; Susan Trock, GA; Arnaldo Vaquer, VA; Jesse Vollmer, ND; Liz Wagstrom,
The Committee met on October 23, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 8:00 a.m. to 6:30 p.m. There were more than 130 members and guests present. Dr. Paul Gibbs welcomed the Committee and guests and Dr. Tammy Beckham provided an update on 2011 Committee resolutions.

**Time-Specific Paper**

Dr. Wim H.M. Van der Poel, Senior Scientist at the Central Veterinary Institute of Wageningen University and Research Centre presented a time-specific paper on the 2011 Schmallenberg Virus Outbreak. The paper in its entirety is included at the end of this report.

**Presentations and Reports**

**Update on the National Research Council Report: Meeting Critical Laboratory Needs for animal Agriculture: Examination of Three Options**

Terry McElwain
Executive Director, Washington Animal disease Diagnostic Laboratory, Associate Director, School for Global Animal Health

Dr. McElwain provided an update and overview of the NRC Study: *Meeting Critical Laboratory Needs for Animal Agriculture: Examination of Three Options*. McElwain described the charge to the NRC committee and the process utilized during the study. The three options that were studied were discussed in detail. Recommendations and conclusions from the study were discussed and reviewed during this update.

**Mexico CSF and END-Progress on International Recognitions of Disease Free Status for CSF and Efforts to Meet APHIS END Requirements**

Dan Sheesley
Chief Executive Officer, Sheesley Enterprises, LLC

The main objective of this project was to provide technical assistance and guidance to both the Ministry of Agriculture, Livestock, Rural Development, Fishing and Food (SAGARPA), National Services of Food and Agriculture, Health, Safety and Quality. (SENASICA) and USDA Animal and Plant Health Inspection Service (APHIS) in establishing a framework for collaborative relationships to obtain the recognition of specific regions of
Mexico as Classical Swine Fever (CSF) and Exotic Newcastle Disease (END) free.

High priority was given to upgrading laboratory diagnosis and reporting procedures, as well as standardizing processes nationwide for laboratory diagnosis methodology, epidemiological surveillance activities, follow up and closure of suspect cases and the establishment of emergency plans for the control and elimination of CSF and END outbreaks.

Methodology included analysis of training needs, design of “Quick Guide” and other standardized field investigation tools, standardization of diagnostic laboratory protocols, thorough documentation and presentation of the required information for USDA for consideration of recognition of CSF free regions and END low risk regions. Sheesley Enterprises conducted comprehensive series of mock reviews for APHIS inspection visits and facilitated the bilateral negotiation meetings held between Mexico and the United States.

Current results include USDA certification of Mexican official laboratories for CSF diagnosis. The recognition by APHIS of Baja California, Baja California Sur, Sonora, Chihuahua, Nayarit, Campeche, Yucatán and Quintana Roo as CSF free states and the probable CSF free recognition for the states of Jalisco, Colima, Michoacan, Zacatecas, San Luis Potosi, Guanajuato and Queretaro. The certification and standardization of Mexico official laboratories for the END diagnosis is well underway, however, further work on the END phase of project was interrupted by the recent outbreak of Avian Influenza.

Update: Department of Homeland Security (DHS), Science and Technology (S&T) Directorate.
Michelle Colby
Branch Chief for Agricultural Defense in the Chemical and Biological Defense Division of DHS Science and Technology Directorate

A brief update on the animal health related research and development (R&D) projects funded by the Department of Homeland Security’s Science and Technology Directorate. Dr. Colby provided an overview of the methods by which entities can do business with the DHS S&T Ag Defense Branch. There are three methods of funding: 1) Grant; 2) Cooperative Research and Development Agreement (CRADA); and 3) Contract. The grant process is a competitive process with the deliverables to include publication, report or completion of a project. The contract is also a competitive process in which the deliverable is a product or service. The CRADA is awarded by the Notice of CRADA intent and either party may approach the other to initiate. The deliverable is a product or services agreed to on both sides. Contact information for the program SandT@dhs.gov.
Update: National Veterinary Services Laboratories
Elizabeth Lautner
Director National Veterinary Services Laboratories (NVSL), USDA-APHIS

Key diagnostic activities NVSL engaged in during 2012 included the identification of the fourth case of BSE in the US, implementing test protocols for detecting Schmallenberg virus, and supporting ongoing investigations of an Influenza A H3N2 virus infecting both swine and humans. From October 1, 2011 through August 1, 2012, NVSL received over 60,000 accessions and has processed over 162,000 samples, with approximately 432,000 tests being reported to clients. The Diagnostic Bacteriology Laboratory continues to support VS efforts in antimicrobial resistance and the tuberculosis and brucellosis programs. Other activities of the Diagnostic Virology Laboratory included test support for the vesicular stomatitis virus outbreak in NM and CO, and identification of a novel influenza virus (H3N8) from harbor seals on the East Coast. The Pathobiology Laboratory coordinated a validation study for three new immunohistochemistry platforms for scrapie and chronic wasting disease program testing, in collaboration with the National Animal Health Laboratory Network (NAHLN). NVSL also provided training and proficiency testing on various diagnostic test methods for US and international audiences. This last year NVSL laboratories distributed over 4700 kits for 22 different diseases. We continue providing diagnostic laboratory expertise to international countries, and responded to 15 requests for assistance including a collaborative project to develop and deploy a Teschovirus vaccine to Haiti. This year NVSL also received designation as an Office of International Epizootics (OIE) reference laboratory for FMD, and as a Food and Agriculture Organization (FAO) reference center for animal influenza and Newcastle disease, bovine tuberculosis and paratuberculosis.

Update: Foreign Animal Disease Diagnostic Laboratory
Fernando Torres-Velez
Director, USDA-APHIS-NVSL Foreign Animal Disease Diagnostic Laboratory (FADDL)

No summary available.

Update: Plum Island Animal Disease Center Foreign Animal Disease Research Unit (FADRU)
Luis Rodriguez
Research Leader, FADRU, USDA-ARS

The Foreign Animal Disease Research Unit (FADRU) at Plum Island Animal Disease Center is the primary laboratory in ARS responsible for research on foreign animal diseases (FAD) of livestock, such as foot-and-mouth disease (FMD), classical swine fever (CSF), African swine fever (ASF) and vesicular stomatitis (VS), diseases that could be accidentally or deliberately introduced into the United States in acts of agro-terrorism. The mission of the FADRU is to carry out the research needed to understand the pathogenesis of these microbes and the host response to them, and to
translate this knowledge into useful interventions and diagnostic tools for an effective response. During the last year, there have been important developments and accomplishments, including the successful re-initiation of ASF research; licensing of the Ad5-FMD vaccine discovered by ARS scientists, continuation of development of marker CSF live-attenuated vaccine and characterization of the re-emerging VS virus in New Mexico. FADRU scientists made great progress toward understanding FMDV, ASF and CSFV functional genomics, pathogenesis and immunology identifying a number of critical interactions between host-cell and viral proteins. They also made great progress in understanding the immune responses against FMD including the T-cell responses that had been previously poorly characterized. These accomplishments are documented in 23 peer-reviewed scientific articles published in the most prestigious journals. Additionally two patents were filed on next generation FMD vaccines. The FADRU had a very strong and successful year due in great part to the continued support not only of USDA base funds, but also extramural support from stake holders and sponsoring agencies including Department of Homeland Security (DHS), State Department, Department of Defense (DoD), Welcome Trust, National Science Foundation (NSF) and National Pork Board among others.

Update: Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD)
Juergen Richt
Director CEEZAD, Kansas State University

CEEZAD is the Co-Lead for the DHS Center of Excellence for Zoonotic and Animal Disease Defense (ZADD). Together with the Foreign Animal and Zoonotic Disease Defense Center (FAZD), CEEZAD addresses challenges posed by high priority foreign animal and zoonotic diseases. CEEZAD’s research program is in its third year of implementation. Currently, CEEZAD’s research portfolio is represented by projects in the areas of vaccine development, diagnostics, epidemiology/modeling and education with participation of universities, government agencies, and industry partners. The major focus in the vaccine area is on the development of subunit and vector-based vaccines for RVFV and continuing expansion and development of CEEZAD vaccine platforms. Diagnostic and detection efforts focus on the development of multiplex (RT) PCR tests for agents important for agricultural species and unbiased detection and molecular characterization of emerging novel pathogens. Several projects are devoted to the epidemiology, risk assessment, and decision to development for Rift Valley fever virus (RVFV). Through the Education and Outreach Overlay, CEEZAD supports continuing education courses on emerging diseases of animals and training for BSL-3 containment. Recently, CEEZAD in collaboration with Center for Food Security and Public Health (CFSPH), held a workshop on Vaccine and Diagnostics for Transboundry Animal Diseases in Ames, Iowa, and was awarded a grant through the Kansas Biosciences Authority for development
of diagnostics and prophylactics against Schmallenberg virus, a recently emerged pathogen of ruminant species in Europe.

Update: National Center for Foreign Animal and Zoonotic Disease Defense
Tammy Beckham
Director, DHS National Center for Foreign Animal and Zoonotic Disease Defense, Texas A&M University

The Foreign Animal and Zoonotic Disease (FAZD) Defense Center is a DHS National Center of Excellence. FAZD is the Co-Lead of the Zoonotic and Animal Disease Defense Center (ZADD) with the Center of Excellence for Emerging and Zoonotic Animal Diseases at Kansas State University. This presentation reviewed the FAZD portfolio to include the Biologic, Information Analysis and Education and Outreach components of FAZD and their activities throughout 2012. Most notably, FAZD Center is working with partners in federal, state, agricultural and private industries to develop biological countermeasures (agricultural screening tools) to support early detection and business continuity efforts within the US. The information analysis systems theme projects support continued development of the Ag Connect suite of tools. These tools include the Emergency Response Support System, the Laboratory Capacity Estimation Model, the Biosurveillance Field Entry System and the Enhanced Passive Surveillance System. The ERSS can be utilized for all phases of an emergency response (preparedness, response and recovery). The Education and Outreach Theme has developed K-12 programs as well as supporting the training of doctor of veterinary medicine (DVM) and graduate students through career development grant opportunities.

Update: National Animal Health Laboratory Network (NAHLN)
Sarah Tomlinson
Associate Coordinator, NAHLN, USDA-APHIS

The National Animal Health Laboratory Network (NAHLN), established in 2002 as a partnership between 12 State and University diagnostic laboratories and USDA, has evolved to include over 60 State, University and Federal laboratories. To create a consistent and credible framework for the NAHLN laboratories, the following Founding Principles were developed:

- Quality management standards
- Competency of laboratory personnel
- Standardized diagnostic techniques
- Reference materials and equipment
- Secure communications and reporting system
- Adequate facilities to ensure biosafety/biosecurity levels
- Assessment of preparedness through scenario testing

To support these principles, the NAHLN Program office has developed and delivered training courses that include Procedures for the Investigation of Potential Foreign Animal Disease/Emerging Disease Incidents.
Additionally, the NAHLN Program office has collaborated with the American Association of Veterinary Laboratory Diagnosticians (AAVLD) Accreditation Committee to develop the Quality Management System (QMS) Training Program. The NAHLN has been an active partner in collaborating with various stakeholder groups to enhance preparedness. Network function is being enhanced through collaboration with the Foreign Animal and Zoonotic Disease Defense (FAZD) and NAHLN laboratories on the development of the Laboratory Capacity Estimation Model (LCEM) which will evaluate and monitor the testing capacity during a disease outbreak as well as through web-based exercises that are currently being piloted. In addition, Ag Screening Tools workshops have been conducted by FAZD in collaboration with federal, state and industry partners to identify diagnostic and policy gaps. Based on input from these collaborations and with the assistance of NAHLN laboratories, multiple assays have been developed through funding provided by the Department of Homeland Security. Information from each activity has been used to prioritize actions needed to improve the Nation’s ability to address transboundary diseases.

**USDA Response to Schmallenberg Virus: Testing and Diagnosis**
Diane Rodman
Veterinary Medical Officer, Diagnostic Virology Laboratory, National Veterinary Service Laboratory (NVSL), USDA-APHIS
An update on the USDA response to the EU outbreak of Schmallenberg virus was provided. Through collaborations and cooperation from EU laboratories, the USDA-NVSL Ames and NVSL-FADDL have obtained the capability to perform virus neutralization, PCR and virus isolation for detection of the Schmallenberg virus.

**2012 California BSE Incident: Behind the Scenes**
Annette Jones, State Veterinarian, California
Dr. Jones gave an update on the timelines of the bovine spongiform encephalopathy (BSE) outbreak in California in 2012. She also gave an overview of the communications and coordination process in handling and dealing with this recent outbreak and identification of a BSE positive dairy cow in California.

**Avian Influenza in Jalisco, Mexico**
Hugo Fragoso
Director, National Centre for Animal Health Verification (CENAPA), Mexico
The 2012 outbreak of H7N3 in Jalisco, Mexico was reviewed during this presentation. A timeline for detection, typing and response was outlined along with the numbers of premises and birds affected. Response strategies were discussed as well as effects on the egg industry in Mexico.

**Assessment of National Strategies for Control of HPAI and H5/H7**
Low Pathogenicity Notifiable Avian Influenza (LPNAI) with an emphasis on Vaccination Programs

David Swayne
Director, USDA-ARS Southeast Poultry Research Laboratory

There have been 31 epizootics of H5 or H7 high pathogenicity avian influenza (HPAI) from 1959 to early 2012. The largest has been the H5N1 HPAI which began in Guangdong China in 1996, and has affected over 250 million poultry and/or wild birds in 63 countries. For most countries, stamping-out programs have been used in poultry to eradicate HPAI. However, 15 affected countries have utilized vaccination as a part of the control strategy. Greater than 113 billion doses were used from 2002-2010; 95.5% inactivated and 4.5% recombinant live vaccines. Mongolia, Kazakhstan, France, The Netherlands, Cote d’Ivoire, Sudan, North Korea, Israel, Russia, and Pakistan used <1% of the AI vaccine, and vaccination was targeted to preventive or emergency use. Five countries have utilized nationwide routine vaccination programs, accounting for 99% of vaccine use: 1) China (90.9%); 2) Egypt (4.6%); 3) Indonesia (2.3%); 4) Vietnam (1.4%); and 5) Hong Kong SAR (<0.01%). Six countries have enzootic H5N1 HPAI: 1) China, Indonesia, Egypt and Indonesia implemented vaccination after H5N1 HPAI became enzootic in poultry, and 2) Bangladesh and eastern India have enzootic H5N1 HPAI without vaccination. Vaccine use has prevented clinical disease and mortality, reduced human cases, and maintained rural livelihoods and food security. However, field outbreaks have occurred in vaccinating enzootic countries primarily because of inadequate coverage in the target species, but also some instances of vaccine failures following antigenic drift of field viruses. The primary strategy for HPAI and H5/H7 LPNAI control will continue to be immediate eradication by a four component strategy: 1) education, 2) biosecurity, 3) rapid diagnostics and surveillance, and 4) elimination of infected poultry. Vaccination can be a second tier component or ‘tool’ when immediate eradication is not feasible.

Development of an Influenza Risk Assessment Tool

Susan C. Trock¹, Nancy J. Cox¹, and Stephen A. Burke¹²
¹NCIRD, Influenza Division, CDC, Atlanta, GA; ²Battelle Atlanta Analytical Services, Atlanta, GA

Influenza pandemics pose a continuous risk to human and animal health and may engender food security issues. As new reassortant influenza A viruses are identified, pandemic preparedness strategies necessarily involve decisions regarding which viruses to target for further studies and mitigation efforts.

Scientific advances have yielded an explosion of information regarding influenza. Laboratory advances allowing for deep genome sequencing, three-dimensional crystallography, increased sophistication of experimental designs and studies have provided insight into differences among what heretofore might have been considered the same influenza virus. Additionally, there has been an increase in epidemiologic studies and
surveillance, often gathering information from wildlife or domestic animals sources.

Resource limitations dictate that viruses posing the greatest risk to public or animal health be selected for further research and potentially as vaccine candidates. Recently there is interest in applying objective, science-based risk assessments to evaluating influenza viruses. Such assessments often seek to answer different questions. The CDC has proposed an Influenza Risk Assessment Tool (IRAT) to address two specific questions: 1) What is the risk that a virus not currently circulating in the human population has the potential for sustained human-to-human transmission; and 2) If the viruses were to achieve sustained human-to-human transmission, what is the risk that a virus not currently circulating in the human population has the potential for significant public health impact? These questions define the parameters of the Tool.

The IRAT is being developed with input from animal health partners and could also be applied to development of animal influenza vaccines.

Quad Foot-and-Mouth Disease (FMD) Code Project
Tom Smylie
Senior Staff Veterinarian, Canadian Food Inspection Agency

Can the three month vaccinate-to-die and six month vaccinate-to-live policies be aligned for trade in animal products?

In 2011 to 2012, Canada along with other QUAD country members undertook a literature review to explore if current science could support eligibility to regain World Animal Health Organization (OIE) status of FMD free country where vaccination is not practiced in three months following an outbreak where stamping-out and higher potency emergency vaccination is applied irrespective of whether vaccinate-to-live (currently six months) or vaccinate-to-die policies (currently three months) were used.

Alignment of the three month waiting period for products derived from animal vaccinated with homologous higher potency emergency vaccines is feasible. Additional risk mitigation measures to meet individual country’s Appropriate Level of Protection (ALOP) as in any application of the Code may be necessary.

The Code provides recommendations for safe trade for germplasm and other animal products from vaccinates in a FMD free country where vaccination is practiced. Geographically and temporally limited use of higher potency FMD vaccines for emergency vaccination in a country with OIE status, FMD free country where vaccination is not practiced results in an insignificant increment to negligible in terms of products derived from such vaccinates. The increase in risk is significantly less than the risk level in countries eradicating FMD with routine conventional vaccination. This risk differential is recognized by the OIE in currently setting relative waiting periods and is evidenced by experimental and modelling studies.

Rather than stipulating a three or six month waiting period, the review proposes that the OIE set an acceptable level of statistical certainty for
surveillance to 1.) Substantiate the absence of FMDV infection for an FMD free country where vaccination is not practiced; or 2.) Demonstrate the absence of FMDV circulation for FMD free country where vaccination is practiced.

Is the United States Really at Risk for Introduction of Rift Valley Fever Virus
Mo Salman
Professor of Veterinary Epidemiology; College of Veterinary Medicine and Biomedical Sciences, Colorado State University

Rift Valley Fever (RVF) continues to garner significant attention as a potential agricultural and zoonotic disease threat to the United States (USA). Major outbreaks have been recorded in many parts of sub-Saharan Africa since that time. The first report of RVF outside of Africa was attributed to the importation of cattle and small ruminants from the Horn of Africa. The aim of this presentation is to qualitatively assess the threat of introduction of RVF in non-endemic regions, particularly into the USA. Various routes of introduction will be discussed.

The United States Department of Agriculture (USDA) recently convened a group of infectious disease scientists within the federal government to assess and prioritize a list of damaging animal disease threats. RVFV was ranked fourth on this list. The likelihood of importation of infected animals into the USA is negligible as all livestock from locations in the world where Rift Valley Fever occurs are prohibited from entering the USA.

RVF virus most certainly does not warrant a ranking of fourth on a list of animal disease threats to the USA. If research work in the USA continues on this virus and disease it should be with the overt objectives of assisting areas of the world where the disease occurs and not for the highly unlikely introduction of virus into the USA.

Following Salman’s presentation, several questions arose from the audience regarding the conclusions made in the presentation that RVF did not warrant a high ranking on the US disease threat list. Several committee members questioned and disagreed with the conclusions and stated that indeed, controlling and studying the disease in the endemic areas is important, generally felt that introduction into the US was a possibility that that the US should maintain this high on its threat list.

One Health
Valerie Ragan
Director, Center for Public and Corporate Veterinary Medicine, Virginia-Maryland Regional College of Veterinary Medicine

The concept of One Health, while not a new concept, is one that is gaining increased visibility and interest in the veterinary profession. The concept is often schematically demonstrated as three interlocking circles representing the linkages between animal health, human health, and environmental health.
The mission statement for the One Health Initiative states: Recognizing that human health (including mental health via the human-animal bond phenomenon), animal health, and ecosystem health are inextricably linked, One Health seeks to promote, improve, and defend the health and well-being of all species by enhancing cooperation and collaboration between physicians, veterinarians, other scientific health and environmental professionals and by promoting strengths in leadership and management to achieve these goals.

There are numerous examples of new interdisciplinary partnerships between agencies that are being developed to address zoonotic diseases worldwide. However, challenges remain for implementation, especially in underdeveloped countries where funding and education are limited, yet the threats of zoonotic diseases are exceedingly high. In this presentation, a perspective on enhancing implementation at the local level will be discussed, resulting in a proposal for a new One Health paradigm.

**New World Screwworm Exercise in Florida with Historical and Current Threat Information**

Gregory Christy  
Division of Animal Industry, Florida Department of Agriculture and Consumer Services

Since 2000, 12 imported animals with a *Cochliomyia hominivorax* (New World Screwworm) larvae infestation have been identified in the United States. Although in those cases, the larvae were eliminated before the life cycle of the fly could be completed, awareness and constant surveillance is necessary to prevent further reintroduction of the pest into the US. It is estimated that if screwworm were reintroduced into the US and became established, losses in the southern US alone could exceed $1 billion a year.

Because of this threat, on January 24-25, 2012, the Florida Department of Agriculture and Consumer Services (FDACS), Division of Animal Industry, hosted a *Cochliomyia hominivorax* (New World Screwworm) tabletop training exercise at the State Emergency Operations Center (SEOC) in Tallahassee, Florida. The simulated outbreak spread across multiple Florida counties and impacted livestock industries, pets, and public health. For two days, participants planned response actions to a series of realistic scenarios and were divided into a Multiagency Coordination (MAC) group, a simulated Incident Management Team (IMT), and a state-level Joint Information Center (JIC). Dr. John Welch, USDA-APHIS, International Services (IS) and Dr. Steve Skoda, USDA, Agricultural Research Services (ARS) attended the exercise and acted as subject matter experts on current USDA screwworm eradication programs.

Dr. Clarence Campbell, Florida’s State Veterinarian from 1952 through 1991, presented information at the exercise about the joint state-federal screwworm eradication program in the southeastern US, which began in 1957 during his tenure. He was instrumental in the successful implementation of Florida’s program. Using sterile flies produced in a
converted WWII airplane hangar in Sebring, Florida, the 2-year campaign cost approximately $11 million and eliminated the annual $20 million in screwworm-related producer losses in the southeastern US.

The presentation will include information and historical pictures and video about the past joint state-federal Cochliomyia hominivorax (New World Screwworm) eradication program in the southeastern United States and the current sterile insect technique (SIT) eradication status in Mexico and Central America. The Florida training exercise, with its lessons learned, will be discussed, as well as recent developments regarding the USDA plan to end funding of a sterile fly plant in Mexico.

FADD Field Manual for Use in FAD Field Investigations

Liz Clark
Laboratory Training Specialist, Professional Development Staff, Plum Island Animal Disease Center

In 2010, a USDA Foreign Animal Disease working group was formed to review the Foreign Animal Disease Diagnostician (FADD) course. The group consisted of Animal and Plant Health Inspection Service (APHIS), Eastern and Western Region epidemiologists, state and federal FADDs, National Center for Animal Health representatives, Emergency Management (NCAHEM) and the Professional Development Staff (PDS). The group identified the need for additional Foreign Animal Disease (FAD) training support. Among the specific recommendations was a FAD Field Guide to include “Job Aids” designed to facilitate the state and federal FADDs during their FAD investigations.

The goal for the FAD Field Guide was to develop an easy-to-use, easily updateable guide in order to stay current on policies and procedures and for the field manual to serve as a reference guide for federal and state foreign animal disease diagnosticians who are called upon to perform FAD field investigations.

The FAD Field guide will be rolled out during the presentation and a review of the instructional DVD will be also be viewed. The presentation will also provide a brief overview of the current curriculum of the FADD course at the Plum Island Animal Disease Center. Included in the presentation will be current changes to the curriculum, additional training opportunities available to FADDs through area offices, new FADD CE requirements and an overview of the training conducted in 2012.

Committee Business

The USAHA Committee on Foreign and Emerging Disease discussed a resolution to support development of a written response plan for a new world screwworm outbreak. The committee reviewed, discussed and passed this resolution. In addition, the committee reviewed and endorsed three resolutions from the joint AAVLD/USAHA Committee on Animal Emergency Management. These included a resolution to support the construction of National Bio and Agro-Defense Facility (NBAF), one to support the
FOREIGN AND EMERGING DISEASES

procurement of foot-and-mouth disease (FMD) vaccine for the national veterinary stockpile and one for the support of 840 radio-frequency identification (RFID) tags for tagging vaccinated animals during an FMD outbreak.
Abstract

In November 2011, a novel orthobunyavirus of the Simbu serogroup, the Schmallenberg-virus (SBV), was discovered using a metagenomic approach. The virus was associated with severe diarrhea and milk drop in dairy cattle and malformations of new-born lambs. As with related viruses such as Akabane virus, SBV seems to be transmitted by biting midges. Transplacental infection can result in malformations in foetuses of ruminants. During the epidemic, in thousands of farms in Germany, The Netherlands, Belgium, France, Italy, Spain, United Kingdom, Luxembourg, Denmark and Switzerland, acute infections of adult ruminants or malformed SBV-positive offspring were observed. Very high SBV seroprevalences were detected in adult ruminants in the core regions in the Netherlands, Germany and Belgium. As the family of Bunyaviridae contains several important zoonoses, studies were performed to elucidate its zoonotic potential. In a rapid risk assessment in December 2011 it was concluded that human infections were unlikely but could not be excluded. Therefore both in the Netherlands and Germany serosurveys in the human population were performed. Persons exposed to SBV, farmers and veterinarians, were tested. None of the tested individuals showed antibody to SBV and it was concluded that there is no evidence for zoonotic infection. Very soon after the SBV outbreak started, veterinary institutes in the affected countries worked together on the development of diagnostic tools, materials and protocols were rapidly exchanged. After RT-PCR virus detection methods were put in place, institutes focused on the development of antibody tests, which are indispensable for the needed epidemiological surveys. In February 2012, the world organisation for animal health (OIE) scientific committee endorsed recommendations for trade, and in March 2012 scientific support studies on Schmallenberg virus were started commissioned by the European commission and the involved EU member states.

Schmallenberg Virus First Detection and Spread

In November 2011, a novel orthobunyavirus was detected in plasma samples from cattle with fever and reduced milk yield in a farm near the German town of Schmallenberg (1). The Schmallenberg virus (SBV) was traced using a metagenomic approach with next generation sequencing. Schmallenberg virus belongs to the Simbu serogroup of the genus Orthobunyavirus and is most closely related to viruses of the Sathuperi species (2). The Schmallenberg virus infection represents the first known outbreak caused by a member of the Simbu serogroup in Europe.
First acute infections were detected in cattle in late summer 2011 in Germany and the Netherlands. These infections presented with a short fever period and a marked reduction in milk yield in dairy cattle. In a number of farms, especially in the Netherlands, severe diarrhea was a first striking clinical observation. Acute infections in sheep and goats in association with clinical signs were not seen. In the acute phase of the infection in adult animals a short viraemia of only 5-6 days occurred (1).

Malformations due to SBV infection have been observed from December 2011 onwards in stillborn or new-born lambs, calves and goat kids, which were usually born at term. The first SBV-induced malformed lambs were detected in the Netherlands in December 2011. The main pathological findings induced by SBV were identical to changes described for severe Akabane virus infections: arthrogryposis, torticollis, scoliosis and kyphosis, brachygnathia inferior and various malformations of the brain, cerebellum and spinal cord, including hydranencephaly and porencephaly (3; 4).

Examination of archived samples did not indicate the presence of SBV in Europe before 2011, and it could be concluded that the virus most likely was introduced in Europe in summer 2011. All notified cases of malformed lambs, calves and goat kids that emerged from December 2011 onwards were the delayed consequence of the infection of pregnant sheep, cattle and goats which took place in summer or autumn 2011. Within a few months, the infection had spread over a large area in Western Europe including Belgium, France, Germany, Luxembourg, the Netherlands, the United Kingdom and in 2012 also Switzerland. In 2012 an increasing number of infections were also reported from Poland, Italy, Spain and Denmark.

![Figure 1. Numbers of brain tissue samples of calves in the Netherlands tested positive (dark grey bars) and negative (light grey bars) by RT-PCR, per week, from week 52 of 2011 until week 22 of 2012.](image)

The first available information on SBV seroprevalence suggested that a large proportion of susceptible species (primarily ruminants) were exposed to the infection in the centre of the epidemic (> 95% in North Rhine-Westphalia). In the Netherlands, the estimated seroprevalence of antibodies to SBV in dairy cows was 72.5% for cattle sera collected between November 2011 and February 2012. High (70-100%) within-herd seroprevalences were
observed in two SBV-infected sheep and dairy farms in which a considerable number of animals was tested (5). If SBV-specific antibodies convey protection against reinfection, the level of immunity in ruminant populations will be high in the Netherlands and in North-Western parts of Germany, while a further spread of SBV in or from regions with a lower seroprevalence can be expected in 2012/2013.

**Arthropod Vectors**

Although vector transmission has not yet been formally proven for SBV, findings indicate that biting midges (Culicoides spp.) play a central role in the transmission of the disease. SBV has been detected in Culicoides spp. in Belgium (6), Denmark (7), Italy, the Netherlands and Germany. In some cases, the infected insects could be typed as members of the Obsoletus complex or as *C. dewulfi*. It is not known if other arthropod vectors can also transmit the virus. First experimental infections in cattle at the Friedrich-Loeffler-Institut and in sheep at the Central Veterinary Institute in Lelystad do not suggest that direct horizontal transmission plays any role for SBV transmission (unpublished data).

**Impact of the Schmallenberg Virus Outbreak**

Economic losses due to Schmallenberg virus infections in livestock production can be considerable on a farm level. Within herds, the highest economic losses are observed in those sheep farms experiencing a high number of malformed lambs. Such malformations have been detected in about 4% of the sheep farms and about 1.3% of cattle farms in the outbreak region. In cattle farms, mostly single or few cases of malformed SBV-infected calves were reported and only a relatively small number of goat farms have been affected. Economic loss in cattle due to delivery of malformed calves is limited and may be lower than the losses due to milk yield reduction and return to service. However, to assess the impact of the SBV outbreak on animal production and animal welfare, it will be necessary to estimate the impact on return to service, milk yields, rates of dystocia, congenital malformations and nervous symptoms in offspring.

Nevertheless, SBV-infections caused substantial concern among farmers and in the general public, already before any calculations of economic losses have been made. The emergence of the infection had major impact on international trade of susceptible animals and animal products such as semen and embryos. Countries imposed restrictions on imports of live cattle from the EU. However, based on the updated OIE factsheet on SBV (8), the European Union (EU) is of the opinion that SBV does not deserve a treatment different from the one applied to Akabane virus, which causes a disease that is neither OIE listed nor notifiable in the EU nor subject to specific OIE standards or restrictions although it is endemic in many areas of the world.

After the SBV outbreak was established in December 2011, a first assessment of the potential human health hazard was made using a risk profiling algorithm at the Dutch Institute for Public Health and the Environment (RIVM), by the German Robert Koch-Institut (RKI) and by the
European Centre of Disease Control (ECDC) (9). Since the risk for zoonotic transmission of SBV could not be excluded in the beginning, health complaints of potentially exposed persons were monitored. Serological studies were performed in the human population and in particular among people living and/or working on SBV-affected farms. SBV-neutralizing antibodies were not detected in humans and it was concluded that there was no evidence for zoonotic transmission from either syndromic illness monitoring or serological testing (10:11). Therefore, the public health risk of SBV should be regarded as extremely low to negligible.

**Diagnostics and Primary Measures**

Diagnostic procedures for the detection of SBV infections became available very soon after the discovery of the virus and were rapidly distributed. They included (i) real-time RT-PCR (implemented and preliminary validated within days; validated commercial kits available after about three months; 12), (ii) neutralisations tests and indirect immunofluorescence (validated with the first virus isolate within a few weeks) and (iii) SBV antibody ELISAs allowing mass screening (available within about five months). These techniques allow the unambiguous diagnosis of SBV infections in malformed neonates by PCR or demonstration of precolostral antibodies with high sensitivity and specificity. The short viremia limits the use of RT-PCR for the detection of SBV infections in adult animals to the acute phase of the infection. The sensitivity is highest in animals presenting with fever.

Immediately after the emergence of SBV was recognized, the Netherlands was the first country to impose the obligatory notification of malformed calves, lambs and goat kids on test farms for SBV. It was thus possible to record accurately all infected farms. This measure was prompted by the fact that in the beginning a zoonotic potential could not be excluded and by the need to assess the impact of the epidemic rapidly. At a later stage, the disease was made notifiable in several other European countries including Germany and France. As a consequence, the number of notified cases (i.e. affected holdings in most countries) mainly reflects the distribution of SBV-induced malformations in neonates. The development of the epidemiological situation was swiftly communicated to trade partners and the general public. However, in the area of the epidemic the spread of SBV infections could only be recorded as no measures were feasible to control the outbreak.

For a vector transmitted infectious disease, prompt detection and instigation of control measures such as vaccination are crucial to prevent spread. However, a vaccine is not yet available for SBV. Therefore, further spread of SBV can currently not be influenced by control measures directly aimed at the virus. However several institutes and companies are in the process of developing SBV vaccines, but the availability of licensed products before 2013 is unlikely. As a consequence, as in the early phase of other new epidemics we currently will have to rely on biocontainment and biosecurity measures.
Conclusions

In the case of Schmallenberg virus the novel technology of metagenomics was proven to be very useful for early detection. Schmallenberg virus was detected in the acute phase of the epidemic before the first malformed lambs and calves were born. As a result, diagnostic tools were available very early and could be used to follow the cases of SBV-induced malformation and to study, for example, seroprevalences. Veterinary diagnostics in Europe have proven to be prepared for this kind of outbreak situations and it was shown that there is a very effective network of institutions working on epizootic diseases within the European Union. This network should be supported and improved, as currently is done by the EPIZONE European research Group (www.epizone-eu.net).

A re-emergence and further spread of SBV in Europe can be expected and the spread of SBV by Culicoides spp. may be more efficient than the spread of BTV in Europe. Taking the Australian experience with Akabane virus into account, a spread even to countries outside Europe may be possible.

The SBV affected region has some unique features which may favour the introduction of new pathogens: (i) numerous international airports, such as in Amsterdam, Brussels, Cologne, and harbours such as in Rotterdam; (ii) a high human population density with the need of importing large amounts of fresh goods like fruits, vegetables and flowers from all over the world every day; (iii) a high density of cattle and sheep which represent a perfect target for exotic infectious diseases of ruminants; and finally (iv) domestic populations of Culicoides spp. which are competent for diseases transmitted by biting midges. This means that new introductions of vector borne diseases must be expected in this region. Infectious diseases surveillance, screening and sentinel programs therefore are indicated. In addition novel technologies such as metagenomics with next generation sequencing and microarray analysis have to be further developed and used for the analysis of cases suspected of exotic infectious diseases. The awareness of farmers and veterinarians about the possible introduction of diseases has to be raised and maintained at a high level. National and international cooperation between institutes and also cooperation between authorities should be improved as much as possible. In addition the ‘One Health’ approach, involving inclusive collaboration between physicians, veterinarians and other health and environmental professionals, will be more and more important to combat emerging viral diseases.

References


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REPORT OF THE COMMITTEE ON GOVERNMENT RELATIONS

Chair: Stephen K. Crawford, NH

Bill Barton, ID; Kristin Haas, VT; Steven L. Halstead, MI; Christine N. Hoang, IL; Keith Roehr, CO; Bruce King, UT; David T. Marshall, NC; David Meeker, VA; Dustin Oedekoven, SD; David Schmitt, IA; Brian T. Smith, DC; James Watson, MS; Annette Whiteford, CA.

USAHA Attendees: Tammy Beckham, TX; Stephen K. Crawford, NH; Dave Fly, NM; Steven L. Halstead, MI; Julie Helm, SC; Paul Gibbs, FL; Mike Gilsdorf, DC; Gail Golab, IL; Heather Hirst, DE; Christine N. Hoang, IL; Guy Hohenhaus, MD; Bruce King, UT; Jim Logan, WY; David T. Marshall, NC; David Meeker, VA; John Ragan, MD; David Schmitt, IA; Brian T. Smith, DC; Scott Stuart, CO.

AAVLD Attendees: John Adaska, CA; Bruce Akey, NY; Catherine Barr, TX; Tim Bazsler, WA; Craig Carter, KY; Thomas McKenna, WI; Barbara Powers, CO; David Zeman, SD.

The Committee met on Tuesday, March 13, 2012 at the American Veterinary Medical Association Government Relations Division office in Washington, D.C. There were 29 members and representatives in attendance at this year’s meeting. The Committee met with several organizations and agencies over the following two days.

American Veterinary Medical Association (AVMA)

Ron DeHaven, Mark Lutschaunig, Gina Luke, Whitney Miller, Ashley Morgan

Dr. DeHaven provided an update by video teleconference. He discussed the AVMA new strategic plan developed in June 2011, key aspects include: Economics of profession incl. practice profitability and mentoring for new practitioners; Animal welfare; Research funding; and new means of communication with members/member engagement.

He then covered AVMA/ Association of American Veterinary Medical Colleges (AAVMC) collaboration on specific areas including workforce study to address true shortages of veterinarians, student debt, and employer expectations for new graduates.

DeHaven noted that a revised and improved Veterinary Practice Act draft has been circulated for comment.

He discussed two important legislation topics of interest. The first is H.R.1406, which will require written prescriptions for medication from small animal clinicians, even if dispensed from own clinic. AVMA does not support this and is advocating against passage. The second is H.R.3798, the Egg Products Inspection Act amendments, particularly of note the standards for poultry houses, of which AVMA supports this legislation as it is consistent with AVMA policy for laying hens.
DeHaven concluded with two Task force initiatives that have been established on the AVMA administrative structure and the AVMA role in accreditation of foreign colleges of veterinary medicine.

AVMA staff continued with more detailed legislative updates. Dr. Morgan discussed Preservation of Antibiotics for Medical Treatment Act (PAMTA) and animal feed additives, waiting for draft of codified regulations from FDA.

Dr. Miller covered H.R.3704, which requires immediate euthanasia of downer animals at slaughter facilities. AVMA is currently not supportive because the bill does not allow resting of fatigued swine. She also discussed H.R. 3798 egg products inspection act in further detail. AVMA is not actively advocating but do support the bill. DeHaven added there are concerns in the industry about equivalency requirements related to international trade. The Committee further discussed the economic impacts, enforcement and specificity of rules if the bill becomes law.

Ms. Luke updated the group on the Veterinary Medical Loan Repayment Act. This is the top appropriations priority for AVMA this year. They will be advocating to make the program tax-exempt which would allow an estimated 40 percent more money available for participants.

AVMA GRD staff anticipates it may be December before a budget is passed in Congress this year. Regarding the Farm Bill, the timeline is unsure at this time. They anticipate that a draft has been established in broad strokes, and will include Veterinary Medicine Loan Repayment Program (VMLRP), but National Animal Health Laboratory Network (NAHLN) funding is still in question.

Association of American Veterinary Medical Colleges (AAVMC)
Mike Chaddock and Brian Smith

Dr. Chaddock highlighted the progress of the North American Veterinary Medical Education Consortium (NAVMEC). In summary it is a roadmap to look at education in veterinary medicine, developed through a process of several meetings to produce 23 recommendations. The national class size generally increases 2-2.3% per year. Current graduates are still getting jobs but there seems to be fewer job offers per graduate. Centers of Excellence are under discussion as a means for improving efficiency of clinical training, but the process is very complicated.

Mr. Brian Smith updated the Committee on AAVMC’s legislative positions, many of which are parallel to those of the AVMA. He provided a packet of information regarding details of their priorities.

Animal Ag Coalition (AAC)
Dudley Hoskins, Chair; Gina Luke, Vice-Chair

The Committee discussed several funding and legislative issues with the AAC. They are beginning the process to address Farm Bill priorities, and anticipate an uphill battle to include NAHLN as part of the Bill. The request for $30 million will provide challenges. It is anticipated that passage of the Farm Bill may not happen this year. Without passage or extension, the
programs could revert to 1948 levels, which could be a disaster. It was noted that any new mandatory funding requests must have an offset within the budget.

The Committee discussed animal welfare issues. AAC has historically been silent on welfare related issues, and has no position on H.R. 3798. The Committee also discussed the Horse Protection Act and related needs for that program.

Funding for equine related disease programs was discussed, with relative support for increasing funding for the FY2013 Budget. There are a number of foreign animal disease investigations related to horses each year.

Animal Disease Traceability (ADT) was the next topic. AAC supports funding at the President’s request of $14 million. Members of AAC support at varying levels for implementation of the program.

AAC members were encouraged to stay through other parts of the meeting as well, and adjourned this portion of the meeting.

**USDA-Agriculture Research Service (ARS)**

Caird Rexroad, Cyril Gay and Eileen Thacker

The Committee next met with representative from ARS. Dr. Rexroad provided a budget overview for the current year, and the President’s proposed FY 2013 budget. In FY 2012, ARS has a budget of $1,094,647,000, which was a $38M reduction from FY 2011. In response to budget reduction closed 12 laboratories and 238 positions cut, but none in animal health.

In the proposed FY 2013 budget, ARS would receive an increase to $1,102,565,000 (approximately 1%). Rexroad noted that this is the first upturn in budget to ARS in many years. He explained how increased funding would be applied for a total of $72.7M for program initiatives including: environmental stewardship ($35.9M), crop breeding and protection ($19M), animal breeding and protection ($8.1M), food safety ($5.3M), human nutrition ($2.9M), the national agriculture library ($1.5M), repair and maintenance $3M, and FY 2013 pay increases ($2.7M). The proposed budget also includes the following decreases as follows: termination of extramural research $20M; FY 2013 proposed redirections ($50.4M); proposed laboratory/location consolidations ($16.9M) such as the Michigan State University Avian Diseases Laboratory to Athens, Georgia; and proposed reallocations of ongoing research ($33.4).

The Committee discussed several additional issues with ARS staff. Regarding ARS efforts in antibiotic use and resistance research, ARS is not addressing directly, but do work collaboratively on food safety issues that are related. Dr. Gay indicated they are working with the World Organization for Animal Health (OIE) for a Symposium on "Alternatives to Antibiotics (ATA): Challenges and solutions in animal production", scheduled for September 2012 in Paris, France. They are currently soliciting papers for this, and are interested in seeking out new technologies for treating bacterial diseases. Dr. Thacker added that there is interest in other alternatives like
vaccines and immunity to parasites. ARS’ role is not to assess already approved antibiotics. They are investigating a metagenomics tool for investigating gut flora and how that changes with antibiotics, how resistance is transmitted and naturally occurring peptides with antimicrobial activities. Dr. Gay added that many countries are already restricting antibiotic use so the issue may affect international trade.

ARS discussed the Brucellosis recommendation from the Laramie Agenda in Wyoming in 2005, which was continued research in brucellosis diagnostics and vaccines. ARS has not made much progress since 2005 because of lack of funding and limitations with B. abortus as a select agent.

Gay provided comment regarding decreased funding allocated to USDA-ARS. ARS continues to do much of its research by leveraging funds by forming unique partnerships for research such as domestic and international partnership with other federal and university laboratories. Two examples are:

- Plum Island research funds (60%) leveraged through international partnerships
- African Swine Fever (ASF): ARS no longer doing ASF research when Department of Homeland Security (DHS) took over Foreign Animal Disease Diagnostic Laboratory (FADDL). Formed international partnership to increase resources for ASF research.

The Committee asked if there is ongoing research for *Salmonella enteritidis* vaccines, with the response that there is not much currently underway, due to food safety not being a primary directive of ARS.

ARS addressed a question on Schmallenberg virus research. ARS does not have any research currently, nor for new and emerging pathogens. This is a matter of funding not being authorized for this type of work. Research could be done at Arthropod-Borne Animal Diseases Research Unit in Kansas which investigates Bluetongue and Rift Valley Fever. Additionally there are two cases of Cache Valley Fever in Wyoming could be emerging disease like Schmallenberg virus. ARS realizes the problem of expertise in vector-borne diseases but no active solutions to problem exist. Also could be solved with Arthropod-Borne Animal Diseases Research Unit in Kansas which investigates Bluetongue and Rift Valley Fever.

**Food and Drug Administration (FDA), Center for Veterinary Medicine (CVM)**
Bernadette Dunham, Bill Flynn

The Committee next met with FDA-CVM representatives, sharing positive comments on successful programs. Veterinary Laboratory Response Network (VetLRN) Program has $5.1 million in current funding. Dr. Dunham is thankful for support in continuing to grow the program. They will try to extend interactions at meeting opportunities.

It was noted that the proficiency test portion of the program is very helpful. There is concern with future programs based on competitive grants, which can have high percentages (up to 55%) of overhead taken by
universities. Dunham appreciates feedback, and the program will continue to be dynamic and based on input from laboratories.

*Salmonella enteritidis* rule (2010 Resolution 45) falls under Center for Food Safety and Applied Nutrition (CFSAN) jurisdiction. Dunham will find proper contact for follow-up by USAHA.

National Organics Program has potential conflict with SE rule, in regards to soil and sunlight access standards. There is concern over review of the rule, which is typically done to ensure that no conflicts exist. Egg producers in organic markets need an answer.

Pet Food Reporting Network (PetNet) has been working well, according to Dunham. Strong effort to improve awareness, communication and reporting for pet health issues, including feed portal. The program was developed after the melamine incident. CVM is looking at a current situation in dog illness, with possible link to product from China. CVM is working with both domestic and Chinese resources to determine the source.

CVM is conducting a blind study regarding antibiotics testing in milk. The study is initiated at the laboratory level, with assurance in the data collection that a farm source is not identifiable. The target is to collect 1,800 samples, including 900 coming from a targeted list of meat residue violators to determine if a correlation exists. There are no current plans for how the report will be publicly released, which will be dependent on results and interpretation of findings.

Dunham discussed impacts of the Food Safety Modernization Act (FSMA). There are separate rules for preventative control of food and animal feeds. There are four rules forthcoming for public comment, and it is anticipated the document will be extensive. FDA will be looking at a federal and state cooperative effort to enable the food safety system. They are also underway with an international assessment to look at equivalence. User fees are intended to be implemented to fund the program. CVM has no new funding in the proposed budget, so any increases will be made through user-fees for many programs.

CVM will be moving to risk-based inspection schedules and establishing a reportable food registry. There is concern that just inspections may not provide the best results for food safety. Training and education will be a big part of FSMA.

One Health in relation to education and recruitment at FDA was discussed. As students look at careers in one health fields, veterinary students are well positioned for a variety of positions that may not necessarily have DVM requirements. Limited opportunities exist at FDA due to the current economic conditions.

The BSE Feed rule has gone well, though it has presented challenges with industry in rendering. Dr. David Meeker, National Renderers Association, indicated many have continued dead stock pickup; others have eliminated that as part of their businesses.

Regarding the draft 209 Guidance, the focus is on medically important human antibiotics, with the objective to phase out production uses and
transition to veterinary oversight for those that are currently over-the-counter. The Veterinary Feed Directive becomes an important tool, and FDA has gathered input from stakeholders on this issue to help to streamline the system into a workable program. The goal is to proceed with the rulemaking process to get improvements in place. Electronic capabilities are also an important part of the streamlining.

Guidance 213 is the roadmap for changing pharmaceutical labels into compliance and maintaining availability for therapeutic use. Long-term implementation is likely to address various issues in different sectors.

Dunham addressed a question on roxarsone, with the intention to phase out use. Concerns exist with impacts on poultry production. Alternatives are an important effort to consider, though options are currently very limited.

The future of the National Antimicrobial Resistance Monitoring System (NARMS) was discussed. FDA is continuing the program, including trend analysis, documentation on antimicrobials and overall use. Stakeholders want to continue this program, thus having strong support. Anonymity continues to be a key issue, with challenges of needing to have comprehensive information.

Department of Homeland Security, Office of Health Affairs
Doug Meckes, Jamie Johnson, Stic Harris, Jasmine Ausawis

Mr. Johnson provided an update on the National Bio and Agri Defense Facility (NBAF). Site preparation is underway in Manhattan, Kansas. The design is 70% complete. Congress has mandated an additional risk assessment, which includes that site must be hardened for natural disasters; such as withstanding 228 MPH winds and more redundancy for filtration/ rendering. The National Academy of Science is evaluating the new risk assessment, will report in June, 2012. The transition from Plum Island will have a 3-4 year overlap.

Johnson addressed the NBAF budget situation, with the following key points:

- President’s budget calls for zero budget
- New design for risk reduction adds $400M to the price tag
- Total project is not at $1.1B
- FY2013 – Congress has not appropriated any funding for construction at this time
- One option is designing a smaller NBAF to reduce costs
- Alternate plan – stay at Plum Island - ~$500M to upgrade, costs $40M to operate currently
- Secretary of Agriculture visited Plum Island, and is very supportive of the project
- Delays causing $40-70M increase in construction budget annually

Estimated completion is now 2021, and DHS is exploring a possible interim agreement with the Winnipeg and Australian laboratories.
Dr. Meckes provided a general overview of the DHS budget. Grant funding is still prioritized for police, fire, emergency services. Very little funding is projected for veterinary issues. The Federal Emergency Management Agency (FEMA) web site has the DHS Vision Document available for reference on priorities. In general, the food and agriculture sector gets less than 1% of DHS grants. At the state level, state DHS administrators will decide about distribution of funds/grants. Office of Health Affairs (OHA) is now working with FEMA to consider all animals in the model—laboratories, zoos, livestock. Training dollars for animal health responders lost (approximately $300,000), courses at University of California, Davis, Louisiana State University, and University of Tennessee now not funded. The National Biosurveillance Integration Center (NBIC) is now being used to study the emergence of new diseases. For example, the Schmallenberg Virus caused a White House security alert in February.

Meckes noted National Animal Health Laboratory Network (NAHLN) falls under the Integrated Consortium of Laboratory Networks (ICLN), to which the Committee posed the question as to how could NAHLN be incorporated into the National Biosurveillance Integration Center (NBIC).

The Committee adjourned for the day following the meeting with DHS. Meetings resumed on Wednesday morning at the South Agriculture Building.

Center for Public and Corporate Veterinary Medicine
Valerie Ragan

Dr. Ragan expressed her thanks to USAHA and AAVLD for supporting the program for student travel awards to the annual meeting. The students are very appreciative of the opportunity to attend the USAHA/AAVLD Annual Meeting. USAHA and AAVLD reviewed their support for this program, intending to continue for the coming year. USAHA will continue support of a part-time student staff, and AAVLD will provide scholarship funding.

Dr. Ragan provided an overview of a survey taken among students that participated in the travel program. Highlights include:

- Survey of attending students (12) indicated highly positive responses, funded or not.
  - Represented six different schools
  - Enthusiastic about the vet student luncheon and member interactions
  - Only complaint: they only have the weekend to spend – not enough face time/participation
  - One suggested decreasing award amount to $300 to increase the number of potential awardees
  - Some pursued other meeting support independently (e.g., grant from Hill's) – were unaware of the travel award program
All agreed that the travel award program to the AAVLD/USAHA annual meeting should be promoted at all 28 veterinary schools this year.
  - Greensboro location will allow ground travel - decreased cost/travel time
  - Encourage student participation in regional meetings

The Requirements for student award application have gone out, and selection criteria are being established. Criteria include a review of presentation, statement of gain from meeting, interest in public practice. Three individuals will review applications/select awardees. The Award amount will remain $500 for this year, and may be increased if presenting. The AAVLD Executive Committee voted to provide up to $6000 for travel scholarships.

Ragan indicated that Center for Public and Corporate Veterinary Medicine (CPCVM) will sponsor a career transition workshop. This workshop will assist veterinarians leaving private practice to explore options in public service. It will be held September 14-15, 2012; with a fee increasing from $175 to $225. CPCVM will also host a free workshop at AVMA. The workshop is intended to provide the following benefits/services:
  - Self-evaluation tools for skills, qualifications, goals and interests
  - Possible resume and placement assistance, participant blog, interest interviews
  - Participants typically in practice 2-5 years or over 25 years
  - Includes introduction to USAHA and AAVLD web sites
  - CPCVM will share curriculum with USAHA and AAVLD.
  - USAHA and AAVLD member involvement would be welcomed.
  - Workshop could increase interest membership in USAHA and AAVLD.

The Committee discussed the following action items:
  - Quick turn-around time – before students leave for summer:
    - USAHA/AAVLD: Create and recruit USAHA/AAVLD liaisons for each veterinary college – selected travel award recipients
    - USAHA: Cross-reference USAHA members with employers/faculty; contact for agreement and designate a USAHA liaison; also a liaison from each state without a school or diagnostic laboratory
    - AAVLD: Contact and designate an AAVLD liaison from each laboratory – contact for students
  - CPCVM: Develop a power point presentation for distribution to each veterinary college
  - CPCVM: Establish a database including:
    - Colleges of veterinary medicine
    - Deans
    - State Veterinarians
    - Area Veterinarian in Charge (AVICs)
The Committee met with representatives of FSIS, including Phil Derfler (Deputy Administrator), Ken Peterson (Asst. Administrator for the Office of Field Operations), and Dan Englejohn (Office of Policy). The meeting began with Drs. Crawford and Marshall briefing them on our organization and the purpose of our visit. Dr. Marshall, as USAHA President, provided Mr. Derfler with handout material and invited FSIS to become an official agency member of the USAHA.

A brief discussion of the small scale poultry slaughter exemption allowed FSIS to expound on the 1,000 and 20,000 bird annual exemptions from mandatory inspection requirements for those birds being sold retail. There are only nine approved mobile slaughter facilities for any species in the country and they present their own set of problems. The inspection program for rabbits falls under the USDA’s Agricultural Marketing Service (AMS) as rabbits are not an amendable species.

Dr. David Schmitt introduced a question regarding the 2008 Farm Bill and the allowance for interstate shipment of state inspected product. Peterson explained the necessity for individual plants to meet a “same as” federal definition rather than the traditional “equal to” requirements to gain this eligibility. Currently, a small number of plants in four states are investigating this option. Crawford asked about information he had heard regarding FSIS’ intent to utilize third party line inspectors. Peterson confirmed that in an efficiency move, some of the routine pre-sorting quality inspection tasks would be assumed by plant employees, with FSIS inspectors providing the general oversight and final inspection as well as other pre-harvest tasks.

Dr. Dave Zeman, South Dakota State University Diagnostic Laboratory briefed the FSIS representatives on the AAVLD organization, and then inquired as to a rumor that FSIS will not recognize AAVLD accreditation and require laboratories to become ISO 17025 certified. He said this would be an unnecessary requirement and an administrative and financial burden to small laboratories such as his. Englejohn explained that the ISO requirements would only apply to product inspected under the previously mentioned “same as” program, and that FSIS had no expectations that testing be identical, only that they can depend on the results. ISO accreditation is meant to be the starting point, and there is flexibility if a laboratory can demonstrate proficiency through some other quality program oversight.

Horse slaughter was discussed, with FSIS confirming that 1) equines are amenable to the Federal Meat Inspection Act but inspection would be on a fee basis; 2) drug residues in horse meat are a concern, including flunixin; 3) future horse slaughter would have to be done in separate, designated facilities; and 4) Humane Society of the United States (HSUS) has requested that an environmental impact assessment be conducted before proceeding.
Marshall inquired as to what impact the federal budget crisis would have on states that may elect to give up their state programs due to their own budget shortfalls. Peterson stated that in the past that expense was covered with a separate supplemental appropriations request, but that source of additional funding could not be relied upon into the future.

**National Institute of Food and Agriculture (NIFA)**
Mark Robinson, Muquarrab Quereshi, Meryl Brousarrd, Gary Sherman, Robert Holland

The Committee began its discussion with review of the proposed FY2013 budget. NIFA provided five handouts for attendees related to budget and NIFA programs. Expectations are that it will continue to be tight. The President’s proposed budget for NIFA is a 5% reduction, so some indications point to expectations to prepare for 10% reduction once finalized by Congress. This proposed FY2013 budget does maintain Agriculture and Food Research Initiative (AFRI) competitive grants at previous year levels. Congress is asking for budget line consolidation, such as the combination of various crop protection items (minor use, minor species, pest management, etc.) into one line of $29 million. Programs authorized by the Farm Bill as mandatory (approximately $151 million) need to be re-authorized by the new Farm Bill or will be lost. Many of these are crop related. There are no specific operating funds authorized for the NIFA budget, so operations come out of the various lines. This equates to about 4% of their budget. Animal Health Formula funds are zeroed out, but opportunities are still there in competitive programs. The point was made by an attendee that the 1433 Formula Funds help scientists be ready for emerging diseases. Mystery Swine Disease was used as an example.

The Committee continued with questions and discussion. There was lengthy conversation regarding the future of the NAHLN, centered on the following questions:

Could crop protection be moved out of the Food and Ag Defense line to protect NAHLN funding? NIFA responded that they would not be favoring one program over another, as per the President’s proposed budget.

Is it better to ask Congress for specific objectives, such as the minor crop pest line, with the interest being protecting funding for animal diagnostics (again, toward the goal of securing and protecting NAHLN funding)? NIFA responded that such an approach would align with NIFA recommendations. NIFA can only spend/allocate funding as directed by Congress, so efforts should be concentrated on convincing Congress of importance of specified programs such as NAHLN.

**National Animal Health Laboratory Network (NAHLN) and National Veterinary Services Laboratory (NVSL)**
Beth Lautner, Sarah Tomlinson, John Picanso

The Committee next discussed laboratory related issues with USDA-APHIS-VS. Dr. Tomlinson joined the group by teleconference.
Three comprehensive handouts were provided:

- NVSL/NAHLN update
- VS IT Diagram showing the interrelationship between EMRS, MIM, LRMS, ERSS, SCS, and COGNOS
- PowerPoint slides describing Diagnostic Development Projects

Explanation of APHIS' support for the NAHLN from 2007 to 2011: Dr. Lautner referenced the chart on the last page of the NVSL/NAHLN update handout. The numbers on this chart are “net to location”, meaning that the total appropriated may be more than shown on the chart, but what is shown on the chart is what came to NVSL to support NAHLN activities. The data shows slight increases over time, with a total of $6,671,071 in support in FY 2011, split between:
  - User Fee Funding to Laboratories:$3,245,375
  - Direct Support to NAHLN Laboratories (includes IT):$2,089,492
  - Program Support: $1,336,204

Funding for FY 2012 is expected to remain stable for NAHLN Program activities and support to NAHLN laboratories, with funding for testing dependent on current surveillance plans and policies. Historically it has been difficult to compare funding levels for NAHLN because of the way the money was divided up among different programs in VS. Going forward, the NALHN funding will all be in the Veterinary Diagnostics line.

NAHLN Structure Update: Lautner gave an overview of the NAHLN restructuring process. The plan is to codify the NAHLN Coordinating Council’s “Current Thinking” paper into the Code of Federal Regulations (CFR) establishing the criteria required to qualify for the different levels of NAHLN responsibility and funding. The proposed rule-making will focus on performance based standards in the CFR, which are more easily modified than is a list of specific requirements.

Aquaculture Laboratories and the NALHN: The new NAHLN structure could accommodate specialty laboratories, like aquaculture laboratories. Tomlinson is exploring including aquaculture laboratories in the NAHLN with the appropriate aquaculture players. This will be complex, because there is a mixture of commercial laboratories, federal laboratories, state laboratories, etc. The goal of including aquaculture laboratories in the NAHLN is to bring the level of standardization and rigor of the NAHLN to the aquaculture diagnostic testing community.

Laboratory Perspective on Cooperative Agreements: VS is looking to become more efficient by improving the way they distribute money to the States and the Laboratories. A task force has been formed which will evaluate possible ways to improve the process. Laboratories will be offered an opportunity to provide input. The Blanket Purchase Agreement (BPA) may be used as the model funding tool going forward.

There was a discussion about some of the possible challenges presented by changing from Cooperative Agreements (CA) to BPAs. BPAs are harder to coordinate with the State Veterinarian’s office. Also there was
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care that the BPA process may force AAVLD laboratories to bid against each other for Federal testing dollars. In response to the concern Lautner explained that she anticipated two broad types of testing being done, each with a different funding process.

- Large volume testing which VS would expect to offer to a few laboratories, and which would not need to be performed by every state. This type of testing would go through the bid process.
- Other testing, where State Veterinarians would want to have the testing capacity close to the State. This type of testing would utilize the BPA process.

The discussion centered around the challenges of deciding which testing would fall into which category and the importance of making Federally funded surveillance testing available to all NALHN laboratories at a price that allowed the laboratories to at least cover their expenses (including overhead) – recognizing that expenses are different for different parts of the country.

Lautner understands the challenges and goals and is committed to working with both USAHA and AAVLD to make sure that the process is equitable.

Several other issues were addressed during the meeting:

- NVSL is evaluating the tests they offer, and how they can continue to offer needed service in the face of budget cuts. They will look at the impact of longer turn-around times for results, user fee charges, whether to offer specific tests or not, etc. They are doing the same thing for reagents.
- Review of assay development activities (PowerPoint handout covers this in detail): Two spoken about specifically were PCR to detect FMD in milk and FMD pen-side test.
- Plan to develop web-based exercises for NAHLN Laboratories and State Departments of Agriculture to be offered through the NAHLN portal.

NAHLN IT: Mr. Picanso gave an overview of current VS IT activities. It is clear that funding for VS IT needs is not high enough to meet all of the demands on Picanso and his team. There was a technical discussion about how the different aspects of VS IT activities affected the NALHN.

Dr. Akey informed Picanso that some of the IT people from NAHLN member laboratories were going to move forward to improve the messaging capabilities among the NAHLN laboratories and the State Veterinarians outside of the Federal firewall. Picanso is committed to working with the NAHLN on this, but is constrained by short resources.

The conclusion is that the current NAHLN IT system needs to re-evaluate with an eye toward functionality.

The Committee added it would like to see more time in discussion with NAHLN and NVSL representatives in the future.
The meeting started with Dr. John Clifford introducing Lisa Ferguson, Laura Christensen and Sharon Fischer. Dr. Clifford reported since 2009 there has been approximately $32 – $33 million reduction in their budget and $12 million reduction in the 2013 budget. He reported there will be a slight increase in funding for Animal Disease Traceability and Aquatic Health, but reductions in Avian Health, Cattle Health, Sheep and Goat Health, Swine Health and Biologics.

With proposed funding reductions USDA will be closing 14 USDA Veterinary Service offices in the US and five International Services offices and a reduction of approximately 100 personnel. If the proposed 2013 budget is finalized, the total number reduction of USDA personnel could be as many as 200 positions. Currently, the Center for Veterinary Biologics is “bleeding” and there are 25 open positions. Dr. Clifford stated he remains committed to not having a reduction of "boots on the ground" personnel.

Ms. Rebecca Blue, Deputy Under-Secretary, and Dr. Greg Parham, APHIS Administrator joined the meeting, and the Committee addressed issues specific to APHIS and the Secretary's level.

The effects of closing of additional offices was addressed and Parham stated that with $54 million dollars less than last year there were no plans to close additional offices, but this could be on the table in the future.

A question to Parham was raised by Dr. Dave Fly, New Mexico State Veterinarian, about the closure of a port crossing and the impact to local producers who rely on movement of cattle to feedyards. Parham stated they tried to accommodate by keeping the port open. Clifford stated if keeping a port open required an armored escort they will not put personnel at risk and will not go in.

NAHLN funding was discussed. All agreed this is a critical network. Clifford stated VS could cooperate and coordinate better with National Institute of Food and Agriculture (NIFA) and USAHA/AAVLD need to critically raise the profile importance of the NAHLN with appropriate key congressional committee members.

A question raised concern about increased international movements of large numbers of cattle and the effect on VS resources. Clifford reported there are user fees and they are mostly pulling the necessary resources out of the field to do that work.

Timeline on elephant TB: Clifford stated this is going through the closing processes, and they have the intent to follow through. While this is on the radar of the Secretary, he could not give a timeline.

Secretary’s Advisory Committee on Animal Health (SACAH): Parham indicated there has been $1.8 million to support advisory committee, but over
the years most has not been used. There will continue to be funding for the SACAH, but not intended for subcommittees.

Oral rabies: There is approximately $20 million plus for Wildlife Services (WS) for the oral rabies program. WS will continue baiting focused on targeted areas in the northeast and look at more efficacious vaccine development.

NAHLN IT structure and need to develop those systems: Clifford stated they have cut back on IT a lot. They are open to discussions to hire a developer solely devoted to NAHLN activities.

Security banner progress: Clifford reported this has been reviewed with Office of the General Counsel (OCG), and case law supported confidentiality from Freedom of Information Act (FOIA) and states would have to review this with their own attorney general offices if this is acceptable.

Brucellosis and Tuberculosis Indemnification: Dr. Jim Logan, Wyoming State Veterinarian, asked about harmonization of tuberculosis and brucellosis indemnification and development of a depopulation matrix. Clifford stated the basis for depopulation needs to be looked at scientifically and they are trying to develop a broader indemnity rule. Dr. Mike Gilsdorf reported a depopulation matrix was sent to Centers for Epidemiology and Animal Health (CEAH), and they would not support but would develop a policy. Clifford asked that the matrix sent to Lisa Ferguson for review.

Support for replacement of National Veterinary Services Laboratories (NVSL) Plum Island facility: Clifford stated they definitely support, but DHS has the lead on this.

Cooperative agreement process improvements: Clifford reported there are approximately 700 to 800 USDA cooperative agreements annually. He would like to see this reduced to about 100 per year with a separate additional cooperative agreement for animal disease traceability (ADT). ADT needs a separate cooperative agreement to give maximum flexibility. This structuring of cooperative agreements would be inclusive for each state’s species health programs and would pay for full-time equivalents (FTEs), travel and supplies.

National Reportable Disease list: Reported to be pretty much done. Stated this will go into the rule making process to finalize in September 2012. Ferguson stated this needs to be in the Code of Federal Regulations (CFR) and then would add to federal reporting requiring laboratories and veterinarians for reporting.

CoreOne (SCS): Picanso reported in the first year over a billion lines of data have been transferred, five states have migrated data, all data has been standardized and cleaned up, and the National Surveillance Unit (NSU) is writing Standard Operating Procedures (SOP’s). They will hopefully be offering an IBM product (COGNOS) to all cooperators in the SCS by the end of the summer.

Animal Welfare: Clifford stated USDA does not work with animal welfare issues on the farm, but has horse authorities. USDA is keeping abreast of farm animal welfare issues and they may have to certify for trade to meet
international trade standards. The proposed UEP/HSUS egg layer standards are proposed to be added into the Farm Bill with talks of certification being done by AMS, but it could go to APHIS.

Chronic Wasting Disease (CWD) rule: Clifford reported the Office of Management and Budget (OMB) wants an update and the rule will not pre-empt states.

Bovine Spongiform Encephalopathy (BSE) surveillance: Clifford said that if it was up to USDA, surveillance testing would be scaled back. The US has requested negligible risk status, but OIE has been informed the US, that we will not get this status this year.
REPORT OF THE COMMITTEE ON IMPORT-EXPORT

Co-Chairs: Charles E. Brown II, WI
Mark Engle, TN
Vice Chair: George Winegar, MI

Bobby Acord, NC; Debbie Barr, CAN; Bob Bokma, MD; Gary Brickler, CA; Stan Bruntz, CO; Sarah Chalangaran, CA; Ignacio dela Cruz, MP; Linda Detwiler, NJ; Effingham Embree, Jr., IL; J Amelita Facchiano, TX; William Fales, MO; Mallory Gaines, DC; Julie Gard, AL; Chester Gipson, MD; Tony Good, OH; Cathleen Hanlon, NY; Robert Hilsenroth, FL; Donald Hoenig, ME; Floyd Horn, MD; Dudley Hoskins, DC; Laurie Hueneke, DC; Annette Jones, CA; Ralph Knowles, FL; Elizabeth Lautner, IA; David Meeker, VA; Richard Mitchell, CT; Sandra Norman, IN; Elizabeth Parker, ITA; James Pearson, IA; Ben Pendergrass, DC; William Pittenger, MO; Kay Riddell, AL; Paul Rodgers, WV; Larry Samples, PA; A. David Scarfe, IL; Shawn Schafer, ND; Kathryn Simmons, DC; Susan Tellez, TX; Peter Timoney, KY; Charles Vail, CO; Arnaldo Vaquer, VA; Mark Walter, PA; James Watson, MS; Patrick Webb, IA; Roger Weigle, WI; Brad Williams, TX; William Wilson, KS; David Winters, TX; Richard Winters, Jr., TX; Cindy Wolf, MN.

The Committee met on October 21, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 12:30 p.m. to 4:30 p.m. There were 14 members and 33 guests present. The chair opened the meeting, reviewed sign-in sheet locations, agenda items and availability of copies of resolutions.

Review – European Union (EU) Trade Issues
John Clifford, USDA-APHIS-VS

Dr. Clifford reviewed the status of trade with the EU regarding swine exports to and through the EU. United States Department of Agriculture (USDA) has submitted a draft export health certificate for swine exports to the EU Commission. The sticking point in the negotiations is vesicular stomatitis testing. There are many trade issues that need resolution from both the USA and the EU and they will require coordinated negotiations and agreements to resolve.

Activities of APHIS’ National Center for Import and Export (NCIE) for FY2011
Bob Bokma, Joyce Bowling, Export products NCIE; Magde Elshafie, Import products and by-products, NCIE

Drs. Bokma, Bowling-Heyward, and Elshafie reviewed NCIE activities regarding export of products and animals and import of products and by-products. A summary of their presentations is included at the end of this report.
USDA Re-Organization and Electronic Health Certification Pilot Program
Joyce Bowling, Export animals NCIE
Dr. Bowling presented an overview of the planned re-structuring of USDA and an electronic health certificate system for exports. A summary of the presentations are included at the end of the report.

African Swine Fever (ASF) - A Local Perspective
Kazimierz Tarasiuk
Dr. Tarasiuk presented an overview of the ASF incursion and on-going outbreak in Russia. A summary is included at the end of this report.

Committee Business
The Chair received a letter from the President of LEA (Livestock Exporters Association). The letter was to be read to the committee. This did not occur in the business meeting. It is included at the end of this report.

The Committee reviewed and approved two resolutions for consideration by the Committee on Nominations and Resolutions:

1. The United States Animal Health Association (USAHA) urges The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to eliminate the requirement for a culture for Mycobacterium bovis on histopathologically negative tissues and to return to the tuberculosis (TB) directives of VS Memorandum 592.102 dated October 29, 1993. There was lengthy discussion and comments from regulatory officials and industry. Issues reviewed were risks and consequences to exporters, trading partners, the disease prevalence, regulations as found in the Council on Foreign Relations (CFR) and Unified Methods and Rules (UM&R) and risk assessments to justify changes in the policies of USDA. This resolution passed with 6 in favor, 2 against, 3 abstentions.

2. The United States Animal Health Association (USAHA) urges that USDA-APHIS-VS attempt to replace through negotiation the terminology Scrapie Flock Certification Program in any existing protocols when negotiating health protocols and replace it with language that the animals/flocks conform to the requirements of the National Scrapie Eradication Program. This resolution passed with no discussion by a vote of 9 for and 2 abstentions. The full resolution is attached at the end of the report.
The Export Animal Products group (EAP) conducts activities that foster the export of animal products, including development of policy pertaining to export, clarification of the requirements of other countries, and management of the inspection and approval of facilities that export certain commodities to certain countries. In order to assure consistent policy and compliance with the requirements of other countries, EAP works in collaboration with other agencies, such as USDA Food Safety Inspection Service (FSIS), the Food and Drug Administration (FDA), and National Oceanic and Atmospheric Administration’s (NOAA) Seafood Inspection Program, among others. EAP cooperates with Agricultural Marketing Service (AMS) for the certification of dairy products and shell eggs. They collaborate with the Trade Support Team, Foreign Agricultural Service (FAS), and the Office of the US Trade Representative and with foreign officials, providing expertise and technical support during negotiations concerning animal disease requirements. Finally, EAP negotiates directly with counterparts in foreign governments to seek access, as well as OIE-consistent and favorable conditions, for diverse animal product commodities intended for use in animals, for further processing, or for human consumption.

NCIE export staff officers continue working to eliminate bans and restrictions due to several animal diseases including bovine spongiform encephalopathy (BSE) and avian influenza. Significant gains include the following:

The following are some specific examples of work done during FY 2012, among many others:

- Canada: EAP worked to regain access for bovine blood for animal feeding.
- China: EAP was successful retaining the market for fish meal (certification by Department of Commerce’s NOAA) and the market for dairy commodities.
- Colombia: EAP increased access for poultry meat and other fresh products sourced from regions that have affected with low pathogenic avian influenza.
- El Salvador: EAP was able to gain access for bovine meat sourced from animals over 30 months of age.
- European Union (EU): EAP continually worked with both central EU authorities and individual EU countries to retain and expand exports of animal by-products estimated to be worth approximately $500,000,000 annually.
- French Polynesia: EAP achieved access for animal feeds.
REPORT OF THE COMMITTEE

- Japan: EAP retained and expanded US exports of poultry products to Japan by getting Japan to lift avian influenza restrictions on six States and also finalizing a protocol with Japan which for the first time would allow for regionalization of the US for highly pathogenic avian influenza. The regionalization would mean that Japan would not ban the entire US for commodities such as eggs and poultry meat if HPAI were confirmed in only a portion of the US.

- Korea: As a result of EAP action, tallow is now an acceptable bovine ingredient in US exports.

- Mexico: EAP worked with Mexico to streamline their requirements; gained access for food preparations containing up to 2% meat products, as well as for additional bovine meat commodities as long as the source animal is less than 30 months of age. The breaker eggs market to Mexico has been opened and a requirement for placing sealed containers of shell eggs has been removed.

- Taiwan: EAP retained the market for milk and milk products to Taiwan.

- Vietnam: EAP opened the market for bovine bone-derived gelatin, porcine bone-derived gelatin, bovine or porcine hide/skin derived gelatin, bovine blood for technical use, and fetal bovine serum for technical use.

A database of export certificates shows that some 79,754 export certificates were issued by Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) for products during Fiscal Year 2012 (through September 13, 2012). These numbers demonstrate that milk and milk product was the most significant (37.5%). A large proportion of this commodity is milk for human consumption exported to Mexico. Other commodities ranking high were hides and skins (14.1%), pet foods (14.1%), animal feeds not including pet foods (8.5%), blood products (7.8 %), meat and bone meals (3.1%), and animal fats (3.0%). These data also include certificates for pharmaceutical and biological products (3.0%).


The Eightieth General Assembly of OIE met as usual this past May. As part of the general meeting, the member countries (178 according to OIE 2011 data) vote to adopt changes or new chapters. With regard to the work of Terrestrial Animal Health Commission, this year, the member countries took action to approve chapter changes or new chapters for the following: antimicrobial resistance (surveillance and monitoring, usage patterns in livestock), equine viral arteritis, semen and embryos, infection with Aujeszky's disease virus, rabies, and avian influenza.

Several other chapters continue under revision and were not acted on during the OIE general meeting. Currently these are brucellosis, bovine
tuberculosis, Trichinellosis, classical swine fever, peste des petits ruminants, and a chapter on the prudent and responsible use of antimicrobial agents.

Of interest to the membership of the Committee on Import and Export will also be that the OIE continues working towards guidance for safe production methods for animal-based foods. A working group is heading up this work, addressing food borne hazards that stem from animals before slaughter, focusing attention at the animal production level. Specific issues being addressed are Salmonella, Trichinella, animal feeding, and antimicrobial resistance.

Finally, the OIE continues their work on animal welfare pertaining to food animals. Under development during 2012 is guidance towards livestock production systems with a focus on beef cattle. Future expected work will be broiler production (2013), dairy production (perhaps in 2014), to be followed with swine production. We continue encouraging an approach focusing on outcomes resulting from of a range of acceptable practices, and that OIE would focus less on a prescriptive measures.
Bovine Spongiform Encephalopathy (BSE) Comprehensive Rule

The BSE Comprehensive Rule was published March 2012, the comment period closed in June of 2012. It established BSE-related import provisions which are more closely aligned with OIE guidelines including country risk status classifications (Negligible, Controlled, and Undetermined). It also allows flexibility in the BSE risk classification process allowing Animal and Plant Health Inspection Service (APHIS) to concur with World Animal Health Organization (OIE) BSE determinations. However, this will not eliminate independent APHIS evaluation of any country or region for BSE status. A country will be considered undetermined risk until such time that APHIS determines it to be Negligible or Controlled Risk. Recognition will be based on the following criteria;

1) APHIS concurrence with OIE classification, OR
2) APHIS evaluation, upon request, of countries not classified by the OIE.

The BSE Comprehensive Rule eliminates the need for formal rulemaking for each individual country/region. The importation of bovines and bovine products from BSE minimal-risk regions (Canada) and for boneless beef from Japan would be removed from the Federal Register and incorporated into the final rule. It will allow the importation of additional bovine and bovine products into the United States from all negligible and controlled risk regions using requirements based on OIE guidelines.

- Hides/skins and Gelatin/Collagen from hides/skins
- Deboned meat (excluding methylsulfonylmethane (MSM) from cattle ≤30 months of age provided the animals pass ante- and post-mortem inspection, specified risk materials (SRM) are removed, and they were not subjected to an air injected stunning process or pithing
- Protein-free tallow and derivatives made from this tallow
- Dicalcium phosphate with no trace of protein or fat
- Blood/blood by-products derived from cattle not subjected to an air injected stunning process or pithing, and collected in a manner that avoids contamination

Ruminant meat-and-bone meal (MBM) and greaves from controlled and undetermined risk countries will remain as prohibited materials.

Transmissible Spongiform Encephalopathies (TSE) Rule

OIE Code does not address BSE risk for ovines/caprines. Therefore, a separate rule and risk assessment currently under development that will address import requirements for TSEs and allow importation of sheep and...
goats, their embryos, and their products/by products from countries classified as Negligible or Controlled Risk for BSE under certain conditions.

**Exotic Newcastle Disease/Highly Pathogenic Avian Influenza (END/HPAI) Interim Rule**

The END/HPAI Interim Rule is a revision of USDA policy regarding the importation of bird and poultry products from regions where END and HPAI are considered to exist. Previous USDA HPAI restrictions focused only on the H5N1 subtype. The Interim Rule applies to all HPAI subtypes. Changes include the addition of a specific cooking requirement (74°C internal temperature) to mitigate END and HPAI and a provision allowing exporting countries to certify that they have employed this mitigation as part of the export process.

Unprocessed bird trophies exported from END/HPAI regions require an import permit which authorizes the import with mitigations or authorizes consignment to a USDA approved establishment for processing to mitigate for diseases of concern.

Hunter harvested avian meat for personal use may be imported if it: 1.) has a thoroughly cooked appearance; 2.) is accompanied by certification stating the avian meat was cooked to a minimum internal temperature of 74 degrees C; or 3.) accompanied by an import permit.

The END/HPAI Final Rule is currently being drafted.

**Regionalization**

APHIS Defined EU Civil Society Forum (CSF) Region: Proposed rule to recognize the addition of Estonia, Hungary, Slovakia and Slovenia to the APHIS defined EU CSF regions. (This includes removal of restrictions on the importation of swine semen from the EU.) Published 2/11/2011.

Uruguay: Proposed rule to establish conditions for the importation of lamb and sheep meat from Uruguay. Published 2/24/2011

Switzerland and Liechtenstein: Final rule to recognize Switzerland and Liechtenstein as low-risk for CSF and Liechtenstein as FMD/SVD free. Published 11/10/2011.

END and HPAI in EU Member States: Proposed rule to recognize as low risk for END and HPAI. Published 7/19/2011.

**VS New Science and Vision Initiative**

Streamline the animal products import regulations in Title 9 of the Code of Federal Regulations in Parts 94, 95, and 96. Revisions are as follows:

- Reorganize and clarify the language in these parts to make it easier to understand.
- Make disease mitigation requirements less prescriptive and more performance based. Add a notice-based process and risk-based criteria for acceptance of new disease mitigation procedures.
- Make miscellaneous updates and corrections identified during regulation review
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APHIS-VS-NCIE Live Animals

Joyce Bowling-Heyward
USDA-APHIS-VS-NCIE

The National Center for Import and Export (NCIE) Import-Export Animals staff has focused on plans to revise and streamline regulations, update import and export protocols where they are outdated, and standardize procedures for import and export of live animals. The Veterinary Export Health Certificate System (VEHCS) pilot project has been launched this year, and successfully used to issue some health certificates. We continue to work on making improvements to our website so that information will be more readily accessible to the public.

Animal Export

NCIE develops export protocols, participates in negotiations, and provides technical expertise in developing, retaining, and expanding export markets for US-origin animals and germplasm. Cattle exports to Russia and Turkey continue to set new records. The US has exported close to 100,000 head of cattle to Russia, Turkey and Kazakhstan worth more than $300 million dollars in 2012.

In FY 2012, NCIE:
- Opened 26 new markets in 20 countries, including cattle to Oman, feeder cattle to Turkey, bovine genetics to Sri Lanka, swine, and sheep and goats to Jamaica and Costa Rica.
- Negotiated retention of 29 markets in 10 countries (trade never stopped but the importing country threatened to shut down market).
- Expanded 35 markets in 26 countries (removed requirements or simplified certifications that would allow more animals to be exported).
- Sent 41 proposals to 21 countries for negotiation.

NCIE animal export staff engaged in bilateral meetings with Canada, Chile, Japan, Taiwan, Tunisia, Turkey, South Africa, and Russia. In addition to negotiating export protocols, these meetings allow us to exchange technical information with other countries so that we can ensure that requirements are based on the latest scientific developments.

In addition to negotiating export protocols, NCIE facilitated international trade by serving as a technical liaison, providing technical support for visits from foreign veterinarians (for audits or training), participating on international committees, attending meetings/conference calls, preparing letters/reports/briefings for senior level leaders, responding to notices (issued by foreign countries) to the World Trade Organization (OIE) and responding to the impact of US animal disease outbreaks on exports. NCIE negotiates the release of detained shipments and receives derogations from foreign requirements for trade in animals. NCIE staff officers provided support to VS field staff, VS Regional and Area Offices, the US animal export industry, and the public by providing direction and responding to questions. NCIE staffs
also provide interpretation of the foreign animal import requirements as well as developing associated policies to facilitate trade. NCIE handles dozens of queries each month about companion animals (including efforts to release pets detained at the entry points in foreign countries) as well as negotiating new protocols for exporting pets to foreign countries.

NCIE staff completed the development of the VEHCS pilot project to electronically issue export certificates. The system is currently being tested with a few exporters, accredited veterinarians and area offices to generate export certificates for swine to Canada and poultry to Guatemala. New certificates are being developed and the system will be expanded to allow for cattle and poultry to Canada. This system allows for accredited veterinarians to complete a certificate electronically and submit it electronically to an area office, along with any attachments that may be necessary. The certificate can be saved as a template to simplify data entry for repeat exports. After the area office reviews the information, the certificate is printed and signed. In the future, VS hopes importing countries will accept electronic delivery of the certification information with an electronically signed certificate. Countries that don’t wish to accept data in this manner will still be able to view completed certificates on a secure website in order to validate certification information.

NCIE training activities in 2012 were focused on training exporters and accredited veterinarians to use the VEHCS system as well as VS field personnel. VS has also spent time training foreign governments on the capabilities of the new VEHCS system and negotiating acceptance of the new certificate format.

NCIE organized several visits for foreign delegations that came to the US to audit our live animal export procedures. These included hosting government officials visiting from Hong Kong, the European Union, Turkey, and Russia.

Other foreign visitors were part of technical exchange programs and NCIE staff provided presentations on the roles and responsibilities of APHIS, explained our veterinary infrastructure and described US systems of animal disease control. These training activities build more personal international relations and help build foreign veterinary capacity both of which indirectly facilitate the flow of international trade in animals and animal products.

Animal Import

NCIE is responsible for negotiating import protocols, notifying field of import requirements, and setting standards to be followed at animal import centers and land border ports. In addition, many of the import and transit permits for live animals are issued by NCIE. Training is provided to the field on proper import quarantine procedures. NCIE coordinates with laboratory people to ensure that import tests are the most effective. Changes to import requirements are communicated to trading partners, world trade organization (WTO), and the public.

NCIE issued over 2,900 import permits in 2012 for regulated animals and commodities. In addition, complicated import and transit requests for live
animals are coordinated with the field to ensure that animals are properly monitored while in transit, or en route to an animal import center.

NCIE import animals staff monitors world animal disease status, and coordinates any response involving appropriate import requirements and/or restrictions. Import alerts are sent to notify field personnel about changes in disease status and/or import requirements. NCIE also responds to numerous questions and requests for information from the public. A significant development this year was the emergence of Schmallenberg Disease in Europe, which required revision of some import protocols for ruminant germplasma. NCIE participated in a review of the tick eradication program of Chihuahua, Mexico as a preliminary step to revising regulations. NCIE continues to participate in Binational Committee Meetings to resolve issues relating to the export of cattle from Mexico. A NCIE representative attended an OIE meeting relating to import and quarantine of competition horses. NCIE has been meeting with Canadian officials on a regular basis to resolve export issues relating to new aquaculture requirements in Canada.

NCIE staff participated in a training course for Canadian border port inspectors. In addition, a number of VS Memoranda were revised to standardize procedures for imported animals. This included updates to import requirements for Mexican cattle due to changes in tuberculosis (TB) status of various regions. Import regulations relating to TB and brucellosis have been revised consistent with changes being made to domestic programs. Regions wanting to export cattle to the US will be evaluated based on their disease program and their prevalence of disease. Import requirements will be determined based on their level of risk.

NCIE completed work with the E-Permits system to allow live animal importers to submit their application online for an import permit. This is streamlining the permit process, and facilitating the flow of information between importers and NCIE.
Summary of Veterinary Export Health Certificate System (VEHCS)

Veterinary Services has created a web based electronic export health certification system using the platform that has been in use by Plant Protection and quarantine for the last 6 years. The VEHCS system is currently being used as a pilot project with a limited number of accredited veterinarians and area offices participating. Currently it is used for exporting swine to Canada and poultry to Guatemala. The system will be expanded in 2013 to allow for the export of cattle and poultry to Canada. In addition, more area offices and accredited veterinarians will participate in the pilot.

The VEHCS system has many benefits. The accredited veterinarian is able to go online using e-authentication, and complete the export certificate. Any laboratory tests or other supporting documentation can be attached as electronic documents. The certificate is sent electronically to the area office, where it can be reviewed. The APHIS veterinarian can approve the certificate in the system. The certificate is then printed out and endorsed in the normal fashion. In the future the data could be sent electronically to the importing country without the need to create a paper certificate.

The electronic system saves some of the time and expense currently needed at this time to move paper documents to create the certificate. If an exporter sends multiple shipments to the same consignee, it is possible to create template certificates that will greatly decrease the amount of time needed to create a certificate. The system allows for easier tracking of the document to know the stage of processing. It also simplifies the correction process in the event a certificate has been filled out incorrectly.

The system allows for online verification of an electronic certificate (PDF version). It can be used to send out messages to users of the system based on the role they have been given in the system. VEHCS will be capable of interfacing with other systems. In the future APHIS expects to be able to endorse certificates electronically.

Summary of Veterinary Services Reorganization

Veterinary Services is being reorganized along functional lines. There will be four sub-parts:

- Movement and Marketability (M&M) – import and export technical trade services, import and export field services, OIE services
- Surveillance, Preparedness, and Response (SPR) – animal health commodity teams, SPR field services, national veterinary stockpile, one health, traceability
- Science, Technology and Analysis (STA) – diagnostics, veterinary biologics, most CEAH functions
• Program Support Services (PSS) - planning, finance and strategy, information technology, management support, communications and regulatory support

Veterinary Services is seeking input from employees to fill in the details of this organizational structure. It will be implemented throughout 2013, until that time, the current organizational structure remains in place.
African Swine Fever (ASF) is a disease of pigs with mortality rates approaching 100%. The disease is not zoonotic and thus does not directly affect public health. However, it has a serious social and economic impact on the trade of swine, pig by-products, food security and limits pig production in affected countries. At present there is no vaccine against ASF, this limits the options for disease control which now is based on stamping-out.

According to the Rosselkhoznadzor (Russian Federal Service for Veterinary and Phitosanitary Surveillance), ASF was first reported in the Russian Federation in 2007. Since then 26 regions have been confirmed infected and 600 thousands pigs have been stamped-out. The total loss for the pig industry has been estimated for 30 B Rubbles (1B USD).

Rosselkhoznadzor reports that 2% of the outbreaks have been related to direct contact between healthy and sick domestic pigs, 3% infections were transmitted by personnel, 6% by transport, 6% by wild boars, 55% by swill and 28% of the cases were unknown in terms of the source of the virus.

After each reported case, Rosselkhoznadzor imposed a quarantine on the infected area and ensured the slaughter of all the pigs in the area. The authorities carried out a census of the pig populations in the infected areas and set up veterinary police posts on the edge of the region/province and closed minor roads.

In order to prevent the infection dissemination, Rosselkhoznadzor urges farmers to have the pigs vaccinated against Classical Swine Fever (CSF) and keep pigs indoors with good biosecurity. The authorities communicate to swine farmers to only introduce pigs under veterinary control and to avoid non-decontaminated feeds. Any contact with an infected area should be limited and any suspicion/case has to be reported immediately.

Rosselkhoznadzor additionally states: “In case AFS appears, quarantine should be introduced on affected farms. Pig’s carcasses, manure, remaining feeds, low-value handling items should be incinerated. Ashes mixed with lime should be buried. Premises and territories of the farm should be disinfected with 3% caustic soda solution and 2% formaldehyde solution. The whole swine population should be slaughtered within 10-kilometre radius from the affected area, and the meat should be processed for preserves. Quarantine may be lifted six months after the last case of animal death and pig’s breeding in the affected area is allowed not earlier than a year after the quarantine lifting.”
A letter to the Chairman:

TO: Dr. Charles Brown II, Chairman
United States Animal Health Association Committee on Import-Export
FROM: Tony Clayton, President, Livestock Exporters Association
DATE: October 9, 2012
RE: Status of Livestock Exports from the United States

President Obama’s National Export Initiative Executive Order clearly states, “A critical component of stimulating economic growth in the United States is ensuring that US businesses can actively participate in international markets by increasing their exports of goods, services, and agricultural products.” For the past few years, the world demand for meat protein and milk has created a tremendous amount of interest in livestock genetics exported from the United States. In 2011, the livestock export industry grew by 25% and we are a billion dollar industry. This growth can be attributed to the export sales of beef and dairy cattle exported to Kazakhstan, Russia and Turkey plus swine genetic exports to China, South Korea, Philippines and Vietnam.

Our industry faces many obstacles in the export process. We would welcome the assistance of the USAHA to ensure the United States remains competitive in the world market. The following concerns need to be addressed:

1. Closure of USDA/APHIS/VS Offices around the United States. The endorsement of health papers is a necessary part of the export process. USDA/APHIS/VS must be encouraged to maintain offices in key export states so timely export shipments can be made.

2. The inconsistency between USDA/APHIS/VS Offices in various states. Export shipments frequently consist of animals originating from different states. Problems arise because each state seems to have a different interpretation of the export process and protocol requirements.

3. Tuberculosis testing procedures. The current procedures for testing TB suspects could jeopardize an entire shipment and few exporters and breeders could survive that happening. Therefore, we feel that research into the OIE-approved Elisa blood testing methods would be extremely beneficial.

4. USDA/APHIS/VS User Fees and Overtime charges. We feel these charges have been increasing at an unreasonable rate. (Please see attached chart).

The US livestock genetic industry is poised to capture a large share of the world’s market, and contribute to the US economy by all the service providers that participate in the export process such as veterinarians,
IMPORT-EXPORT

laboratories, feed suppliers, etc. We hope the USAHA and your committee will give consideration to discussing the above points in the Import-Export Committee and during the annual meeting.

Thank you so very much.
Sincerely,
Tony Clayton, President
Livestock Exporters Association
Cc: Mr. Benjamin Richey, United States Animal Health Association
Mr. Mike Phillips, United States Livestock Genetics Exports, Inc.
Livestock Exporters Association Officers and Board Members

Figure 1. LEA Slide of USER FEES

![Graph showing USDA User Fees and Health Paper from 1992 to 2012 with Overtime Rate indicated.](image-url)
REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES OF CATTLE, BISON, AND CAMELIDS

Chair: James Evermann, WA
Vice Chair: Chuck Massengill, MO

Helen Acland, PA; Chris Ashworth, AR; Yugendar Bommineni, NM; Charlie Broaddus, VA; Charles Brown, II, WI; Beth Carlson, ND; Karen Conyngham, TX; Stephen Crawford, NH; Edward Dubovi, NY; William Edmiston, TX; Anita Edmondson, CA; James England, ID; Betsy Flores, VA; Robert Fulton, OK; Dorothy Geale, CAN; Dale Grotelueschen, TN; Thomas Hairgrove, TX; Rod Hall, OK; Del Hensel, CO; Floyd Horn, MD; Dennis Hughes, NE; David Hunter, MT; Annette Jones, CA; Paul Jones, AL; Bruce King, UT; John Lawrence, ME; James Leafstedt, SD; Howard Lehmkuhl, IA; Rick Linscott, ME; Pat Long, TN; Francine Lord, CAN; Janet Maass, CO; Patrick McDonough, NY; Richard Mock, NC; Cheryl Nelson, KY; Jeanne Rankin, MT; Bill Sauble, NM; Nick Striegel, CO; R. Flint Taylor, NM; Susan Tellez, TX; Robert Temple, OH; Charles Thoen, IA; Kenneth Throlson, ND; Paul Virkler, NY; Brad Williams, TX; William Wilson, KS; George Winegar, MI.

The Committee met on October 21, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina from 12:30 to 5:00 p.m. There were 22 members, and 37 guests present. Dr. Evermann welcomed the members, guests, and speakers to the meeting and reviewed the agenda.

Bovine Viral Diarrhea Virus (BVDV) Subcommittee Report
Dale Grotelueschen
Pfizer Animal Health

Dr. Grotelueschen presented an overview of BVDV with primary emphasis on cow-calf beef operations. He differentiated the attempts to “control” BVD persistent infectious (PI), rather than “eradicate” BVDV infections – disease from the US cattle populations. He reviewed the principles of biosecurity and that there are two main approaches to fulfilling this control. The first is by testing for BVD PI by antigen ELISA, IHC or PCR. The second is by vaccination of animals pre-breeding. The vaccines provide a good degree of PI prevention, but are not 100% therefore, testing is still a necessity.

Dale introduced a new web based BVD Control Program for 2013. It will be based upon risk assessment knowledge and can be used by producers as well as veterinarians (www.bvdinfo.org). He emphasized that it would be for beef production only.

Dr. Alison Von Enennaam from UC-Davis said such a program is being developed for dairy operations (www.brdcomplex.org).
Update on Schmallenberg Virus (SBV)
Dianne Rodman
National Veterinary Services Laboratory (NVSL), USDA-APHIS

Dr. Rodman gave a brief history of the discovery of SBV in the city of Schmallenberg, Germany, where it caused decreased milk production in adult dairy cattle in November 2011. It has subsequently been shown to be related to a group of arboviruses known in the US as the Bunyaviridae group, which includes Akabane and Cache Valley Viruses.

The virus is spread by the midge, Culicoides ssp. It can cause fetal abnormalities in calves, lambs, and goat kids. In Europe there is an ELISA for antibody detection. AT NVSL there is a virus neutralization (VN) assay. The samples need to be submitted by an area AVIC. Antemortem samples include: RTT and PTT blood tubes. Postmortem samples include: fetal tissues and brain for PCR and virus isolation.

Update on Bovine Respiratory Disease Research at USDA Agricultural Research Center (ARC), Ames, Iowa
Julia Ridpath
USDA Project Leader

Dr. Ridpath introduced the different Current Research Information System (CRIS) programs being done at Ames. The two programs that interface the best are ones looking at: 1) Intervention Strategies to Control Viral Diseases of Cattle; and 2) Looking at Emerging Viruses and Immunomodulation of the Bovine Immune Response. Their group is looking at Bovine Respiratory Syncytial Virus (BRSV), Respiratory coronavirus, Hobi Virus (a variant pestivirus originally isolated from Farm Business Survey (FBS)); and unusual strains of Bovine Viral Diarrhea Virus (BVDV) from domestic and wildlife. Ridpath requested strains of BRSV, PI-3 and pestivirus for their comparative studies.

She also announced plans for an upcoming International BVDV Symposium in Kansas City in 2014 to be held in conjunction with AAVLD-USAHA. Interested individuals are to contact Ridpath.

Ecology and Epidemiology of Vesicular Stomatitis Viruses (VSV) in the Americas
Luis Rodriguez
USDA, Plum Island, New York

Dr. Rodriguez gave an overview of VSV ecology in Mexico and its spread via insects northward to the US where it infects susceptible cattle and horses. VSV disease mimics foot-and-mouth disease (FMD), so its epidemiology is very important for early recognition of and differentiation from the exotic FMD. VSV can also infect pigs by direct transmission (no insects needed), as well as humans where it can cause mild fever, headaches and photophobia. The biological vectors include: sand flies, black flies, and Culicodes spp. Many wild ungulates, as well as rodents, bats, birds, and reptiles have VSV specific antibodies. It is regarded as an “unconventional
arbovirus.” The virus appears to overwinter in the reservoir populations and spread out of Mexico every 8-10 years.

**Cryptococcosis in Camelids: Review of Fungal Infections**
Rob Bildfel
Oregon State University

Dr. Bildfel reviewed the literature and presented the main groups of fungi affecting animals, primarily alpacas and llamas. Cryptococcosis usually observed clinically in cats and is spread by birds in feces. Some species of animal are more susceptible. Humans that are immunocompromised (HIV) are particularly susceptible to disease. *C. gattii* is the predominant fungal agent and in some areas can result in up to 62% infection rates with a case fatality rate as high as 20% untreated. In camelids, the fungus can cause ataxia and blindness. There is a polymerase chain reaction (PCR) assay available at Oregon State University (OSU) Diagnostic Laboratory.

**Mycoplasma Bovis Infections in Bison**
Dave Hunter
Turner Ranches, Hamilton, Montana

Dr. Hunter gave an overview of the management practices of handling bison in large groups. Along with the stress of working the bison for Brucellosis testing, the occurrence of *M. Bovis* can be a primary pathogen. Hunter’s group is working in conjunction with several laboratories to identify isolates for potential vaccines, and is also doing genetic testing of the bison to explore possible resistance genes against disease susceptibility.

**Committee Business**

The Committee had no resolutions or other actions during the course of the meeting.
REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES OF HORSES

Chair: W. Kent Fowler, CA
Vice Chair: James Watson, MS

Helen Acland, PA; George Badley, AR; Debbie Barr, CAN; Tony Benz, MO; C. Black, GA; Yugendar Bommineni, NM; Becky Brewer-Walker, AR; Charlie Broaddus, VA; Stan Bruntz, CO; Clarence Campbell, FL; Craig Carter, KY; Stephen Crawford, NH; Glenda Davis, AZ; Brandon Doss, AR; Edward Dubovi, NY; Adam Eichelberger, SC; Leonard Eldridge, WA; Dee Ellis, TX; J Amelita Facchiano, TX; Dave Fly, NM; Edward 'Rusty' Ford, KY; Tony Frazier, AL; Robert Gerlach, AK; Paul Gibbs, FL; Kristin Haas, VT; Steven Halstead, MI; Jeffrey Hamer, PA; William Hare, MI; Greg Hawkins, TX; Burke Healey, CO; Carl Heckendorf, CO; Michael Herrin, OK; Floyd Horn, MD; Dudley Hoskins, DC; Bruce King, UT; Don Knowles, WA; Ralph Knowles, FL; Paul Kohrs, WA; Maxwell Lea, Jr., LA; Donald Lein, NY; Mary Lis, CT; Francine Lord, CAN; Patrick McDonough, NY; Richard Mitchell, CT; Linda Mittel, NY; Cheryl Nelson, KY; Sandra Norman, IN; Don Notter, KY; Eileen Ostlund, IA; Boyd Parr, SC; Ben Pendergrass, DC; Jewell Plumley, WV; Anette Rink, NV; Keith Roehr, CO; Dennis Schmitt, MO; Andy Schwartz, TX; Jack Shere, NC; Marilyn Simunich, ID; David Smith, NY; Diane Stacy, LA; Robert Stout, KY; Manoel Tamassia, NJ; R. Flint Taylor, NM; David Thain, NV; Peter Timoney, KY; Susan Trock, GA; Charles Vail, CO; Ellen Wilson, CA; Taylor Woods, MO; Ernest Zirkle, NJ.

The Committee met on October 22, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 1:00 to 6:00 p.m. There were 29 members and 50 guests present. The meeting was chaired by Dr. W. Kent Fowler. The mission statement was reviewed and the committee decided no changes were necessary at this time. The monthly National Equine Conference Call was discussed and reported by Fowler to have an average of 56 call-ins on each monthly call. There are two proposed resolutions to be discussed in the business session.

Time-Specific Papers

Dr. Udeni Balasuriya, Gluck Equine Research Center, University of Kentucky, presented a time-specific paper on “Laboratory Diagnosis of Equine Herpesvirus-1 Infection in Horses: Advances and Challenges”. The paper, in its entirety, is included at the end of this report.

Dr. Massaro Ueti, USDA-ARS-Animal Disease Research Unit and Department of Veterinary Microbiology and Pathology, Washington State University, presented a time-specific paper on “Chemotherapeutic Elimination of Tick-borne Apicomplexan Theileria equi in Naturally Infected Horses”. The paper, in its entirety, is included at the end of this report.

Presentations and Reports
Equine Passports
Andy Schwartz
Texas Animal Health Commission

A number of states have signed agreements establishing interstate movement permits or interstate event permits, called equine passports here. These equine passports allow the movement of equine between states for a six-month period of time, if certain criteria are met. The passports take the place of a 45-day Certificate of Veterinary Inspection (CVI).

The number of Southern District states participating in a passport program is increasing, with 14 signatures on the current agreement. Six Western District states have had an agreement for a number of years. Producer participation in the passport program is high in both districts. Other multi-state agreements may exist.

In general, application must be made to the state of residence that includes proof of a current negative EIA test and veterinary inspection. Individual states can add their own requirements as the agreements are established. Some states use a paper certificate, while others use laminated certificates or wallet sized cards. Digital images of the equine are accepted by most states. If non-standard microchips are used, some states require the transporter to provide an appropriate microchip reader. An itinerary is kept on each equine should tracing be necessary. States may cancel passports in disease outbreak situations.

There is interest among some regulatory officials and industry representatives for the establishment of an equine passport that would be accepted by all states.

EIA Subcommittee Update
Andy Schwartz
Texas Animal Health Commission

Dr. Schwartz provided the EIA Subcommittee Report, included at the end of this Committee report.

Equine Piroplasmosis Subcommittee Update
Mike Short
Florida Department of Agriculture and Consumer Services

Dr. Short presented the Equine Piroplasmosis Subcommittee report, available at the end of this Committee report.

Update on African Horse Sickness in South Africa
Alan Guthrie
Equine Research Centre, Faculty of Veterinary Science, University of Pretoria, South Africa

The complete text of this presentation is included at the end of this report.

Equine Leptospirosis
Craig Carter, DVM, University of Kentucky, Veterinary Diagnostic Laboratory

The complete text of this presentation is included at the end of this report.

Panel Discussion on an Infectious Disease Outbreak at a Large Equine Event

Angela Pelzel McCluskey, USDA-APHIS-VS, Western Region Epidemiologist
Dee Ellis, Executive Director of Texas Animal Health Commission
Keith Roehr, Colorado State Veterinarian
Glenn Petty, Executive Vice President, Arabian Horse Association
Charles Vail, Senior Partner, Littleton Equine Medical Center
Moderator: Kent Fowler

Roles assumed:
- Federal Regulatory: Dr. Angela Pelzel-McClusky
- State Regulatory: Dr. Dee Ellis
- State Regulatory: Dr. Keith Roehr
- Show Management: Mr. Glenn Petty
- Show Veterinarian: Dr. Charlie Vail

The panel members were to assume that they were responding to the scenario and provide input from their respective positions. The panel discussion was provided a scenario of an Equine Herpes Myeloencephalopathy incident at a large equine event. The 239 acre event venue had ten barns with 1,080 permanent stalls and 42 temporary tent barns. The venue had a great deal of movement of animals, people and commodities. An isolation stall/barn was present on the show premises.

Scenario:

The Horse Show Veterinarian Report – Sick horse on Sunday at 0700 on day two of competition.

A horse located in Barn 5 had a temperature 102.5°F and became acutely ataxic and recumbent. This horse had arrived at the show from a 150 horse stable three days earlier. The horse was purchased by an East Coast owner for $175,000 six weeks ago. There are eight more days of competition for this event. The horse show veterinarian contacted State regulatory officials of the possibility of EHV based on clinical signs. Nasal swab and blood test results are expected on Monday PM.

Moderator: What are your recommendations at this time for the index horse?

Show Veterinarian Vail: There are 20 horses in Barn 5. Most important at this time is that everyone should get a thermometer for every horse, monitor temperatures and there should be no movement in or out of the barn at this time.

State Regulatory Official Roehr: Recommend a hold order - a limitation of movement - since there are no laboratory results. If the affected horse is recumbent, the horse may be more effectively treated in medical facility, if possible to move, and not in the isolation facility. No decision would be made in a vacuum; I would talk with event organizers and the show veterinarians;
an inventory of owners would be needed but not much contact at this time—need participant information from show management at this time since contacts will likely be needed.

State Regulatory Official Ellis – It would be advantageous to isolate this horse and disinfect the area, but this horse is recumbent; it would be better off isolated…we had this same type of scenario happen in Texas, but we were able to get the affected horse moved. I would think of rabies and other things, not just EHV-1. There would not be any official action at this time. I would talk with the show veterinarian and show management. Texas has a plan for biosecurity and has recommendations; I would think about and talk about contingency plans.

Federal Regulatory Official Pelzel – There would be no federal involvement at this time. EHV-1 is not an immediate reportable disease to USDA. USDA reports EHV-1 on the OIE six month report and most states have some reportability for EHV-1. Colorado and Texas have plans. USDA appreciates receiving the information from the states and provides support upon request.

Show Management Petty – I would listen to the show veterinarian recommendations. It is important to not have knee jerk reactions. We have two areas - one isolation area for suspects and one quarantine area for affected horses. At the current Arabian National Show there are 3,400 stalls and we have a quarantine area; I follow show veterinarian recommendations. A few years ago we had a dead horse on a Saturday when horses were leaving and we had no contact information for exhibitors. We listen to the show veterinarian. When the rumor mill starts, this is where it is difficult for us to control movement of horses from the facility and manage approval for departure – we have a $0.5-1 million dollar liability in hotel expenses alone with large shows; we have $50-100 M worth of horses on the ground - we rely on the advice of veterinary professionals.

**Scenario Inject #2:** At 1500 on Sunday, a horse located in Barn 26 that was on the same plane as the index horse has a temperature of 104.1º F and slight hind limb ataxia and another horse in an adjacent stall to the index horse in Barn 5 has a temperature of 101.7º F and no other symptoms. Both horses were swabbed and bled and the samples were to be sent to the laboratory on Monday morning.

Moderator: Does this additional information impact your initial response?

Show Veterinarian Vail: With Barn 5 I would hold steady. I would contact the state veterinarian and the show management to move the Barn 26 horses to an isolation area; I would leave the recumbent horse where it is in Barn 5.

State Regulatory Official Roehr: I concur with the show veterinarian; my concern is increasing, there would be discussions ongoing with show management; we already have contact information for exhibitors.

State Regulatory Official Ellis: I would need contact information. I would have a conference call with other state veterinarians and continue monitoring
of activities. In Texas we would allow movement of horses from the grounds on VS 1-27s.

Show Veterinarian Vail: I would continue the focus on Barn 5 and the Barn 26 single horse; in Barn 5 and 26 we would obtain BID temperatures on all horses.

**Scenario Inject #3:** Monday morning 0730, there are confirmed reports that 12 horses have left the show premises from Tent 25 at 2400 hrs due to owner/trainer concern of health risk and reportedly headed home (600 miles away).

Moderator: What are the concerns with movement of horses from the facilities? What messaging is taking place at this time prior to receiving test results?

State Regulatory Official Ellis: This changes my perception with evidence of disease spread. I would talk to show management to find out additional information on these horses and where they are from. I would have a conference call with other state veterinarians that have horses from their state at this show. We have contingency plans in our state plans for movement of horses on VS 1-27s.

Show Management Petty: I would follow the recommendation of the state veterinarian. We have signage to limit movement in certain area. We would institute biosecurity measures with veterinarians, farriers, feed deliveries, etc.

Show Veterinarian Vail: I would defer to show management in terms of what happens on the grounds. I would communicate to exhibitors that biosecurity measures have been instituted and we are waiting for test results. Our state veterinarian is a great communicator and keeps us apprised of actions.

Moderator: Dr. Roehr, you are being contacted for a media interview.

State Regulatory Official Roehr: I would refer to our Public Information Officer. The key considerations are that some people have left and there are others who are thinking about leaving...transparency is important. We must talk through these issues with people. There are problems with doing too little and problems with doing too much...we are waiting for test results and it is difficult to say much more at this time. We need proper biosecurity from the beginning with affected barns and must remember that people are great fomites. There are questions where the recumbent horse would receive the best care if it can be moved.

Moderator: What about communication to all exhibitors?

State Regulatory Official Ellis: We have a situation where communication is critical. There is a need to talk to the show veterinarian and an epidemiologist. I would meet with show management on contingencies...arrange meeting with participants to assess feelings and provide information - for sure need interaction with participants on their desire to stay or leave the venue and a conference call with other state veterinarians...would meet with press for press conference. I would plan out the day...I may seek consultants...then give out focused information even
before test results are back...if some exhibitors chose to head home then conversations need to take place with state veterinarian in state of origin.

Show Management Petty: I would follow guidance from veterinarians...I would meet with trainers since they are a smaller group of people and communicate the situation.

**Scenario Inject #4: Monday 1400 - test results positive for neurotropic equine herpes virus (NEHV) are received on index horse - PCR CT value 31 on nasal swab indicating a high viral load. Monday 1600 - neurologic symptoms have progressed on index horse and the insurance company has approved the euthanasia request. Two additional horses at show (five total) which were on the same plane with the index horse are showing compatible EHM clinical signs.

Moderator: What current actions based on positive EHM?

State Regulatory Official Roehr – You should never issue a quarantine without knowing how you are going to release it. It is very difficult to quarantine all horses on the show premises for any length of time for many reasons. We would likely send horses to home premises and isolate horses. We have plan in Colorado for large events. Many people will want to leave; may use 1-27 sealed shipments; media communications would be in full swing ...one unified message, well-coordinated.

Show Veterinarian Vail: I would meet with show management and the state veterinarian; if show is going to continue and people are still coming in they need to know the situation.

Show Management Petty: I would rely on state and federal officials since this is getting beyond show management; we are very concerned about the progression of this disease incident.

Moderator: Any quarantine actions at this time? What is the mechanism to allow horses to move off the show premises?

State Regulatory Official Ellis: I would go to show management - does entire show need to be cancelled? Can we clean and disinfect and continue on in other areas? This would be the time when we would get USDA involved because of potential interstate movements; an epidemiology team is needed to put the pieces together ...complicating factors are trainers...state veterinarians and receiving states need to know the situation.

Federal Regulatory Official Pelzel: From an epidemiological standpoint we are asked for testing schemes etc. Field epidemiologist - to create scenario plans that fit with state plans and also higher epidemiological evaluation and analysis; USDA could provide support locally (area veterinarian in charge (AVIC) and federal VMOs will provide support to state personnel, i.e., writing VS 1-27 permits, sealing trailers and receiving sealed trailers...sealed trailers on long trips - must have right kind of trailer for the load.

State Regulatory Official Roehr: EHV-1 is regulated in Colorado; need informed consultation and participation (ICP) to coordinate management of the event and manage movements; can be effective without creating undo concern; unique thing about EHV-1 is that once neurologic, the outcome is
usually not good; cancellation of events for the well-being of horses has been seen previously.

Show Management Petty: Panic starts with additional horses being diagnosed; many shows cancel from fear; in the past some local veterinarians were giving bad advice and inciting fear – we saw cancellation of 16 Arabian shows following Ogden incident; this is an area where good communication with state officials is essential; social media increases panic so news releases can counteract this inaccurate information; we have to contract and guarantee hotel rooms and golf carts, etc… large shows have real economic problems with cancellations.

Moderator: Dr. Vail, would you be recommending additional testing?

Show Veterinarian Vail: No. Temperature charts and monitoring becomes the passport out of the facility…ultimately it is the State Animal Health Officials (SAHO) decision. Do the State Animal Health Officials determine where the horses can go?

State Regulatory Official Ellis: We would go back to the IC to evaluate before departing…we will evaluate movement to locations other than home after evaluation…in Texas I was asked repeatedly if we should cancel our show. It would be of big help to State Animal Health Officials to have criteria to evaluate just this…maybe we can develop something to help – a State Animal Health Official toolkit.

Show Management Petty: We have moved horses to race tracks during off season…vacant horse farms are also an option and fair facilities that are not in use.

Comments:

Nick Striegel: A spreadsheet of criteria to determine risk of going on with the show was developed in Colorado…would be useful to ask organizers what the risk would be?

Carl Heckendorf: There are benefits of the Biosecurity Toolkit developed in California; it is absolutely imperative that event managers proactively address these things; also American Association of Equine Practitioners (AAEP) website has valuable information on the same subject.

Marilyn Simunich: Do participants sign an agreement that they will comply with biosecurity and pay for quarantine area?

Show Management Petty: Participants sign agreement that they will abide by United States Equestrian Federation (USEF) and show rules; we have veterinary lists with phone numbers, etc.

Kent Fowler: Following the Ogden event, contacting owners was difficult so we encourage event managers to obtain correct contact information from participants at registration.

Show Management Petty: For emergency purposes, we asked for hotel information from participants.

Ellis: We need to do more outreach, but we have limited staff; we would like to meet with all large event managers to discuss these things in advance; at the Appaloosa show last year, the show veterinarian was the key to solving a great number of the problems.
REPORT OF THE COMMITTEE

Ellis: Social media is part of the problem and part of the solution; expectations are to chat with them but we learned quickly what we weren’t communicating effectively and we were able to bring misinformation to a halt by using social media.

Roehr: We also gave daily updates and many questions were answered in this manner. An option is to have a trainers meeting about moving horses early on, so that movement off premises could be coordinated.

Petty: Our public relations department was put under pressure to write things, we linked to state vet website and USDA website and then did e-blast of links to members which cut down on misinformation.

Committee Business:

Following conclusion of the scientific program, the Committee went into Business Session. Two resolutions were considered, approved and forwarded to the Committee on Nominations and Resolutions for approval by the general membership. One of these resolutions requests that USDA-APHIS-VS-NVSL proceed with the nEHV-1 ring trial and make every effort to standardize testing methodology for nEHV-1 PCR testing at diagnostic facilities in the United States. The other resolution urges USDA-APHIS-VS to reevaluate the dourine and glanders testing policy change for US domestic equids and allow this NCIE recommended testing upon request at the owner’s expense. This testing provides US owners exporting horses the opportunity to pre-test domestic horses and possibly avoid a domestic horse returning home from being denied entry into the United States. The meeting was adjourned at 6:00 p.m.
The effort to bring about change in the USDA rules pertaining to Equine Infectious Anemia (EIA) began in 2004. A USAHA resolution that year asked the United States Department of Agriculture (USDA), Veterinary Services (VS) to update the Code of Federal Regulations (CFR) to create a national EIA control program. In 2006, another USAHA resolution asked the USDA to place the current equine infectious anemia (EIA) Uniform Methods and Rules (UMR) in the CFR. The CFR was not changed.

In 2008 another USAHA resolution asked VS to fund a national EIA program and eradication efforts in high prevalence states. The resolution also asked that a working group be established to do a census on the horse population in the US, and determine the prevalence of EIA in the horse population. The resolution went on to ask that a three-tiered laboratory system be established, that information be shared by laboratories in an electronic format, and again asked that the UMR be added to the CFR. The VS response indicated that funds were not available for a national program, but there was support for sharing laboratory data electronically. The CFR was not changed, but work was initiated on a proposed rule.

The current EIA regulations outlined in 9 CFR 75.4 pertain to reactor equines and laboratory requirements. The CFR does not cover EIA testing requirements for interstate movements or handling of exposed equine. Updated EIA regulations are needed to codify current VS activities not supported by the CFR, such as requiring that a State/Federal animal health official or an accredited veterinarian collect and submit EIA samples as stated on the VS 10-11 form.

VS has drafted the proposed EIA rule, and has informed stakeholders of the concepts in the rule at USAHA, American Association of Equine Practitioners (AAEP), American Horse Council (AHC), and National Institute for Animal Agriculture (NIAA) meetings, and on conference calls sponsored by USAHA, AHC, and National Assembly of State Animal Health Officials (NASAHO). These meetings and calls were held between October 2011 and March 2012. Stakeholder responses to the concepts of the proposed rule were mixed. Many supported the rule, at least as a starting point for change, while others opposed it.

In June 2012, a Decision Memorandum for the Deputy Administrator of VS was prepared. The memo presented two options: continue the rulemaking process and publish the proposed rule, or discontinue the current EIA proposed rule activities. The Deputy Administrator elected to pursue the first option, that of continuing the rulemaking process and publishing the proposed rule. At this writing, the proposed rule has not been published.
There continues to be significant efforts in equine piroplasmosis (EP) surveillance and research. EP testing of horses continues to be driven primarily by industry but some regulatory testing is occurring as well. Industry testing continues to occur through multiple routes including, sanctioned race tracks and breed sponsored events and sales. The majority of regulatory testing is being done through disease investigations and international export with some interstate testing.

According to the National EP Situation Report, there have been 190,085 horses tested since November 2009, with more than 42,000 tested in the past year. Since 2009 there have been 189 horses determined to be positive for EP, of those 11 were detected in the past 12 months (excludes the horses detected as positive during the investigation of the 2009 Texas ranch outbreak). All of the positive EP horses, except one with ongoing investigation, have been in one of two high risk categories; horses imported prior to August 2005 using the CF test and those involved in racing, primarily Quarter Horse racing.

During the past year the EP Subcommittee held one meeting which took place via conference call. The primary discussion points and continued areas of interest and concern of the subcommittee are:

- **Update on status of the EP Working Group long-term recommendations**
  - The USDA has begun to implement some of the recommendations and the VS Management Team is continuing to review the other long term recommendations for potential implementation.

- **EP Uniform Standards Document**
  - The USDA is working on an EP Uniform Standards document to include the current guidance in VS Memo 555.20, the Long-term recommendations from the EP Working Group and the laboratory EP testing approval notice, in one comprehensive document.

- **B. caballi** suspect case testing protocol completed.
  - Since the USAHA meeting last year, the USDA has approved a **B. caballi** adjunct test, validated at ARS in Pullman, Washington. The new protocol for any horse testing positive for **B. caballi** on the cELISA test, is to automatically be tested on this new confirmatory test at National Veterinary Services Laboratory (NVSL). The complete results are being issued on the regular NVSL results report, including a statement of interpretation in the comments section of the report. The testing is being completed on most samples within 2-3
business days from the date of receipt at NVSL. The horses with a confirmatory negative test can be moved based on the final NVSL report with no further regulatory restrictions. A copy of the final NVSL report should be used as proof of the EP negative status for movement and event entry purposes.

- A confirmatory test for *B. caballi* was needed as there have been a small number of *B. caballi*, cELISA positive results on horses that have had no epidemiological link to high risk disciplines or management and have been of low risk signalment and/or of low risk breed. These same cases have been yielding discrepant results on additional testing. In many of those cases, while the cELISA is at the 40% inhibition level or higher it is believed that the result is a false positive and the test is reacting to a protein not originating from the *B. caballi* organism.

- Center for Epidemiology and Animal Health (CEAH) National Center for Risk Analysis is conducting a feasibility study for an *Amblyomma cajennense* risk assessment.
  - In February of this year the Parasitic Disease Committee of the USAHA recommended that CEAH, National Center for Risk Analysis conduct a risk assessment on the potential for *Amblyomma cajennense* to be transported via livestock or wildlife from Texas to other states and that CEAH determine the natural range and current known locations of *A. cajennense*.
  - CEAH has stated three primary aims of the study,
    - Define the geographic distribution of the Cayenne tick in the US based on tick survey data.
    - Characterize the habitat associated with the presence of the Cayenne tick in the US.
    - Evaluate the interstate movements of horses, cattle, and feral swine within the defined tick habitat.
  - Part of the risk assessment will be based on wildlife tick surveillance being conducted by the Southeastern Cooperative Wildlife Disease Study (SCWDS), which began this summer. The SCWDS wildlife tick surveillance is being conducted in South Texas in an effort to better determine wildlife host range and geographic distribution of *A. cajennense* and *Rhipicephalus (Boophilus) microplus*.

- Continued illegal movement of livestock across the Mexican/US border.
  - There is ongoing illegal movement of livestock from Mexico into the US. These livestock pose a continual risk to US livestock as they often carry disease and foreign ticks.
In May of this year, fourteen horses (ten adults and four foals) were seized while moving illegally from Mexico into the US. All ten adult horses tested positive for EP.

According to the USDA there were 440 animals (horses and cattle) seized while trying to move from Mexico into the US illegally in 2011.

Ongoing EP surveillance

In the past year EP surveillance testing has decreased due to a reduction in both regulatory and industry testing requirements.

There is concern that needed EP surveillance will continue to drop due to multiple factors including:

- Reduction in the perceived importance of testing as the number of domestic case falls.
- Economic pressure reducing industry driven testing.

Review of the USDA responses to the two EP Subcommittee resolutions passed during the IDOHC secession at last year’s USAHA meeting.

The USDA responses to both resolutions were positive and implementation of both resolutions is expected in the near future.

- Resolution 21, requested that a protocol be approved for the release of positive EP horses after treatment and testing negative via multiple test methods including the cELISA test.
- Resolution 22, requested that import testing for horses include the complement fixation test (CFT) in addition to the cELISA test.
LABORATORY DIAGNOSIS OF EQUINE HERPESVIRUS-1 INFECTION IN HORSES: ADVANCES AND CHALLENGES

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Background:
Equine herpesvirus-1 (EHV-1) has a global distribution and almost all domesticated horses will become infected/reinfected with this virus during their lives, an event that may have significant clinical consequences. EHV-1 can cause acute upper respiratory tract disease, abortion, neonatal death and neurological disease that may lead to paralysis in horses4. In a high percentage of infected animals, EHV-1 establishes life-long latent infections in long-lived cells such as the neurons in the trigeminal ganglia and lymphoreticular tissues associated with the respiratory tract2,4. Reactivation of latent virus can lead to recrudescence of disease and result in virus transmission to additional susceptible hosts. Outbreaks of neurologic disease are thought to be initiated by viral reactivation followed by nasal shedding of the mutant EHV-1 strain by latently infected carrier horses5. The severity of clinical disease resulting from EHV-1 infection is determined by a number of host related factors including age, physical condition, immune status and whether the infection is the result of a primary exposure, reinfection or the reactivation of latent virus3,4. Although it appears that all EHV-1 strains can induce abortion in pregnant mares, only certain strains (neuropathogenic or mutant) have the ability to cause wide scale outbreaks of equine herpesvirus myeloencephalopathy (EHM) or neurologic disease in horses17. The earliest recorded outbreak of paralytic disease directly linked to EHV-1 was in 196628. This was originally thought to be a comparatively rare event limited to a handful of cases each year. Unfortunately, the neurologic form of EHV-1 infection appears to be becoming more prevalent with an increasing number of outbreaks characterized by a high case-fatality rate among affected horses on farms, at racetracks and at riding schools since 20005,27. This has led to increased industry awareness of the problem and prompted the United States Department of Agriculture (USDA) to designate EHV-1 myeloencephalopathy as a “potentially emerging disease of the horse”7. It has been reported that the neuropathogenic phenotype of EHV-1 can result from a single non-synonymous nucleotide (nt) A to G substitution at position 2254 (A→G2254), leading to a change from neutral asparagine to negatively charged aspartic acid at amino acid position 752 (N→D752)13,17,31. EHV-1 isolates with the A2254 genotype have been linked principally with non-
neurologic infections, while viruses possessing the G2254 genotype are frequently but not invariably associated with neuropathogenic disease.

**Laboratory Diagnosis of EHV-1 Infection:**

Rapid, accurate and timely diagnosis of equine herpesvirus-1 (EHV-1) infection in horses is important for equine practitioners, horse owners, breeders and trainers. The clinical signs of EHV-1 related respiratory disease can mimic those caused by other equine viral respiratory pathogens such as EHV-4, equine influenza virus, equine arteritis virus (EAV), equine rhinitis virus A and equine adenovirus-1. Similarly, EHV-1 induced abortions and neurologic disease must be differentiated from those caused by other infectious (EAV, EHV-4 abortions, equine protozoal myeloencephalitis, eastern equine encephalitis and West Nile virus encephalitis) and non-infectious causes. When confronted with a disease outbreak, confirmation of a provisional clinical diagnosis by means of a rapid, sensitive and specific laboratory diagnostic test(s) is essential to ensure that appropriate biosecurity and quarantine measures are implemented without unnecessary delay.

Laboratory diagnosis of various forms of EHV-1 infection is done either by direct demonstration of virus (virus isolation or viral antigen) or viral nucleic acid detection (polymerase chain reaction [PCR]) or indirectly through serologic evidence of recent infection. The OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (2008) recommends any of these methods for the diagnosis of EHV-1 infection. Different diagnostic laboratories will select the test(s) or assay(s) for diagnosis of EHV-1 infection based on available facilities and expertise. However, the clinician or the practitioner still needs to be aware of the inherent advantages and limitations of any given test in order to be able to interpret the results of a test appropriately. The primary objective of this article is to provide an update on advances that have been made in the recent years in diagnostic testing of samples for EHV-1 and some caveats when using molecular tests for its detection in clinical specimens.

**Sample collection:**

It is imperative to collect the appropriate clinical sample(s) at the correct time by selecting the most suitable case(s) within an affected group of horses. Virus shedding from the respiratory tract is generally short lived (<10 days post infection [dpi]), may be intermittent and is most reliable during the acute phase of the disease or early, febrile phase of respiratory infection (1-5 dpi). Nasal/nasopharyngeal swab samples collected 10 days or later after the onset of first clinical signs are less likely to yield positive results on attempted virus isolation. Nasopharyngeal swabs (16") are preferred over regular nasal swabs. They should be transported to the laboratory in viral transport medium containing antibiotics for testing. During outbreaks, it is important to collect samples from in-contact horses that are febrile and which may not show any other clinical signs at the time because clinical signs appear later in the course of the disease. It is especially important to collect
nasopharyngeal swabs in the early stages of disease since in suspected cases of EHM, neurological signs appear towards the end of the viremic phase of infection, by which time virus shedding from the respiratory tract is waning or may have ceased. Furthermore, during the viremic phase of the disease (4-10 dpi), before the appearance of neurologic signs, virus also can be detected in peripheral blood mononuclear cells (PBMCs [buffy coat fraction]). Approximately 10-20 ml of sterile blood samples should be collected into EDTA (ethylene diamine tetra-acetic acid [purple top tubes]; the preferred anticoagulant). The blood samples should be transported directly to the laboratory on ice (4°C), but not frozen. On occasion, the virus can also be detected in the cerebrospinal fluid (CSF) in parallel with the appearance of neurological signs (7-16 dpi). However, while brain and spinal cord samples collected at necropsy are not usually suitable for virus isolation, they may be useful for confirmation of viral DNA by PCR. The placenta, lung, liver, spleen and thymus should be collected aseptically in suspected cases of EHV-1 abortion for virus detection. Portions of these tissues can also be collected in 10% buffered formalin along with spinal cord from cases of EHM for histopathological (hematoxylin and eosin [H & E]) and immunohistochemical (IHC) examinations.

Serological diagnosis:
Serological diagnosis of EHV-1 infection can be achieved by demonstration of a four-fold rise in antibody titers in paired sera taken during acute and convalescent stages of the disease (sera collected at onset and two-four weeks later). It should be kept in mind that serum from mares that aborted or from horses with EHV-1 neurologic disease may already contain peak levels of antibodies, and no increase in titers will be detectable in subsequently collected sera. Serum antibody levels to EHV-1 can be determined by virus neutralization, ELISA or complement fixation tests. However, there are no internationally recognized reagents or standardized laboratory protocols for performing these tests and as a result, there is frequent variation in serological results among laboratories. Furthermore, all these serological tests detect antibodies that are cross-reactive between EHV-1 and EHV-4. However, the demonstration of a four-fold or greater rise in antibody titers to EHV-1 or EHV-4 by any of these tests between paired sera is serological confirmation of recent infection with one of the viruses. A glycoprotein G (gG) specific ELISA that can distinguish EHV-1 and EHV-4 is commercially available.

Traditional Methods of Detection of Virus and Viral Antigens:
Virus isolation (VI) - EHV-1 isolation can be attempted from nasal/nasopharyngeal swabs, tissues of aborted fetuses (placenta, lung, liver, thymus and spleen), PBMCs and central nervous system material from cases of neurological disease in continuous cell lines (rabbit kidney-13 [RK-13], equine dermis [ED], and baby hamster kidney-21 [BHK-21], Madin-Darby bovine kidney [MDBK], pig kidney-15 [PK-15] and primary or diploid equine cells (equine lung or kidney cells and equine endothelial cells)18. Unlike EHV-4 which requires equine derived cell cultures for isolation, EHV-1
can be isolated in a variety of non-equine derived cell types. However, the sensitivity of different cells and cell lines can vary significantly and this can lead to false negative results. Tissue samples for VI should be kept at 4°C, not frozen at -20°C, until inoculated into cell culture. Samples that cannot be processed within a few hours after collection should be stored at -70°C. Blood samples collected for buffy coat separation should not be frozen. The identity of virus isolates recovered from clinical specimens must be confirmed by PCR, indirect immunofluorescent or neutralization assays using EHV-1 specific antisera or monoclonal antibodies. PCR has largely superseded VI in most diagnostic laboratories, which test specimens for EHV-1 and -4.

Immunofluorescence and immunohistochemical staining - Frozen sections of postmortem material can be stained with conjugated or unconjugated monoclonal antibody (MAb) or polyclonal antiserum to EHV-118. FITC conjugated polyclonal swine antiserum to EHV-1 can be obtained from the National Veterinary Services Laboratories of the United Stated Department of Agriculture, Ames, IA. Immunohistochemical (IHC) staining methods to detect viral antigen in paraffin-embedded tissues of aborted equine fetuses or neurologic cases have been described. IHC staining along with H & E examination is particularly useful for the simultaneous evaluation of histopathological lesions and identification of the infectious agent in affected tissues. Furthermore, both assays can be performed on infected cell monolayers, which can be used to confirm isolation of EHV-1 in the laboratory. Both IFA and IHC staining must include a positive and negative control consisting of sections from known EHV-1 infected and uninfected tissues.

Contemporary Molecular Biologic Methods of Viral Nucleic Acid Detection:

Polymerase chain reaction (PCR) based assays - Several reports have documented the use of PCR-based assays, both standard and real-time, for the detection of EHV-1 in clinical specimens8,9,12,13. The PCR based techniques are rapid, sensitive and do not require the presence of infectious virus in the clinical samples. These techniques can be used for diagnostic detection of EHV-1 nucleic acid in clinical specimens, tissue culture fluid (TCF) from inoculated cultures and paraffin-embedded archived tissues. A variety of type-specific PCR primers and probes have been published which can distinguish between EHV-1 and EHV-4, as well as other EHV (EHV-2, EHV-3 and EHV-5). A multiplex PCR assay for simultaneous detection of both EHV-1 and EHV-4 nucleic acids has been described. The OIE manual described a more sensitive nested PCR assay targeting the glycoprotein B genes (gB) of EHV-1 and EHV-4, which allows identification, and discrimination of these two EHV. However, it should be borne in mind that nested PCR assays are prone to give a higher number of false positive results due to sample carryover and cross contamination. Therefore, the use of a nested PCR assay should be avoided in the routine laboratory diagnosis of EHV-1. The PCR assays (standard, nested and real-time) target a number of EHV-1 genes (gB, gC, gD and DNA polymerase) but some of these genes
are highly variable among EHV-1 field isolates and consequently, not all primers and probes may have similar or equivalent sensitivity. To avoid false negative test results, the primers and probes should be designed based on highly conserved regions of these genes and assays should be properly developed and validated based on testing a significant number of clinical samples before they are recommended for routine diagnostic purposes.

Hemoglobin and lactoferrin have been identified as PCR inhibitor components in erythrocytes and leukocytes, respectively. In addition, some anticoagulants (e.g. heparin) are reported to interfere with the PCR assay. These PCR inhibitors act primarily by inactivating the Taq DNA polymerase used in PCR assays. Various protocols and DNA extraction procedures are available to purify DNA and eliminate these inhibitors prior to performing the assay. However, these extra steps are time-consuming, may not completely remove inhibitors or may lead to a loss of target DNA resulting in decreased sensitivity of the real-time PCR assay. Consequently, the detection of EHV-1 DNA in blood or buffy coat cells may be less sensitive and this may result in significant variation in sensitivity of PCR assays among diagnostic laboratories.

Real-time quantitative PCR assays - A number of real-time PCR assays targeting various EHV-1 genes (gB, gD and viral DNA polymerase [open reading frame 30; ORF30]) have been described in the literature\textsuperscript{11,16,23,25}. However, very few of these assays are properly designed and validated. Real-time PCR assays targeting gB and gD are used for measuring the viral copy number (“viral load”) in clinical samples by some laboratories\textsuperscript{25}. Two methods are used to quantify the viral DNA copy number in clinical specimens: relative quantification using cellular housekeeping genes (e.g. β-actin) or absolute quantification using a standard curve based on plasmid dilutions of the target gene. However, the quantification of viral DNA copy number in a clinical sample is challenging for the following reasons: 1). The sample collection method is not uniform due to various amounts of mucous, nasal discharge, debris and epithelial cells in the clinical specimens, and the method of swab collection (swab length, variation in contact time with the mucosa [2-20 seconds], together with type and volume of transport medium [0.1-7 ml]); 2). Nasal/nasopharyngeal swabs are mostly acellular (very few epithelial cells and leukocytes). Thus cellular genes should not be used for correcting DNA purification efficacy and calculating the viral DNA copy number in nasal secretions. Absolute quantification based on a standard curve should be used to quantitate virus in nasal secretions; this method should provide a more accurate assessment of viral DNA copy number in clinical specimens.

Real-time allelic discrimination PCR assays - Although numerous studies have examined the validity and efficiency of EHV-1 real-time PCR assays as diagnostic and research tools, there remains an urgent need for an assay that would enable reliable and simultaneous detection of EHV-1 and at the same time, discriminate between neuropathogenic and non-neuropathogenic strains in clinical specimens\textsuperscript{11,14-16,22,26}. EHV-1 isolates with the A\textsubscript{2254}
genotype have been linked principally but not invariably with non-neuropathogenic infections, while viruses possessing the G2254 genotype are primarily but not invariably associated with neurologic disease characterized by a high clinical-attack rate and a high case-fatality rate. This single nt polymorphism in ORF30 led to the development of an allelic discrimination, real-time PCR (rPCR) assay to distinguish between potential neuropathogenic and non-neuropathogenic EHV-1 strains. The first allelic discrimination rPCR assay (E2) described by Allen (2007) had a distinct advantage over existing PCR assays in that it could simultaneously detect and genotype EHV-1 strains. However, subsequent evaluation of clinical samples using this allelic discrimination PCR assay in several diagnostic laboratories demonstrated that this assay lacks adequate sensitivity for routine diagnostic applications and may also generate false dual positive (A2254+G2254) results, seriously compromising its usefulness for A2254/G2254 genotype differentiation. Additionally, false negative results are produced in this assay by the presence of a single, additional nt substitution within ORF30, at position 2258. Recently, we have developed a new allelic discrimination EHV-1 rPCR assay (E1) and compared its sensitivity and specificity with the original assay (E2) described by Allen. The new assay has the following key features: 1). The new E1 assay has been validated with a large number of archived tissue culture fluid samples (TCF; n=76) and clinical samples (n=433); 2). The new assay was ten times more sensitive than the original E2 assay, with a lower detection limit of ten infectious virus particles; 3). The new assay was able to accurately discriminate between A2254 and G2254 genotypes, whereas E2 produced 20 false dual positive results with only one actual mixed A2254+G2254 genotype confirmed; and 4). The new assay offers greater sensitivity and accuracy for the detection and A/G2254 genotyping of EHV-1, making this improved real-time PCR assay a very valuable diagnostic tool for investigating outbreaks of EHV-1 infection.

Finally, the new assay could detect both A2254 and G2254 genotypes in the same clinical specimen, which confirms previous findings and raises many questions about the impact that at least two simultaneously replicating virus strains can have on viral pathogenesis, latency and reactivation. While the ability to identify multiple genotypes within clinical samples represents a significant step forward in our understanding of the dynamics of in vivo EHV-1 replication events, dual false positive results are very detrimental in any diagnostic situation.

Verification of the new E1 assay for use in an accredited veterinary diagnostic laboratory – Since any new assay that has been published in a peer-reviewed journal can be accommodated for routine diagnostic purposes, accredited laboratories should be required to evaluate performance of the assay to demonstrate the assay performs up to expectation. With this in mind, the new E1 assay was tested with 30 known EHV-1 positive and 30 known EHV-1 negative equine nasal swab samples that were submitted for routine diagnosis to the California Animal Health and Food Safety Laboratory, School of Veterinary Medicine, University of
California, Davis, CA. Only one sample per animal was considered in this evaluation. To cover the entire diagnostic range of the assay performance, samples were chosen to represent strong, moderate and weak positive cases. Specifically, 27% of the positive samples were considered strongly positive (n=8), 30% of the samples moderately positive (n=9) and 43% were considered to be weakly positive (n=13). A sample was considered a known positive if it tested positive by PCR using the E2 assay, which was considered the gold standard prior to the development of E1 assay. On the other hand, a sample was considered to be negative if it tested negative by the E1 assay. Mismatches between the two assays were repeated and followed up by PCR sequence analysis (n=8). All of the mismatches had tested weakly positive in the E2 assay but tested negative in the new E1 assay. In the case of four of the eight positive samples, a band was detected by agarose gel electrophoresis. Bands were subjected to sequence analysis and in all 4 cases, the visible product was the result of nonspecific binding of the primer sets giving rise to false positive results. No PCR product was detectable in the remaining four mismatches. The same sample set was evaluated using a modified extraction method involving an automatic extraction platform (Bio sprint, 96, Qiagen, Valencia, California; Reagents were purchased from Life Technologies, Grand Island, New York; using MagMax 96 Viral RNA isolation kit and MagMAX™-96 Al/ND Viral RNA Isolation Kit) to determine whether modification in conducting the assay affected the assay performance. Analytic sensitivity including testing samples spiked with both viruses. Repeatability studies were performed in addition to diagnostic sensitivity and specificity evaluations and these confirmed the assay was not affected by the changes. High efficiency and precision of the new assay over a dynamic range of five logs of either virus genotype (A2254 or G2254), in concert with the results of the field sample testing would indicate the new assay is highly reliable in a diagnostic setting.

Differences in Sensitivity of Real-Time PCR Assay and Virus Isolation and Interpretation of Results:

There is some confusion about interpretation of real-time PCR and VI results in the laboratory diagnosis of EHV-1 infection. The sensitivities of these two assays are significantly different and there is only one study that compared VI to quantitative real-time PCR (qPCR) using clinical specimens from experimentally inoculated horses. This study demonstrated that VI could only detect infectious virus up to 5 dpi, whereas qPCR could detect EHV-1 DNA up to 21 dpi in the same nasal swab samples. However, the number of viral DNA copy numbers that could be detected by qPCR decreased significantly from $10^5$-$10^7$ per ml (1-6 dpi) to $10^0$-$10^1$ per ml between 14-21 dpi. Furthermore, the number of positive horses that could be detected by these two assays varied significantly during the course of the infection. The number of horses positive by VI dropped from 87% (1-2 dpi) to 20% by 5 dpi and virus could not be detected after 6 dpi. In contrast, the qPCR could detect viral DNA in 87% of horses up to 12 dpi following which the percentage rapidly dropped to 53% by 14 dpi and 13% by 21 dpi. The
number of horses tested positive by qPCR dropped rapidly starting at 12 dpi. Taken together, these data clearly showed that the number of horses sampled during an outbreak and the type of diagnostic test performed can have a significant impact on confirming diagnosis of EHV-1 infection. Finally, the interpretation of real-time PCR and VI testing should be done with caution. The following points play an important role in interpretation of the respective laboratory test results:  1). Real-time PCR detects a very small number of viral DNA molecules in clinical specimens, whereas VI requires a higher level of viable virus particles (replication competent) to produce plaques in cell culture; 2). Real-time PCR detects both infectious virus and noninfectious viral DNA in clinical samples, and therefore has a very high sensitivity as compared to the traditional VI in cell culture; 3). A real-time PCR positive result does not mean there is infectious virus in a clinical sample, only VI can detect infectious virus; 4). Real-time PCR assay should be the first choice for rapid detection of EHV-1 nasal shedding during outbreaks and identifying horses and facilities that need to be placed under quarantine; 5). Additional to PCR testing, it is important to perform VI during outbreaks and archive the EHV-1 strain(s) for retrospective molecular characterization and molecular epidemiological studies.

Key Questions about Detecting A→G2254 Substitution (A/G2254 Genotype) in Clinical Specimens:

Some studies support an association between EHM and the G2254 genotype described by Nugent et al., (2006)¹⁷. However, there is an increasing body of compelling evidence to indicate that this nucleotide substitution is not the only determinant of enhanced neuropathogenicity²¹. In the survey of Perkins et al., (2009), 24% of isolates from horses with neurologic disease possessed the A₂₂₅₄ and not the G₂₂₅₄ genotype. This finding is supported by our own investigations comparing results from the real-time allelic discrimination assay with detailed case-histories provided by attending veterinarians²¹. We identified a number of A₂₂₅₄ genotype EHV-1 isolates from cases of neurologic disease, as well as the isolates of the G₂₂₅₄ genotype from numerous horses with no evidence of neurological involvement. In addition, we have identified viruses with non-synonymous nucleotide substitutions in ORF30 besides A→G₂₂₅₄, from horses without signs of neurologic disease; this presents the possibility that these may have an attenuating effect on the viral phenotype. Therefore, identifying and genotyping EHV-1 field strains using allelic discrimination real-time PCR raise several questions that need to be considered at this point but for which we do not yet have answers (Table 1).
### Table 1. Key questions and answers in relation to detecting $A \rightarrow G_{2254}$ substitution ($A/G_{2254}$ genotype) by allelic discrimination real-time PCR.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answer</th>
</tr>
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<tbody>
<tr>
<td>Does $A \rightarrow G_{2254}$ substitution always correlate with the development of EHM?</td>
<td>No. $A$ or $G_{2254}$ genotype identified by allelic discrimination real-time PCR may not always correlate with EHM.</td>
</tr>
<tr>
<td>Could horses shed both genotypes ($A+G_{2254}$)?</td>
<td>Yes. Both genotypes can be shed in nasal secretions. Similarly, both genotypes can be present in lymph nodes of latently infected horses.</td>
</tr>
<tr>
<td>Implementation of control and regulatory (quarantine) measures should based on the $A/G_{2254}$ genotype?</td>
<td>No. Regardless of the $A/G_{2254}$ genotype, appropriate prevention and control measures should be taken during EHV-1 outbreaks associated with neurologic signs, abortions or respiratory disease.</td>
</tr>
<tr>
<td>Should we continue to do $A/G_{2254}$ genotype testing?</td>
<td>Yes. Since we have not identified any other virulence determinants of EHV-1 neurovirulence, we should continue to monitor the association between $A/G_{2254}$ and EHM.</td>
</tr>
<tr>
<td>What real-time PCR assay should be used in routine diagnosis of EHV-1 infection?</td>
<td>Allelic discrimination rPCR targeting ORF30 can be used as a routine diagnostic assay, as well as genotyping assay compared to other real-time qPCR assays targeting gB, gD genes and LAT (used to identify the latent virus).</td>
</tr>
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</table>

As indicated earlier, VI and real-time PCR results will depend on the sample type (e.g. nasal/nasopharyngeal swabs and buffy coat cells) and time of collection of the clinical sample in the course of the infection. Sometimes, the VI and real-time PCR may not agree with each other. In such situations, the respective results should be evaluated carefully (Table 2). In addition to this, there are some caveats when using real-time PCR to confirm a clinical diagnosis of EHV-1 infection during disease outbreaks:

1. All real-time PCR assays need to be carefully developed and validated. Real-time qPCR assays need to include appropriate internal controls to normalize for DNA purification and PCR amplification efficiencies.
2. Results may vary between laboratories due to the use of various nucleic acid extraction methods, target gene and specific commercial
PCR reagents. This variation can be reduced by sending samples to the same diagnostic laboratory with proven expertise and experience in testing for EHV-1 infections. This is especially important when paired samples from the same animal (taken at two different time points) or from the same outbreak are submitted for laboratory testing.

3. Sensitivity and specificity of real-time PCR assays can be affected by a variety of factors such as sample type, sample volume, viral nucleic acid extraction method, target gene, primers and probes and their concentrations, commercial PCR reagent kits, number of cycles and cutoff point. Thus, harmonization of real-time PCR protocols between diagnostic laboratories is very important.

4. The cycle threshold (C_T) values can be used to indicate the approximate viral DNA concentration in samples. C_T <25 = high (acute stage of infection), C_T 25-30 = moderate, C_T 30-35 = low, C_T 35-40 = suspect.

5. The real-time qPCR should only be used for better characterization of the stage of the disease, assessment of risk of exposure to other horses, monitoring of response to treatment and in research studies.
Table 2. Suggested actions to be taken based on real-time PCR test results.

<table>
<thead>
<tr>
<th>Real-time PCR Assay</th>
<th>Virus Isolation</th>
<th>Type of Infection/Action</th>
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<tbody>
<tr>
<td>Nasal Swab</td>
<td>Blood Sample</td>
<td>Nasal Swabs</td>
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*Convalescent infection or establishment of latency - analysis of nasal swabs for 2-4 consecutive days by real-time PCR before lifting quarantine
**Follow AAEP guidelines

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CHEMOTHERAPEUTIC ELIMINATION OF TICK-BORNE APICOMPLEXAN
THEILERIA EQUI IN NATURALLY INFECTED HORSES

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USDA-ARS-Animal Disease Research Unit and Department of Veterinary
Microbiology and Pathology, Washington State University, Pullman,
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Equine piroplasmosis caused by hemoprotezoan parasites, Theileria
equi and Babesia caballi, is a tick-borne disease that affects equids [1].
Infection and disease is of economic importance due to the significant impact
on the international trade [1]. Once horses are infected with T. equi, they
remain carriers for life [2]. Persistently infected horses are therefore a
continuous source for transmission by tick-vectors [3,4]. While feeding on
infected horses, ticks ingest infected erythrocytes. Then the parasite sexual
reproduction occurs in the midgut resulting zygotes [5]. Zygotes invade tick
midgut epithelial cells and transform into kinetes. Kinetes are then released
into the tick hemolymph and invade salivary glands, where parasite transform
into sporozoites [6]. During the second feeding on naive horse, sporozoites
are inoculated into the host via tick saliva and infect lymphocytes. Following
replication of schizonts, the lymphocytes are lysed and merozoites invade
erthrocytes [7]. Asexual replication occurs within erythrocytes causing acute
infection characterized by a hemolytic disease of varying severity. Humoral
and cellular immune responses control acute infection and recovered horses
are persistently infected [8].

Theileria equi is an exotic pathogen for the United States. However, the
discovery of ticks within the US that are capable of transmission and recent
re-emergence have increased concerns that equine piroplasmosis could
become endemic in the US [9,10]. Current control strategies in the US
include permanent quarantine or euthanasia [9]. These methods are
expensive to owners and therefore an alternative control strategy for T. equi
is necessary. In this presentation, the ability of imidocarb dipropionate in
eliminating T. equi from naturally infected horses is discussed.

Natural infection of horses with T. equi was determined by competitive
ELISA and nested PCR targeting ema-1 [11,12]. These naturally infected
horses were treated with imidocarb dipropionate (Imizol®; Schering Plough
Animal Health) using a dose of 4.0 mg/kg at 72 hour intervals for a total of
four intramuscular injections [13]. Following the treatment, elimination of T.
equi was determined by nested PCR and cELISA at multiple time points, and
blood transfer from treated horses into naive splenectomized horses.

After treatment, the majority of horses were tested nested PCR negative
at multiple time points and blood transfer from these horses (nested PCR
negative) into naive splenectomized horses failed to transmit T. equi.
Although the findings are consistent with elimination of parasite, the
remarkable outcome of this study was the long-term persistence of specific
antibody against T. equi. We discuss these findings in the context of disease
control and eradication with an impact to the equine movement by removing equine babesial infection as a global animal restriction.

References
African horse sickness (AHS) is a non-contagious, infectious, insect-borne disease of equids caused by African horse sickness virus (AHSV). In horses, the course of the disease is usually peracute to acute and in fully susceptible animals more than 90 percent of those affected die. Clinically, the disease is characterized by pyrexia, oedema of the lungs, pleura and subcutaneous tissues and haemorrhages on the serosal surfaces of internal organs. Mules are less susceptible than horses and donkeys and zebras rarely show clinical signs of disease.

An Arabic document reports the first known historical reference to a disease resembling AHS occurring in Yemen in 1327. Father Monclaro’s report of the travels of Francisco Baro in East Africa in 1569 also reports AHS affecting horses imported from India. Although neither horses nor donkeys were indigenous to southern Africa, they were introduced shortly after the arrival of the first settlers of the Dutch East India Company in the Cape of Good Hope in 1652. Records of the Dutch East India Company make frequent reference to “perreziekte” or “pardeziekte” in the Cape of Good Hope. In 1719 nearly 1,700 horses died due to AHS in the Cape. During their exploration and expansion into the interior of southern Africa the Voortrekkers reported severe losses amongst their horses. Exploration of southern, central and east Africa by Livingstone was complicated by his inability to use horses on some of his journeys. Although horses die as a result of AHS every year in southern Africa, major epidemics prior to the 1950’s occurred at intervals of roughly 20-30 years. Severe losses were reported in 1780, 1801, 1839, 1855, 1862, 1891, 1914, 1918, 1923, 1940, 1946 and 1953. The 1854/55 epizootic was the most severe with almost 70,000 horses dying, representing more than 40% of the horse population of the Cape of Good Hope.

In the early 1900’s, researchers succeeded in transmitting the disease with a bacteria-free filtrate of blood from infected horses confirming that the disease was caused by a virus. The pioneering research of Sir Arnold Theiler, who founded the Veterinary Research Institute at Onderstepoort in 1908, revealed multiple “immunologically distinct strains” of AHSV since immunity acquired against one “strain” did not always afford protection against infection by “heterologous strains”. Whilst Theiler proposed that AHS may be transmitted by biting insects in 1903, it was not until 1944 that Du Toit confirmed that Culicoides species were probably vectors of both AHS and bluetongue viruses.

Mouse brain attenuated polyvalent vaccines against AHSV were first developed in the 1930’s. Since the 1970’s tissue culture attenuated modified live virus vaccine strains have been developed to provide polyvalent
protection against all serotypes of AHS in South Africa. Approximately 300,000 doses of polyvalent AHSV vaccine are sold annually by Onderstepoort Biological Products, Onderstepoort, South Africa. Monovalent modified live virus vaccines against AHSV serotype 9 are manufactured in a number of North African countries. In endemic areas, severe losses due to AHS have ceased since the development of these polyvalent vaccine. Epidemics of AHS have occurred in the Middle East, south-east Asia and Europe. Due to its high potential for trans-boundary spread AHS is a World Organisation of Animal Health (OIE) listed disease and there are specific chapters devoted to AHS in the OIE Code and OIE Manual. AHS is one of the important diseases to consider when moving equids internationally but movement can be accomplished safely following appropriate quarantine and testing procedures as described in the OIE’s Terrestrial Animal Health Code.

Nine distinct serotypes of AHSV have been described. All nine serotypes have been documented in eastern and southern Africa while serotype 9 is more widespread and appears to predominate in the northern parts of sub-Saharan Africa. Serotypes 3 and 6 were isolated in Ethiopia for the first time in 2003. Serotype 2 of AHS has recently been isolated for the first time in Nigeria, Ghana, The Gambia and Senegal. Multiple serotypes of AHS, including serotypes 2, 6, 7, 8 and 9 have also been identified in Ethiopia. These more recent findings may be an indication of changes to the traditional distribution ranges of the various strains of AHS which may be associated with climate change.

Research activities in South Africa over the last ten years have focused on the development of new generation vaccines and molecularly based diagnostics for AHS. These studies have shown that a canarypox vectored recombinant vaccine against AHSV serotype 4 is highly effective in protecting horses against challenge with virulent AHSV serotype 4. Further studies on canarypox vectored recombinant vaccines against other serotypes of AHSV are currently being developed. Real-time polymerase chain reaction assays (RT-qPCR) using Taqman probes have been developed which have a high diagnostic accuracy and are currently being validated. These assays are suitable for high throughput application and can be applied during outbreaks. More recently serotype specific RT-qPCR’s for all nine serotypes of AHSV have been developed which allows the serotype of the AHSV to be identified directly from clinical samples (whole blood or organ samples) within four hours of receipt of samples in the laboratory.

Whilst AHS is a disease which has been recognised for many years, the changes observed in the epidemiology of many arboviruses observed in many parts of the world including Europe and more recently in the USA, there is increased International awareness of AHS and many countries have become actively involved in developing contingency plans for AHS. It is anticipated that recent developments on new generation vaccines and diagnostics will be incorporated into control strategies for AHS.
Evaluating the Immunogenicity of a Novel Inactivated Vaccine Against Leptospirosis for Horses: Project Overview and Draft Budget

Noah Cohen¹, Suresh Pillai¹, Craig Carter², Erdal Erol²
¹Texas A&M University
²University of Kentucky

A. Rationale for an Equine Leptospirosis Vaccine

1. Leptospirosis is an important disease of horses – Infection with the bacterium *Leptospira* occurs worldwide, and infects humans, domestic animals, and wildlife. In horses, infection with *Leptospira* is most commonly associated with abortion and recurrent uveitis; however, disease of the kidneys, liver, and systemic illness may also occur. The disease is likely under-recognized. In areas such as central Kentucky where horse-breeding is intensive, the importance of equine leptospirosis is frequently identified. Over the last twenty years, 541 cases of leptospiral abortion from the Bluegrass region have been diagnosed by the University of Kentucky Veterinary (UKY) Diagnostic Laboratory. One unpublished study in Kentucky estimates the value of foals lost in the twenty year period at over $100M. A recent national serological survey indicates that horses throughout the continental United States and Ontario are commonly exposed to the bacterium. Finally, a recent graduate student in the UKY College of Public Health demonstrated that equine veterinarians and horse farm workers develop leptospiral antibodies related to their exposure to horses and newborn foals. These data are to be presented at the meeting of the American Public Health Association (APHA) in October, 2012.

2. A vaccine is needed – The fact that wildlife may serve as a maintenance reservoir for infection means that eradication of equine leptospirosis will be difficult because eliminating infections of wildlife, including amphibians and reptiles, will not be possible. Treatment of infection will not help prevent abortions and fetal losses. Thus, there is need for an effective vaccine. Vaccines against leptospirosis exist for other domestic animals including dogs, cattle and pigs. A challenge for vaccine development is the need to include multiple serovars of Leptospira. The proposed vaccine strategy will allow us to include serovars of particular importance to the horse, viz., Pomona var kennewicki and Grippotyphosa.

3. Mucosal vaccination as a new approach – Existing vaccines in other species use the parenteral route (primarily intramuscular or subcutaneous routes). Infection with *Leptospira* is thought to occur primarily through direct contact with infected fluids. Thus, infection is likely to occur primarily by the mucosal route. For mucosal infections, vaccination at mucosal surfaces is likely critical. Thus, we propose using a mucosal route of vaccination against *Leptospira* for horses. Evidence exists that inactivated vaccines administered by the mucosal route can provide protection in the respiratory tract and intestinal tract against respiratory and intestinal pathogens, respectively. Moreover, sublingual (oral) administration of inactivated influenza virus
protected mice against respiratory infection with live influenza virus. Thus, it is feasible that a sublingual, intranasal, or oral vaccination against *Leptospira* might protect horses against developing disease.

4. Inactivated candidate vaccine – Investigators at Texas A&M University have developed a proprietary method for inactivating bacteria. Preliminary data show that inactivated *Rhodococcus equi* given orally are capable of inducing both cell-mediated and humoral mucosal immune responses against this bacterium. A critical advantage of our approach is that the bacteria are whole and recognized by the immune system similar to live bacteria; however, they are incapable of replicating and causing disease. We propose to administer *Leptospira* that have been inactivated by this proprietary method via oral and intranasal routes to evaluate whether immune serological and nasal mucosal immune responses can be induced. If immune responses can be generated, further studies of the vaccine can be investigated for effectiveness. The inactivated bacteria will be administered with a mucosal adjuvant to enhance immune responses.

**B. Preliminary Data**

Proprietary restrictions preclude us from providing full representation of our technology and preliminary data. We have demonstrated using dose-titration experiments demonstrating that inactivation renders *R. equi*, *Salmonella*, and *Streptococcus equi* subspecies *equi* unable to grow on enriched media; the surface structure of these bacteria remain intact (Figure 1) and, when refrigerated, remain intact for at least 14 days. For *R. equi*, we have documented that the surface-expressed protein vapA necessary for virulence remains detectable by flow cytometry on inactivated *R. equi*. A critical aspect of our approach is that the bacteria are whole and recognized by the immune system similar to live bacteria; however, they are incapable of replicating within the host and causing disease.

Moreover, we have demonstrated that inactivated *R. equi* administered orally can elicit cell-mediated immune responses (↑ interferon-gamma expression by CD4+ T cells), and anti-*R. equi* IgA in the upper respiratory tract of foals that is not detectable in control foals.

**Figure 1.** Scanning transmission electron microscopic images of *R. equi* that were live and at exponential growth at the time of processing (a) or inactivated using our proprietary method (b); Note that the cell surface is not
disrupted following treatment, but that the nucleoid (center of cell) of the treated bacterium has changed, presumably reflecting damage to DNA that prevents replication. Similar results were seen with other bacteria.

C. Approach

We will use the following approach:

1. **Optimize the protocol for inactivating Leptospira**: We will need to optimize the dose for inactivating the bacteria and ensure that the bacteria are inactivated, using standard approaches such as growth curves. We also will need to verify membrane integrity using electron microscopy and membrane permeability assays.

2. **Vaccine route and dose** – We will evaluate 2 doses of inactivated Leptospira administered either orally or intranasally in horses to evaluate whether the vaccine is immunogenic by either route.

3. **Immunogenicity** – We will evaluate serologic responses to Leptospira, using both standard MAT titer testing as well as IgG-subisotype-specific testing for antibodies against a whole bacterial lysate. We will evaluate mucosal immunity by testing for Leptospira-specific IgA from nasal swabs and possibly vaginal/uterine swabs as well.

D. Budget

1. Horse Use: 40 horse x $150/horse = $6,000
   (four groups: high dose, low dose, negative control, bovine vaccine)

2. Vaccine Preparation: $12,000
   Includes dose titration, membrane integrity testing, etc.

3. Immunological Testing* (need to adjust if we do fourth group [40 horses])
   a. Serological testing: MAT –
      three times per horse x 40 horses = $1,800
   b. Nasal washes and swabs collection (supplies, sedation, etc.):
      three times per horse x 30 horses x $25/horse = $2,250
   c. Uterine washes and swabs collection
      two times per horse x 30 horses x $25/horse = $2,250
   d. ELISA development and assays (may not be needed if MAT testing suffices)
      i. Development: $5,000
         ii. Assays of nasal swabs and washes for IgA:
            30 horses x 3 time-points x $30/horse = $2,700
         iii. Assays of uterine washes and swabs for IgA $2,700
         iv. Serum IgGa and IgGb:
            30 horses x 3 time-points x $30/horse = $2,700
   e. Cell-mediated immune responses (Included for Plan “A”; Excluded for Plan “B”):
      i. Intracellular interferon gamma staining of peripheral blood
         CD4+ T cells stimulated with Leptospira lysate
         30 horses x 3 time-points x $100/horse = $9,000
f. Post-doctoral support: Dr. Angela Bordin will design assays and perform analyses
   Salary is $60,000/yr + $18,000 benefits = $78,000@50% = $39,000

  g. Student workers to help with lab work, horse work, etc.:
     Two students @ $10/hr x 10 hr/wk x 40 weeks = $4,000

  h. CO2 incubator $12,500

Total Plan “A” (includes cell mediated response metrics) $92,900
Total Plan “B” (excludes cell mediated response metrics) $101,900
REPORT OF THE COMMITTEE ON INTERNATIONAL STANDARDS

Chair: Donald Hoenig, ME
Vice Chair: Richard Willer, HI

Joan Arnoldi, WI; Debbie Barr, CAN; Corrie Brown, GA; Stan Bruntz, CO; Jeein Chung, MN; John Clifford, DC; Karen Conyngham, TX; Michael David, MD; Ron DeHaven, IL; Linda Detwiler, NJ; Brian Evans, CAN; John Fischer, GA; Mallory Gaines, DC; Cyril Gay, MD; Paul Gibbs, FL; Gail Golab, IL; David Harlan, MN; Annette Jones, CA; Karen Jordan, NC; Bruce King, UT; Paul Kitching, BC; Elizabeth Lautner, IA; Randall Levings, MD; Linda Logan, TX; John MacMillian, AR; Kevin Maher, IA; Bret Marsh, IN; Todd McAlloon, MN; Shirley McKenzie, NC; Elizabeth Parker, ITA; James Roth, IA; Mo Salman, CO; A. David Scarfe, IL; Kathryn Simmons, DC; Jonathan Sleeman, WI; Manoel Tamassia, NJ; Susan Tellez, TX; Peter Timoney, KY; Alfonso Torres, NY; Arnaldo Vaquer, VA; Jesse Vollmer, ND; Steve Weber, CO; John Williams, MD; Norman Willis, CAN George Winegar, MI; Nora Wineland, MO.

The Committee met on October 22, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 1:00-5:45 p.m. There were 13 members and 15 guests present. The committee meeting was called to order by Chair Don Hoenig. Vice Chair Rick Willer was unable to attend the meeting.

Time-Specific Paper

Dr. Shane Renwick, Canadian Food Inspection Agency, Ottawa, Canada presented a time-specific paper on Applying Foresight to Animal Health Emergency Management in Canada. Renwick’s paper reviewed the Foresight for Canadian Animal Health (Fore-CAN) project. This project was a participative, systematic approach to creating a long term vision to inform the short term decision-making process. Foresight is not prediction but identifies plausible links between current trends and potential long term outcomes. The paper is included at the end of this report.

Presentations and Reports

USDA Report of the OIE’s 80th General Session
John Clifford and Michael David
USDA-APHIS, Veterinary Services (VS)

Clifford indicated that the US will reapply to World Animal Health Organization (OIE) for “negligible risk” status on BSE in the coming year. This request was denied in 2012 and he noted that the issue of atypical BSE cases needs to be addressed. He also said that the US has raised the issue of transparency within the OIE’s deliberations on matters such as applications for BSE status change.

David subsequently reported on the specifics of the 80th General Session. The OIE this year has 178 member countries and there were over 500 in attendance when the organization met in Paris in May 2012. The
technical item on the agenda this year was countries’ experience with One Health/One World.

Currently the OIE grants country recognition for BSE, FMD and contagious bovine pleuropneumonia (CBP). The Scientific Commission approved adding African swine fever (ASF) to that list and are considering also adding classical swine fever (CSF), Newcastle Disease and Pesti des Peti Ruminants to the list for which status is granted.

Austria, Belgium, Brazil and Colombia were moved from “controlled” to “negligible risk” status. Croatia and Nicaragua were moved from “undetermined” to “controlled risk”.

David also commented on the issue of transparency within the OIE with the US advocating for more clarity from OIE on internal deliberations.

The Code Commission has been working on renaming most chapters (for example renaming equine viral arteritis “infection with equine viral arteritis”. They are also considering adding wildlife and have proposed 30 chapters for adoption. Criteria are being revised for listing diseases and some diseases will be dropped off including vesicular stomatitis and swine vesicular disease. This proposal will take place at the next OIE meeting in Paris in May 2013 and will be effective on January 1, 2014.

David reminded the committee that chapters will soon be sent to the USAHA for comment by members. There is usually a short turnaround for comment and USAHA should be receiving these chapters from David later in November with a 30 day deadline.

The Laboratory Commission has been reviewing the manual at the rate of 15-20 chapters per year. The Regional Commission of the Americas, for which Clifford is the chair, will be meeting in Barbados this November.

Animal Welfare continues to be discussed by OIE with chapters on transportation and slaughter already in place and a chapter on livestock production systems and beef animals (not veal) adopted at the 2012 meeting. The next topics to be considered are: broiler production, 2013; dairy, 2014; and swine possibly sometime in 2015-2016. The US has advocated for these chapters to be outcome-based rather than prescriptive. The issues of the definition of pain in aquatic animals have been another matter for discussion.

The OIE will be holding its third global conference on animal welfare in Malaysia in November and this conference will evaluate the implementation of the slaughter and transport standards. The International Standards Organization has an agreement with OIE and is looking at developing standards for animal welfare.

**Update on the OIE Biological Standards (Laboratory) Commission**

Bev Schmitt
National Veterinary Services Laboratory (NVSL), USDA-APHIS-VS

Dr. Schmitt reported that the focus on the Biological Standards Commission this year has been on new chapters in the Manual. She also related on activities of the Ad Hoc groups including the Biosafety and
INTERNATIONAL STANDARDS

Biocontainment Standards for Veterinary Reference Laboratories group which has been working on refocusing standards on bio-risk rather than on biosafety levels. The Vaccine Group has discussed the issue of the use of dogs in evaluating vaccine efficacy.

There are currently 236 laboratories covering 112 diseases and 41 collaborative centers covering 38 topics. She also reported that there is a new on-line template for reference laboratories and gave an update on the OIE twinning project.

Update on the FAO’s Activities in the Field of Public Health and Rabies
Katinka de Balogh
FAO, Rome, Italy

In a first for the Committee and for the USAHA, Dr. de Balogh gave her presentation via Skype and surprisingly, the technology was relatively flawless. She was able to join us “virtually” from Brussels, Belgium and gave an extremely informative talk on the FAO’s approach to One Health and the status of rabies prevention and control at a global level. She related that among the FAO’s mandates are building a world without hunger; raising levels of nutrition and standards of living; improving agricultural productivity; and bettering the conditions of rural populations. FAO’s approach with respect to zoonotic diseases encompasses neglected/endemic zoonoses; emerging zoonoses; and food-borne diseases. Local communities are the key for disease reporting, prevention and control.

With respect to global rabies prevention and control, de Balogh stated that it is unacceptable to allow people to die of a preventable disease because it “falls between the cracks”. Rabies occurs worldwide in 150 countries and territories with 95% of human deaths occurring in Africa and Asia, mostly in rural areas. Most human rabies cases are caused by dog bites, tragically in children under 15 years of age. Problems with control are more organizational and less technical in nature. World Rabies Day, which started in 2010, has been a resounding success. The new Rabies Blueprint can be found at www.rabiesblueprint.com

CAFTA-DR: Animal Health and Trade Opportunities in Central America and the Caribbean
Arnaldo Vaquer
Vaquer, Inc.

Dr. Vaquer gave the committee an update on the initiative he’s been working on for several years to enhance trade opportunities in the Caribbean with the International Regional Organization for animal and Plant Health (OIRSA). The products that the OIRSA countries wish to import to the US include: poultry meat, pork, beef, bovine semen and bovine embryos. Vaquer’s work involves helping these countries meet international standards to allow them to export these products to the US.
Harmonization with International Standards: Benefits and Challenges: The New Zealand Context  
Matthew Stone  
Animal and Animal Products, New Zealand Ministry for Primary Industries  

Dr. Stone is New Zealand’s representative to the OIE and he spoke to the committee about New Zealand’s SPS market access policy and approaches to implementation as well as harmonization strategies. Primary industries (agriculture) contribute 12.1% to New Zealand’s GDP, account for 11.8% of employment and are 56% of the country’s export markets. Total dairy exports are valued at NZ$13.9 billion with the chief export markets being China. Meat exports are valued at NZ$ 7.9 billion with lamb exports to the EU dominating. The Ministry for Primary Industries’ 2030 strategy sets the vision for growing and protecting New Zealand. Two primary objectives are protection for biological risk and maximizing export opportunities. The top priority on the agrifood agenda is maintaining a world-class biosecurity system. Specific SPS challenges for animal health include: poultry imports (IBD freedom); pork imports (PRRS freedom); and honey imports (European foul brood freedom).

Another high agribusiness priority listed at number seven is completing high quality trade agreements by working in an open, credible, principled and WTO consistent fashion.

Stone also spoke of the strong relationship between New Zealand, Canada, Australia and the US and mentioned the Animal Health Quadrilateral meeting in Victoria, British Columbia in April 2012 during which a strategic framework for 2012-2015 was discussed.

Stone finished by relating the strong emphasis on opening further doors to trade with India and China and harmonization “work-ons” for achieving this.

Update on the New FMD Vaccine and Implications for this Hemisphere  
Luis Rodriguez  
USDA, ARS, Plum Island, New York  

Dr. Rodriguez joined the committee once again to discuss the recently approved novel foot-and-mouth disease (FMD) vaccine. FMD vaccines are one of the largest money-makers for the pharmaceuticals industry world-wide with 4-5 billion doses administered per year. He reviewed the process that has traditionally been employed for manufacturing FMD vaccine which involves the production and purification of large amounts of concentrated frozen FMD antigen. There have always been concerns with the current technique including safety, efficacy and the fact that the vaccine only protects against clinical signs and not infection. Thus, vaccinated animals can be carriers of viable virus. The defective human adenovirus 5 has been used to produce the first molecular vaccine licensed in the world for use in animals. A major advantage of this vaccine is that it can be produced without FMD virus which eliminates the safety concerns of conventional FMD vaccine.
production. One disadvantage is the high dose that needs to be administered.

Rodriguez doesn't think that the new vaccine will be that useful in current hemispheric eradication programs unless it is used in the terminal stages of an eradication program. Its primary use will most likely be for emergency use in the face of an outbreak.

An interesting discussion ensued on the future of FMD eradication and OIE’s approach to molecular vaccines.

Committee Business

There were no resolutions offered for discussion and the Committee meeting was adjourned.
PREPARING FOR EMERGING CHALLENGES TO ANIMAL HEALTH IN CANADA

Shane Renwick
Canadian Food Inspection Agency (CFIA)


A national foresight initiative has produced new tools to help the animal health community in Canada better prepare for future animal disease threats. Canada is currently free of major transmissible animal diseases that fall under the mandate of the Canadian Food Inspection Agency, including foot-and-mouth disease (FMD) and serious strains of avian influenza. However, there is a critical need for all stakeholders in the animal health community to remain vigilant since such disease outbreaks can cause debilitating sickness in livestock, halt trade in animals and animal products, and threaten the food supply, public health and the livelihoods of farmers. We need look back only a few years to remind us why we must remain on guard. For example, the outbreak of FMD in Britain in 2001 caused more than $16 billion (CDN) in damage, with millions of animals slaughtered to prevent the virus from spreading; disruption of the food supply, trade and tourism; and severe psychological trauma and loss of livelihood to thousands of people. The outbreak of bovine spongiform encephalopathy (BSE) in Canada in 2003 has cost the Canadian economy at least $5 billion (CDN). Impacts are still being felt throughout the animal industry nearly ten years later. The 2004 outbreak of highly pathogenic avian influenza in the province of British Columbia, originating from wild birds, caused $300 million (CDN) in damage to the poultry industry before it was finally eradicated, fortunately without serious human illness or loss of life.

Complacency is Not an Option

Animal diseases do not respect international borders and may appear without warning. Canada cannot be complacent. In today’s highly interconnected world, disease-causing agents could enter Canada in a number of ways. Outbreaks might result from natural incursions such as through wildlife or insect movement, or they could occur inadvertently if the virus is carried on contaminated imported products or on international travelers. Faced with these challenges, the Canadian Food Inspection Agency (CFIA) took the lead in 2008 in developing Foresight for Canadian Animal Health (Fore-CAN), an innovative, three-year (2008-2011) multi-partner initiative that applied foresight methods to support new ways of thinking about the animal health emergency management (AHEM) system. Fore-CAN was launched in response to concerns from the animal health and welfare community that failure to anticipate and prepare for future challenges
arising from new, existing or as yet unknown disease threats to healthy animal populations could lead to catastrophic consequences for the health of Canadians and Canada’s economy.

Fore-CAN was funded by the Centre for Security Science, National Defense Canada and in-kind contributions of partner organizations, including Agriculture and Agri-Food Canada; Alberta Agriculture and Rural Development; Dairy Farmers of Canada; Health Canada; Ontario Ministry of Agriculture, Food and Rural Affairs; Public Health Agency of Canada, and Canada’s five veterinary colleges. In all there were over 300 participants from the diverse animal health community, including governments, farmers, producers, food processors, aboriginal representatives, wildlife disease experts, veterinarians, scientists, and consumers and governmental and nongovernmental organizations in Canada and abroad. Fore-CAN’s three objectives were aimed at involving the animal health community in:

i) Learning about and using foresight methods to gain insights into future threats and opportunities;

ii) Applying the resulting insights to guide planning and investments in AHEM capabilities; and,

iii) Sharing and transferring knowledge gained in order to enhance the AHEM system in Canada.

In a series of foresight activities, participants explored the following focal question: How can Canada build a more effective and robust animal health emergency system for 2025 and beyond? Participants followed a stepwise process (Figure 1) that included six foresight activities designed to encourage new ways of thinking and to build trust and understanding:

Figure 1. Foresight for Canadian Animal Health (Fore-CAN) activities and timeline
**Shared Vision, Shared Responsibility**

The convergence of perspectives that emerged from these activities enabled the participants to develop a shared vision for the AHEM system of the future, titled "Healthy Animals, Healthy Future 2025" (Figure 2).

**Figure 2. Shared vision: Healthy Animals, Healthy Future 2025**

![Diagram of shared vision](image)

The shared vision reflects participants’ acceptance of, and appreciation for, shared responsibility for the AHEM system. The vision also recognizes the inextricable interconnections among the economy, the environment, public health and animal health.

**Tools for Turning Insight into Action**

Fore-CAN partners developed the following tools to support future thinking and achieve the shared vision.

1. Plausible future scenarios (Figure 3) were developed to challenge participants’ assumptions, explore issues and broaden shared understanding of a range of future operating environments for AHEM in Canada. The scenario development process considered all of the uncertainties and risks associated with the trends and drivers that had been identified in the scanning exercise, with particular emphasis on what participants considered to be the two critical uncertainties: societal values and the nature of infectious diseases. The scenarios developed describe four distinctly different and plausible operating environments for AHEM in 2025. Based on the characteristics they displayed, the scenarios were called “Asleep at the Wheel,” “One World, One Health,” “Safe Food Inc.” and “In My Backyard.” Each scenario stimulates further thinking about the potential risks, threats, challenges and opportunities – and how the trends and drivers may have an impact on the AHEM system.
2. Fore-CAN Integrated Animal Health Risk Management Framework (Figure 4) comprises four health dimensions in the shared vision (animal health, public health, economic health and eco-system health); five risk management action areas (anticipate; prevent; prepare; respond; and recover and renew); and five key capability areas (Organization and Decision-making; Science and Technology; Expertise and Personnel; Policy, Law and Regulation; and Information and Data-sharing). These dimensions and areas will need to be developed to create a more integrated, agile and adaptive AHEM system that is complementary to the “One Health” concept.
3. Fore-CAN Integrated Animal Health Emergency Management Roadmap (not shown) identifies key outcomes in the short, medium and long terms, as well as candidate initiatives that could be aligned for building the requirements of each capability area.

4. Fore-CAN Capability Assessment Tool provides a simple, systematic process to help diverse participants make an assessment of:
   i) the drivers and impacts of issues across the four health dimensions;
   ii) where the risk management system may be vulnerable, and where gaps may exist; and
   iii) why the system may be vulnerable as explained by strengths and weaknesses in key capability areas.

Using the tools in a stepwise fashion is helping diverse groups of participants from science, policy and other backgrounds understand, for example, the complex forces driving the emergence of an infectious disease such as avian influenza, and how the various dimensions of health could sustain direct or indirect consequences and to what degree. If system vulnerabilities and gaps are identified, strategies and activities across organizations can then be aligned to address them, thereby strengthening the risk management system and achieving desired outcomes. The assessment tool can assist in planning research strategies and action plans by situating research within a broader system of capabilities that need to be
INTERNATIONAL STANDARDS

developed to support outcomes. For example, other system-level capabilities such as policy development, regulations, education and training and information and communication activities may require investment in order to optimize the overall risk management system.

Managing Future Animal Challenges

During Fore-CAN, partners and participants gained an understanding of the ability of foresight activities to build relationships and trust among diverse stakeholders, to help develop shared understanding of complex issues and different points of view, and to aid in illustrating connections among processes, functions and organizations within a multifaceted system. Insights were also gained about future threats and challenges to animal health and their interconnectedness, uncertainty and volatility. The importance of ongoing partnerships and the need for a holistic approach to animal health risk management were other learnings that arose from Fore-CAN. The systematic and collaborative foresight activities of the Fore-CAN initiative harvested the wisdom and experience of participants from over 40 organizations. According to participants, the key achievements of the Fore-CAN initiative included:

- Recognized value of foresight
  - Foresight proved to be a powerful catalyst for awareness raising, change, action and innovation. Participants have an understanding of foresight methods and how they can be used to anticipate future requirements.

- An invigorated animal health community.
  - The community was integrated into the foresight process, learning new skills and building new relationships and partnerships. A network of stakeholders with a shared vision, commitment to collaboration and mutual trust has been developed.

  - A shared vision has been established along with an integrated framework for action and tools to assist decision-makers in planning and investing in capabilities to achieve desired outcomes within the animal health system.

Partner organizations in Canada have already applied the products of Fore-CAN to think critically and innovatively about animal disease surveillance, emerging zoonotic disease risk assessment, anticipation and intelligence activities, new skill sets to integrate activities across health dimensions, and the role of inter-disciplinary research teams to define problems and develop solutions.

The insights and tools developed through Fore-CAN have the potential to be adapted and used by participants challenge with working together in any complex system in order to better assess and understand issues and thereby move toward achieving common outcomes.
References
1. CBRN Research and Technology Initiative (CRTI) Website: http://www.css.drdc-rddc.gc.ca/crti/index-eng.asp
REPORT OF THE COMMITTEE ON JOHNE’S DISEASE

Chair: Elisabeth Patton, WI
Vice Chair: Randy Wheeler, IA

John Adams, VA; Bruce Addison, MO; Paul Anderson, MN; Marilyn Balmer, MD; Richard Breitmeyer, CA; Charles Brown, IL, WI; Todd Byrem, MI; James Carroll, MO; Michael Collins, WI; Thomas Conner, OH; Stephen Crawford, NH; Ria de Grassi, CA; Anita Edmondson, CA; Robert Ehlenfeldt, WI; William Fales, MO; Kathy Finnerty, NY; Keith Forbes, NV; Mallory Gaines, DC; Robert Gerlach, AK; William Hare, MI; William Hartmann, MN; Linda Hickam, MO; Donald Hoenig, ME; Ernest Hovingh, PA; David Hunter, MT; Carla Huston, MS; Annette Jones, CA; Jamie Jonker, VA; Karen Jordan, NC; Susan Keller, ND; John Lawrence, ME; Donald Lein, NY; Tsang Long Lin, IN; Mary Lis, CT; Laurent O’Gene Lollis, FL; Beth Mamer, ID; Chuck Massengill, MO; Chris Murdock, MO; Jeffrey Nelson, IA; Dustin Oedekoven, SD; Kenneth Olson, IL; Lanny Pace, MS; Elizabeth Parker, ITA; Boyd Parr, SC; Janet Payeur, IA; Kris Petrini, MN; Jewell Plumley, WV; Suelee Robbe-Austerman, IA; Paul Rodgers, WV; Allen Roussel, Jr., TX; Patricia Scharko, SC; Andy Schwartz, TX; William Shulaw, OH; Kathryn Simmons, DC; Marilyn Simunich, ID; Shri Singh, KY; Judy Stabel, IA; Scott Stuart, CO; Robert Temple, OH; Charles Thoen, IA; Brad Thurston, IN; Jesse Vollmer, ND; James Watson, MS; Gary Weber, MD; Scott Wells, MN; Diana Whipple, IA; Robert Whitlock, PA; George Winegar, MI; Ching Ching Wu, IN.

The Committee met on October 21, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 12:30-6:00 p.m. There were 24 members and 22 guests present. Self- introductions were made by all in attendance.

Status of 2011 Resolutions and Recommendations

RESOLUTION NUMBER: 12 APPROVED
SOURCE: COMMITTEE ON JOHNE’S DISEASE
SUBJECT MATTER: NATIONAL VETERINARY SERVICES LABORATORY CERTIFICATION FOR DAIRY HERD IMPROVEMENT LABORATORIES
BACKGROUND INFORMATION:

Evaluation of United States Department of Agriculture (USDA)-approved milk enzyme linked immunosorbent assay (ELISA) has shown that milk ELISA is comparable in accuracy to currently available serum ELISA kits. Previous resolutions from the Committee on Johne’s Disease to include milk ELISA testing of Dairy Herd Improvement (DHI) samples as official screening tests for the Voluntary Bovine Johne’s Disease Control Program (VBJDCP) have been approved by the United States Animal Health Association (USAHA). The national Dairy Herd Improvement Association (DHIA), through efforts of Quality Certification Services (QCS), has developed and implemented a laboratory milk ELISA proficiency program that meets the standards of proficiency for DHI laboratories and exceeds the standards of
proficiency required by the milk ELISA proficiency program administered by the USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Veterinary Services Laboratory (NVSL). The availability of two milk ELISA proficiency programs increases the costs of participation and testing for DHI laboratories. In an effort to reduce costs to DHI testing laboratories and to increase testing infrastructure for milk ELISA testing, a consolidation of the two proficiency systems is recommended that would meet the requirements of each of the individual proficiency programs.

RESOLUTION:

The United States Animal Health Association, recognizing the Voluntary Bovine Johne’s Disease Control Program is a voluntary program, requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Veterinary Services Laboratory (NVSL) implement the protocol for Dairy Herd Improvement laboratory certification through the USDA-APHIS-VS-NVSL Johne’s milk enzyme linked immunosorbent assay (ELISA) proficiency test program using the Quality Certification Services ELISA Proficiency Program test data.

FINAL RESPONSE:

The US Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS) supports this resolution. The National Veterinary Services Laboratories (NVSL) is collaborating with Quality Certification Services (QCS) for certification of Dairy Herd Improvement (DHI) and non-DHI laboratories.

As part of this collaboration, NVSL receives annually a panel of well-characterized milk samples from sources routinely used in the QCS monthly test panel. NVSL evaluates these milk samples for suitability; then, if needed, requests additional amounts of the specific milk samples to be used in the proficiency test panel. Sufficient volume of the specific milk samples is supplied for kit assembly to ensure the kit composition meets the description within the Uniform Program Standards for the Voluntary Bovine Johne’s Disease Control Program – 2010.

NVSL distributes the proficiency test kits to all participating laboratories. In 2012, NVSL distributed the milk ELISA proficiency kits in early February. The DHI laboratories receiving these kits conduct all required milk testing (enzyme-linked immunosorbent assay (ELISA) and milk quality testing) using these kits, but no fee is administered to the DHI laboratories for the NVSL supplying the proficiency test kits.

All laboratories (DHI and non-DHI) report their proficiency test results through the QCS online reporting program. At the end of the reporting deadline (February 29 for 2012), NVSL downloads all results from the QCS online reporting program, evaluates the submitted results, and administers certification notices to laboratories that successfully complete the Johné’s Milk ELISA Proficiency Test. NVSL distributed certificates and results in March 2012 for laboratories successfully completing the proficiency test.
The Role of Animal and Plant Health Inspection Service in the Future of Johne’s Disease Control
Michael Carter
USDA-APHIS Veterinary Service (VS)

The President’s fiscal year 2013 budget proposal recommended numerous cuts to Animal and Plant Health Inspection Service (APHIS) budget line items and the Johne’s line item (as part of the Cattle Health line item) was no exception. One recommendation was for the elimination of Johne’s program activities. Under the Cattle Health line item Johne’s is no longer a specified activity, and so APHIS would like to identify what will continue as part of Veterinary Services’ function.

The National Veterinary Services Laboratories (NVSL) will continue to manage the proficiency tests for milk and serum ELISA, fecal culture and fecal PCR. The cost of proficiency testing will be covered by User Fees. NVSL will also continue to maintain the lists of approved laboratories for various Johne’s disease tests. The Center for Veterinary Biologics will continue its evaluation, approval, licensure and monitoring of diagnostic test kits for Johne’s disease since APHIS will need to continue this activity regardless of where the funding comes from.

To a lesser extent, APHIS will provide minimal coordination activities limiting itself to hosting but not organizing the periodic conference calls for the USAHA Committee on Johne’s Disease and the designated Johne’s coordinators. APHIS will also continue to participate in the USAHA Committee on Johne’s Disease and the National Johne’s Working Group. APHIS will act as a reference point for international import and export negotiations and provide Veterinary Accreditation with guidance as necessary.

Since Johne’s is a cattle health disease, minimal field activities can continue such as being involved with State education activities but APHIS will not be the driver of State Johne’s programs and will not act in the designated coordinator roles. APHIS will continue to enforce 9 CFR part 80, banning the interstate movement of Johne’s disease positive animals unless requirements are met for moving directly to slaughter. APHIS will also stay involved with the Mycobacterial Disease of Animals Multistate Initiative both as a Johne’s disease and a tuberculosis disease stakeholder to the project.

National Johne’s Working Group (NJWG) Treasurer’s Report
Ken Olson

Review of NJWG income and expenses from the previous year. Presently, the NJWG had approximately $13,000 in available funds.
National Milk Producers Federation (NMPF) Report
Jamie Jonker
NMPF

The National Milk Producers Federation (NMPF), based in Arlington, VA, develops and carries out policies that advance the well-being of dairy producers and the cooperatives they own. The members of NMPF’s 30 cooperatives produce the majority of the US milk supply, making NMPF the voice of more than 32,000 dairy producers on Capitol Hill and with government agencies.

NMPF has standing policy about animal diseases that continue to reduce profitability for dairy producers and which may impede exports and international market development. Diseases such as tuberculosis, brucellosis, and Johne’s Disease and others can significantly increase costs to dairy producers in terms of decreased milk production, loss of animals, and replacement of animals. NMPF supports adopting Federal programs and securing adequate funding to prevent and/or eradicate animal diseases.

NMPF administers the National Dairy FARM Program: Farmers Assuring Responsible Management™ which is a nationwide verifiable program addressing dairy animal care and well-being. The FARM Animal Care Program provides consistency and uniformity to best practices in animal care and quality assurance in the dairy industry. An important part of the FARM Animal Care Program is developing and implementing a Herd Health Plan which includes requirements for disease prevention and treatment. A Johne’s Disease control program could be an integral part of a Herd Health Plan.

NCBA Report
Mallory Gaines
National Cattlemen’s Beef Association (NCBA)

Johne’s Disease is a chronic infectious disease of cattle and other ruminants caused by the organism Mycobacterium avium subsp. paratuberculosis. The National Cattlemen’s Beef Association (NCBA) currently holds a policy position on Johne’s Disease program quality that urges USDA-APHIS Veterinary Services (VS) to continue efforts to certify laboratories to conduct serology and fecal culture analysis tests for Johne’s Disease in cattle and further resolves to urge the Secretary of Agriculture to continue to place Johne’s Disease as a priority for intramural and extramural research funding. Additionally, the policy resolves to continue to maintain Congressional awareness and support to adequately fund Johne’s Disease control and research programs.

NCBA views Johne’s Disease in beef cattle as a herd biosecurity issue. Biosecurity includes the sum of all actions to keep disease out of the cattle herd. The Beef Quality Assurance Program (BQA) provides best management practices for Johne’s Disease control in beef cattle herds. The federal Johne’s Disease program ended on September 30, 2012. Johne’s Disease program regulations became guidance documents. NCBA’s efforts to ensure the future sustainability of Johne’s Disease control involve:
The beef industry is committed to taking steps to prevent Johne’s Disease from entering low risk herds and controlling the disease in already infected herds as part of our pledge to total quality management to ensure that consumers receive wholesome and safe beef products.

**Update on Research/Resources/Producer Tools**

Ken Olson  
Johne’s Disease Integrated Program (JDIP)

The presentations that follow provide an overview of several ongoing efforts and new tools that have been developed, so were not discussed here. One good source of new information is from the presentations at this year’s International Colloquium on Paratuberculosis (ICP). The meeting brought together over 300 participants from around the world to share results from their work and discuss program activities in their countries. The proceedings are available on the International Association for Paratuberculosis (IAP) site (http://www.paratuberculosis.info/web/index.php) that also includes information on the next ICP that will be held June 22–26, 2014 in Parma, Italy. Recent ICP proceedings are also available on the Searchable Proceedings of Animal Conferences (S-PAC) (http://spac.adsa.org/).

**JDIP JD-RAP**

Ernest Hovingh  
University of Pennsylvania

Dr. Hovingh provided an update on the JDIP Johne’s Disease Risk Assessment Practicum (JD-RAP).

**JDIP Diagnostics Update**

Scott Wells  
University of Minnesota

Comparing diagnostic tests for Johne’s disease has always been challenging. JDIP is working to address the challenges that exist on two fronts. The initial effort focused on developing a modified version of the Standards for Reporting of Diagnostic Accuracy (STARD) that is relevant to paratuberculosis (Johne’s disease) in ruminants. The new guidelines, called STRADAS-para TB, (Standards for Reporting of Animal Diagnostic Accuracy Studies for paratuberculosis) were published in the August issue of the journal Preventive Veterinary Medicine (volume 101:18-34).

The second portion of the project is now underway under the direction of Ray Sweeney (U of Penn) and Murray Hines (U of GA, Tifton Diagnostic Lab) and will include a “head-to-head” comparison of diagnostic tests. Goals of the
project are to: 1) create a repository of well-characterized samples for use in the studies of Johne’s disease diagnostic test accuracy; and 2) use samples collected to create the repository to compare performance of multiple diagnostic tests for paratuberculosis in dairy herds. Holstein herds participating in Dairy Herd Improvement Association (DHIA) system and not using paratuberculosis vaccine are eligible for inclusion in the study. Eligible animals in these herds will be those in lactation 2 and greater, and lactating at the time of sample (milk, feces and serum) collection. Infected and non-infected herds will be included in the study.

Once all the samples have been banked in the repository, test sets will be sent to the four laboratories that are participating in the head-to-head comparison of tests:

- Antel BioSystems – Serum ELISA and milk ELISA
- Cornell Animal Health Diagnostic Center – TREK and qualitative PCR
- Johne’s Research Laboratory (U of Penn) - HEYM and Tetracore PCR
- Johne’s Testing Center (UW-Madison) – MGIT

Results will be available in 2012. Samples in the repository will be available for future use by other researchers.

**JDIP Vaccination Update**

Vivek Kapur

There is a strong interest among many producers and veterinarians in having a more effective vaccine available to help combat Johne’s disease. The JDIP Vaccine Project, sponsored in part by USDA-APHIS-VS, was established to help in this effort. The objective of the project is to gather candidates showing vaccine potential and submit each to a consistent, rigorous, three phase screening process designed to identify those with the greatest potential for commercial development. The first two phases are now complete. Of the eighteen knockout mutants submitted, eight were identified as having the best attenuation in the macrophage portion of study and were moved into Phase II, the mouse trial. The five mutants showing the best protection from challenge have now been moved forward into the final phase of the vaccine project, Phase III, the goat model. Phase III is being conducted in the lab of Dr. Murray Hines II at the University of Georgia. A total of 80 goat kids are being used on the five test and three control groups. Results of this work will be available next fall. Additional information about the project is available on the JDIP web-site (www.jdip.org).

**Introducing the Mycobacterial Diseases of Animals (MDA) Multistate Initiative**

Ken Olson

The Mycobacterial Diseases of Animals (MDA) Multistate Initiative is official and operational. This new multistate initiative is focused on two mycobacterial disease complexes - paratuberculosis (Johne’s disease; JD)
and the tuberculosis complex of diseases (TBc: i.e. bovine tuberculosis). Primary objectives are to maintain the networking, collaboration, and basic infrastructure developed through Johne’s Disease Integrated Program (JDIP), allowing participants to identify, obtain and share resources needed to address issues related to Johne’s and other mycobacterial diseases. Since there is minimal funding associated with the multistate initiative, it is anticipated that this collaboration will also increase the potential for success in obtaining future competitive grants.

The MDA has five primary areas of effort:

- Increase understanding of the epidemiology and transmission of Mycobacterial diseases in animals, including predictive modeling;
- Develop and implement new generations of diagnostic tests for JD and TBc;
- Improving our understanding of the biology and pathogenesis of Mycobacterial diseases, as well as the host response to infection;
- Develop programs to evaluate and develop new generations of vaccines for JD and TBc; and,
- Develop and deliver education and outreach material related to JD and TBc in electronic and print form for use by extension specialists, veterinarians, government agencies, producers and other stakeholders. Utilize trade media, producer organizations and other outlets to aid in dissemination of information generated through the initiative.

Interested individuals are invited to join the effort. The initial MDA Annual Meeting will be held on Sunday, December 2, 2012 in Chicago in conjunction with the Conference of Research Workers in Animal Diseases (CRWAD).

**NJDEI Update**

Teres Lambert

National Johne’s Disease Education Initiative (NJDEI) Coordinator

The National Institute for Animal Agriculture (NIAA) has overseen the National Johne’s Disease Education Initiative (NJDEI) for the USDA-APHIS Veterinary Services (VS) for the past several years. This agreement is coming to a close March 31, 2013. While a majority of educational and outreach efforts will be ending—including the quarterly dairy and beef e-newsletters, the website www.johnesdisease.org will remain active. Prior to the end of the contract with USDA-APHIS- VS, all state Designated Johne’s Coordinators (DJs) or a state’s animal health department will be emailed a zipped file containing PDFs of educational documents printable in four-color and in black and white on standard-size paper. It has been a privilege to work with the USDA-APHIS- VS and state DJs in helping educate producers and others about Johne’s disease prevention and control.
Group Discussion on Future Industry Needs from Johne’s Committee
Scott Wells
University of Minnesota

Group discussion included possibility of disease tracking at slaughter, but the point was brought up that since Johne’s disease is not a regulatory disease program, this would likely need to be an industry led initiative. Several examples of other countries with examples of industry driven Johne’s disease control programs include Australia and New Zealand. Johne’s Disease Risk Assessment Practicum (JD-RAP) is thought to be a good resource for dairy producers. NCBA is prioritizing Johne’s disease control by including it in their farm biosecurity efforts, but they need data on the economic impact of Johne’s disease in beef herds. Recommendations were made to keep Johne’s disease in industry publications at least 1-2 times per year. There was discussion that the new MDA could facilitate networking between interested parties.

NVSL Serum/Milk Check Test Results
Jeff Nelson
National Veterinary Services Laboratory, USDA-APHIS

In 2012, 79 laboratories (10 international and 69 USA laboratories) took the Johne’s disease serologic proficiency test and 44 laboratories took the Johne’s disease milk ELISA proficiency test. This year the National Veterinary Services Laboratories (NVSL) approved 30 laboratories to perform the Prionics ELISA and 51 laboratories to perform the IDEXX ELISA for serum testing. Some laboratories are approved to perform both the Prionics and IDEXX ELISAs. NVSL approved 44 labs to perform the milk ELISA. It was noted that there was a decrease in the number of individuals approved to perform the Prionics serologic ELISA, 38 in 2012 vs. 47 in 2011 and an increase in the number of individuals that are approved to perform the IDEXX serologic ELISA, 64 in 2012 vs. 58 in 2011. A slight decrease in the number of labs approved to perform a milk ELISA, 44 in 2012 vs. 48 in 2011, was also noted.

NVSL Fecal Check Test Results
Suelee Robbe-Austerman
NVSL

Dr. Robbe-Austerman provided the report on the fecal check test results. No summary was provided.

Effect of Positive Test Results for Mycobacterium avium Subspecies paratuberculosis on Weaning Weights in Beef Cow-Calf Herds
Allen Roussel, Bikash Bhattarai, Geoff Fosgate, Jason Osterstock, Chuck Fossler, Seong Park
Texas A&M University

The objective of this study was to estimate the economic loss due to decreased adjusted weaning weight (AWW) of beef calves nursing cows with
positive serum ELISA or bacterial culture of the feces (BCF) for *Mycobacterium avium* subspecies *paratuberculosis* (MAP). Records of cattle from beef herds participating in the National Johne’s Disease Demonstration Herd Project from 1999 to 2009 were analyzed. Cows having a positive ELISA weaned calves that weighed 12.2 pounds less than those from cows with a negative ELISA for MAP. Cows having a strong positive ELISA weaned calves that weighed 47.4 pounds less than those with a negative ELISA for MAP. Cows having positive results on BCF for MAP weaned calves that weighed 73.3 pounds less than cows that were negative on BCF for MAP. Cows classified as heavy shedders for MAP in the feces weaned calves that weighed 129 pounds less than cows that were classified as negative on BCF for MAP. Based on the average calf price in the US during the study years, the loss per calf weaned by cows with a strong positive ELISA was $57.59 while the loss per calf weaned by cows that were heavy shedders on BCF was $157.60. A substantial loss in the income due to decreased AWW is associated with serologic status and fecal shedding of beef cows, presumably due to the decrease in milk production by the cow.

**Update on Minnesota Demonstration Herd Project and Other Johne’s Disease Research**

Scott Wells, University of Minnesota

Dr. Wells provided this report to the Committee.

**Update on Demonstration Herd Project, 2007 Johne’s Disease Prevalence Study and Needs for NAHMS 2014 Study**

Jason Lombard

In 2005, the USAHA Committee on Johne’s Disease requested that NAHMS conduct a study to determine the national prevalence of herd-level infection with *Mycobacterium avium* subspecies *paratuberculosis* (MAP). The study was conducted during 2007 and cultures of composite fecal samples were used to determine herd level infection prevalence. The apparent herd level prevalence was approximately 70% across all herd sizes with more than 95% of herds with 500 or more cows having at least one composite fecal sample culture positive for MAP. Using sensitivity estimates from the NAHMS Dairy 2002 study and specificity estimates from expert opinion, a Bayesian approach was used to estimate the true prevalence of MAP on US dairy operations. The true prevalence of MAP was estimated to be 91.1% (95% probability interval, 81.6 to 99.3%). The methods used and results are published in Preventive Veterinary Medicine (Lombard et al., 2012). A list of publications completed as a result of the demonstration herd project was distributed. A copy of this list is provided at the end of this report.

**DHI efforts in Johne’s disease control**

Jay Mattison, NDHIA

Mr. Mattison provided the report to the Committee, no summary available.
Johne’s Testing for DHIA Herds Processed at DRMS

Ken Olson

Johne's Disease Integrated Program (JDIP)
(Presented on behalf of John Clay, Dairy Records Management System)

Over 16,200 herds with 2.2 million cows have their records processed each month at the Dairy Records Management System (DRMS). During the past two years:

• 1,559 herds have sampled 173,939 cows using Johne’s milk ELISA
• 378 herds had samples in each of the four 6-month periods*
• 380 herds had samples in the last 6-month period but not in prior 18 months

The following procedure is used for providing information to producers. DHIA reports are mailed without the Johne’s report. Data are forwarded to DRMS from six laboratories providing ELISA testing. When Johne’s data arrives, it is merged with management information and the Johne’s report, that merges animal identification (ID), Johne’s, production and reproduction information, is either mailed or producers can retrieve it from website. The following observations can be made:

• Consistent numbers of herds and cows are being tested for Johne’s
• Many herds tried service but did not continue
• Majority of testing by herds processed through DRMS occurred in four states (Minnesota, Michigan, Wisconsin and Pennsylvania)
• Marked changes in use of service is not expected

Committee Business:

Two action items and one resolution were taken under consideration, amended and passed as detailed below.

Action item 1: The USAHA Johne’s Disease Committee and National Johne's Working Group (NJWG) will work with USDA-APHIS-VS and the newly established Mycobacterial Diseases of Animals (MDA) to continue teleconferences on Johne’s disease and tuberculosis complex. We will work with the participants to determine frequency and content on these calls.

Action item 2: The USAHA Johne’s Disease Committee approved utilizing NJWG (not to exceed $5,000) for evaluation and/or establishment of non-profit status for the MDA.
REPORT OF THE COMMITTEE ON LIVESTOCK IDENTIFICATION

Chair: Tony Forshey, OH
Vice Chair: Kevin Maher, IA

J Lee Alley, AL; Joan Arnoldi, WI; James Averill, MI; Lowell Barnes, IN; Bill Barton, ID; C. Black, GA; Gwen Bosley, CO; Richard Breitmeyer, CA; Paul Brennan, IN; Becky Brewer-Walker, AR; Gary Brickler, CA; Charlie Broadus, VA; James Carroll, MO; Jon Caspers, IA; Michael Coe, UT; Jim Collins, MN; Karen Conyngham, TX; Scott Dewald, OK; Reta Dyess, TX; Anita Edmondson, CA; Leonard Eldridge, WA; James England, ID; J Amelita Facchiano, TX; Glenn Fischer, TX; Betsy Flores, VA; Dave Fly, NM; Robert Foudraine, WI; W. Kent Fowler, CA; Tony Frazier, AL; Mallory Gaines, DC; Rod Hall, OK; Steven Halstead, MI; Neil Hammerschmidt, MD; William Hartmann, MN; Nephi Harvey, UT; Greg Hawkins, TX; Bill Hawks, DC; Jay Hawley, IN; Burke Healey, CO; Carl Heckendorf, CO; Bob Hillman, ID; Donald Hoenig, ME; Dudley Hoskins, DC; Joseph Huff, CO; Dennis Hughes, NE; John Huntley, WA; Jon Johnson, TX; Jamie Jonker, VA; Susan Keller, ND; Bruce King, UT; Ralph Knowles, FL; Maxwell Lea, Jr., LA; James Leafstedt, SD; Mary Lis, CT; Jim Logan, WY; Laurent O'Gene Lollis, FL; Francine Lord, CAN; Bret Marsh, IN; David Marshall, NC; Jay Mattison, WI; Paul McGraw, WI; James McKean, IA; Thomas McKenna, WI; Ron Miller, PA; Ernie Morales, TX; Henry Moreau, LA; Jim Niewold, IL; Kenneth Olson, IL; Elizabeth Parker, ITA; Boyd Parr, SC; Ben Pendergrass, DC; Jewell Plumley, WV; John Ragan, MD; Valerie Ragan, VA; Jeanne Rankin, MT; Tom Ray, NC; Justin Roach, OK; Nancy Robinson, MO; Keith Roehr, CO; Bill Sauble, NM; A. David Scarfe, IL; Shawn Schafer, ND; Stacey Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Craig Shultz, PA; Richard Sibbel, IA; Kathryn Simmons, DC; David Smith, NY; Robert Stout, KY; Nick Striegel, CO; Scott Stuart, CO; Paul Sundberg, IA; Arnaldo Vaquer, VA; Rick Wahlert, CO; Mark Walter, PA; James Watson, MS; Patrick Webb, IA; Richard Wilkes, VA; John Williams, MD; George Winegar, MI; Josh Winegarner, TX; Cindy Wolf, MN; Taylor Woods, MO; Glen Zebarth, MN; Ernest Zirkle, NJ.

The Committee met on October 23, 2012 at the Sheraton Hotel in Greensboro, North Carolina, from 8:00 a.m. to 12:00 p.m. There were 101 members and guests present.

The agenda was reviewed and followed for the meeting, with the following presentations.

USDA Reorganization Structure
T.J. Myers
USDA-APHIS, Veterinary Services (VS)

Reorganization of the Animal and Plant Health Inspection Service (APHIS) is driven by the following factors:

- New technologies
- Emergencies, disasters, and agroterrorism
REPORT OF THE COMMITTEE

- Food safety concerns
- Flat or decreasing budgets

The new structure will be comprised of the following key components that plan to begin phasing in by spring 2013:
- Movement and Marketability
- Surveillance, Preparedness and Response
- Science, Technology and Analysis
- Program Support Services

USDA-APHIS-VS - Update on Animal Disease Traceability Framework
Neil Hammerschmidt and John Wiemers
USDA-APHIS-VS

Overview
In early 2010, the USDA announced a new, flexible framework for animal disease traceability (ADT). The ADT framework, as it has been developed, is intended to:
- Apply only to animals moved interstate
- Be administered by the States and Tribal Nations to increase flexibility
- Encourage the use of lower-cost technology
- Be implemented transparently through Federal regulations and the full rulemaking process

The new approach is performance-based. It is designed to measure outcomes that will document successful advancement of animal disease traceability. Preliminary traceability performance standards have been prepared by the initial ADT Regulatory Working Group consisting of both State and Federal animal health officials.

Current Status
On August 9, 2011, USDA issued a proposed rule—based on the framework described above—to establish general regulations for the traceability of US livestock moved interstate that would support animal disease control programs. Under the proposed rule, livestock moved interstate must—unless specifically exempted—be officially identified and accompanied by an interstate certificate of veterinary inspection (ICVI) or other documentation such as an owner-shipper statement or brand certificate. The comment period for the proposed rule ended December 9, 2011. The final rule remains under review at the Office of Management and Budget. We had expected to publish it this summer.

Developments
While the final traceability regulation awaits publication, USDA (through the Animal and Plant Health Inspection Service (APHIS) will continue to work on components of the traceability framework. For example, we plan to focus on the activities to be addressed in our current traceability cooperative agreements as well as those that will soon be developed for FY 2013.
One way that we are focusing on traceability activities is by implementing our "road maps." In 2012, APHIS began implementing animal disease traceability road maps prepared by States that obtain USDA funding to help support ADT activities. These road maps, or strategies, outline each participating State’s vision, long-term plans, and objectives in implementing traceability locally.

APHIS is also focusing on the use of tags and other official identification devices. APHIS has expanded the availability of National Uniform Eartagging System (NUES) tags and taggers to support principles of the ADT framework. Increased use of these and other official identification devices, along with proper tag distribution practices, will lead to improved traceability. APHIS is further building an electronic infrastructure sufficient to support easy retrieval of animal health information, as this activity is also critical to improved traceability. States should continue efforts to make searchable data available via information systems to enhance tracing capabilities.

Another key area in improving animal disease traceability is development of more efficient interstate certificate of veterinary inspections (ICVIs); these are vital documents in providing livestock movement information. All efforts to advance the use of electronic ICVI options need to be considered and supported. However, as paper ICVIs will be used for some time, USDA also recommends investing in their conversion to electronic media to achieve searchable data.

APHIS will work with ADT cooperators to annually test tracing capabilities based on defined tracing activities. APHIS will compile the results from participants to establish baseline data that will be used to measure and document the program’s progress.

Another area that USDA will continue to focus on is collection of identification devices. The traceability proposed rule contains provisions that strengthen the collection of identification devices at slaughter.

APHIS conducted a study from April through mid-July 2012 to assess the current level of collection of various types of livestock identification devices (ID) in slaughter establishments. APHIS employees conducted the study by observing device collection. While the survey was in progress, many of the top 40 plants that had been collecting blood samples no longer collected them, or collected fewer samples. APHIS anticipated that reduced sample collection would result in a reduction in overall ID collection at those plants. It will be critical to monitor the level of collection through regular visits to slaughter establishments to see if reduction in blood sample collection does affect the collection of ID.

APHIS has never done a study of current ID collection. The data establish a benchmark which APHIS can use as a comparison in future surveys. APHIS did not intend the study to document compliance with existing regulations or to measure the performance of APHIS field employees assigned to work with slaughter establishments. APHIS intended to determine the current status of slaughter ID collection to identify gaps, focus
resources, develop effective education and outreach strategies, and establish a benchmark with which to measure progress.

The first part of the study (Round 1) focused on the top 40 adult cattle slaughter establishments in terms of number of head slaughtered.

This report highlights the major findings of Round 1, which include:

- The percentage of plants that collected IDs all or most of the time ranged from 66 percent for non-840 radio frequency identification (RFID) eartags to 97 percent for USDA backtags
- When more than one of a given type of ID is present (e.g., more than one official USDA metal eartag), the percentage of plants collecting IDs all or most of the time ranged from 64 percent for non-840 RFID eartags to 82 percent for USDA backtags
- Over 80 percent of plants linked ID devices with the carcass through final inspection all or most of the time for all ID types
- Although it is not a Food Safety and Inspection Service (FSIS) or APHIS requirement, 94 percent of the plants recorded the USDA backtag number all or most of the time. For the other five common ID types, APHIS field staff at well over half of the plants observed that those plants never recorded the numbers
- Length of time ID is held was similar for all ID types. While about one-fourth of plants discard ID immediately after final inspection, about half hold ID 1 to 2 days; the rest hold ID 3 or more days
- Most establishments will need minimal changes, and APHIS field employees will face minimal challenges in gaining full compliance with the collection of most ID devices and storing them after final inspection to make them available to APHIS
- Most of the changes and challenges are related to storing IDs for more than 3 or 4 days after final inspection

APHIS finds it encouraging that there is a high degree of compliance with existing regulations in most of the top adult cattle slaughter plants. The data also indicate areas for improvement, however. The data help us appreciate the challenges in implementing the traceability rule. The plants may have to make changes, our field employees may need to make changes, and they certainly will face obstacles. The good news is that the challenge is not as big as it could have been. While the final rule awaits publication, APHIS will collaborate with FSIS increase compliance with existing regulations to ensure we make immediate progress on this important aspect of traceability.

Conclusion

The publication of the final traceability rule remains a high priority; while it is pending, USDA will continue to implement key facets of the framework. Doing so will advance the infrastructure to support improved traceability.
State and Federal Enforcement Plans of Changing ID Requirements
Bill Hartmann
Minnesota Board of Animal Health; and
Susan Keller
North Dakota Board of Animal Health

Dr. Bill Hartmann presented the results of a questionnaire that he conducted with state veterinarians. The purpose of the questionnaire was to determine where states are in their efforts to trace intrastate movements of breeding cattle and to assess interest in sharing information about traceability among states. The following questions were asked in the questionnaire:

What are your current requirements for intrastate movement of breeding cattle?
Are you in the process of making changes to those regulations?
What are your plans for enforcement of:
• Intrastate regulations for movement of breeding cattle?
• The new federal regulations for interstate movement of breeding cattle?

Do you anticipate having interstate movement agreements with other states as allowed by the proposed federal regulations?

Would you be interested in National Association of State Animal Health Officials (NASAHO) or USAHA coordinating an exchange of information on what is happening in all the states relative to traceability?

Based on the questionnaire he concluded that all states are taking action to improve their ability to trace intrastate movements of breeding cattle, there is a wide variability in how they do that and there is great interest in sharing information among states.

Forty one states responded to the questionnaire (results not provided).

eCVI, IT, Data Standards Discussion Updates
Keith Roehr¹, Sara Aohla¹, Michael Martin², Kevin Maher³
¹Colorado Department of Agriculture
²South Carolina Animal Industry Division/Clemson University
³GlobalVetLink, LC

Recent USAHerds User Group had a discussion on import of data from various electronic Certificates of Veterinary Inspections (eCVIs) into USAHerds. Cost associated in building a “schema” to import data from any new forms coming into the marketplace. It became apparent that data standards need to exist to enhance the quick and accurate flow of data.

The growing marketplace of IT that has created this need, includes:
• eCVI Systems: Private, state-based, federal-based
• Animal Health Management Systems: USAHerds, SCS, “home-grown” systems
• Auction Market Management Systems: Proprietary or “home-grown”
• Laboratory Information Management Systems: Proprietary or “home-grown”
Summary - Each serves its own niche. Value will be enhanced by communication of system-to-system. The value of Animal Health IT will be increased by data exchange to enhance traceability – speed and accuracy.

Cost may be kept lower by agreeing on common standards for communication. We need to establish these standards.

Discussion followed by John Picanso on the status of the interstate certificate of veterinary inspection (ICVI) document standards which are reported to be pending for Federal Register posting- expected by November 2012, followed by a comment period.

Committee Business:

The Committee passed a motion to endorse the formation of a subcommittee of the committee on Animal Health Surveillance and Information Systems.

TOPIC: Development of Standard for Exchange of Electronic Certificates of Veterinary Inspection
SOURCE: NATIONAL ASSEMBLY OF STATE ANIMAL HEALTH OFFICIALS
SUBJECT MATTER: REQUEST ANIMAL HEALTH DATA STANDARDS SUBCOMMITTEE DEVELOP STANDARD FOR EXCHANGE OF ELECTRONIC CERTIFICATES OF VETERINARY INSPECTION

BACKGROUND INFORMATION:
On Sunday, October 21, 2012, the USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems will consider establishment of an Animal Health Data Standards Subcommittee. This subcommittee would be charged with identifying and or creating appropriate technical standards for the exchange of animal health information between information systems. These standards will represent a consensus of government entities, industry, and animal health information systems developers.

The data standards subcommittee will be formed for the purpose of dealing with significant issues of animal health data exchange. A major driving factor in creation of this subcommittee is the need for standards for exchange of electronic certificates of veterinary inspection (eCVI).

The growing number of eCVI implementations along with increasing reliance upon the data contained in eCVIs for animal disease traceability, make the need for a common data interchange standard critical.

MOTION:
The committee requests that the USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems through that subcommittee develop a common standard for the exchange of electronic certificates of veterinary inspection. In addition, the National Assembly requests that the subcommittee also explore methods and standards that would facilitate the sharing of scanned paper certificates of veterinary inspection between states including the capture of any critical data that may be extracted by the scanning state. This subcommittee is tasked
with reporting such standards to AAVLD/USAHA via its parent committee.

RECOMMENDATION:
The ID Committee requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), send appropriate technical experts to participate in this subcommittee, and to cite standards developed where it requires exchange of electronic certificates of veterinary inspection.

The Committee also passed the resolution that had been previously approved by the joint USAHA/AAVLD Committee on Animal Emergency Management, “Use of 840 radio frequency identification (RFID) Ear Tags for Use in Identification of foot-and-mouth disease (FMD) “Vaccinated-to-Live” Livestock.”
The Committee met on October 21, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 12:00 to 2:30 p.m. There were 27 members and 19 guests present.

**National Animal Health Laboratory Network (NAHLN) Funding**

Brad Mollet, American Association of Veterinary Laboratory Diagnosticians (AAVLD) Lobbyist discussed his efforts on behalf of the NAHLN in Congress. Through his efforts, we were successful at getting the funding restored for 2012 and raising the level of awareness within Congress regarding the role of the NAHLN and the necessity for continued funding. We are requesting $9.98 million in funding during the next congress and full funding of $30 million in the 2012 Farm Bill. This $30 million is intended to expand funding to a larger number of eligible laboratories so that all NAHLN laboratories can have adequate funding according to their level of participation. AAVLD has two white papers developed to support future legislative efforts and will be asking laboratories to participate in the lobbying efforts.

**NAHLN Restructuring Concept Paper**

Barb Martin (NAHLN Coordinator) updated the committee on the progress of the NAHLN restructuring concept paper. The document has been edited and reviewed and is awaiting publication in the Federal Register for public comment. This document defines proposed changes to the NAHLN structure and codifies the existence of a NAHLN charter. The charter itself, however, would remain external to the code of federal regulations (CFR) to facilitate future modification as needed. The mechanism to alter the charter is described in the concept document. There was discussion regarding the
opportunity for animal agriculture’s input into activities of the NAHLN Coordinating Council. It was noted that the NAHLN leadership structure allows for the invitation of industry stakeholders to attend coordinating council meetings or to request an opportunity to present concerns of the industry before the council. Sarah Tomlinson outlined the outcomes of recent test exercises and test validation studies and those planned for 2013:

- She noted that NAHLN is celebrating its 10-year anniversary and has a ten year review document available for distribution.
- The group conducted a number of training sessions including a course on Quality Management Systems for the NAHLN laboratories and VS Memo 580.4 training for laboratory personnel and state and federal representatives involved in investigating adverse animal health events. The need for area veterinarian in charge (AVIC) and state animal health official (SAHO) to remember that there is the opportunity to take duplicate samples for foreign animal disease diagnostician (FADD) investigations was expressed as this is an excellent way to exercise the NAHLN in real time and practice lines of communication.
- In addition, she described on-going collaborative diagnostic development and validation projects conducted with NVSL-FADDL, NAHLN laboratories and others to address stakeholder identified gaps resulting in exercises and Agricultural Screening Tools workshops sponsored by the Foreign Animal and Zoonotic Disease (FAZD) center and Department of Homeland Security (DHS).
- The Laboratory Capacity Estimation Model has been deployed to NAHLN laboratories. This program facilitates accessioning and testing processes for any diagnostic assay. This allows the local laboratories to determine throughput capabilities given various scenarios and allows the NAHLN Coordinator to view an individual lab’s current and maximum throughput to guide resource management decisions.

NAHLN IT

Bruce Akey updated the Committee on NAHLN information technology (IT) issues. He noted that Cornell has developed server capabilities to manage the distribution of messaging between participating state diagnostic laboratories, private entities and could serve as a portal into the NAHLN system. This system is a message coordinator and not a data repository. Minimal capabilities are required of participating laboratories and the service is free of charge.

NAHLN Coordinating Council Update

Much of the current effort has been associated with the development of the NAHLN concept paper described earlier. The Coordinating Council is continuing to prioritize IT issues and is currently soliciting nominations for new members to fill expiring terms. National Institute of Food and Agriculture (NIFA) noted that they need input from the coordinating council as well as
this committee on identifying gaps and prioritizing goals within the 28
laboratories with which they have cooperative agreements.

Technical Methods Working Group
Barb Martin and Terry McElwain discussed the activities of the Technical
Methods Working Group. This has been a very involved and focused working
group with valuable input on asset deployment and validation. They held two
meetings in 2012 to discuss the methods development processes, review
complete dossiers for two assays, and provide reviews on assay
development or methods comparison projects. Outcomes of reviews for
assays for chronic wasting disease (CWD), scrapie, pseudorabies (PRV),
swine influenza virus (SIV) and classical swine fever (CSF) were discussed.

NBAF Scientific Panel Review
Terry McElwain updated the Committee on the National Bio and Agro-
Defense Facility (NBAF). The Scientific Panel review asked to consider three
potential scenarios for addressing concerns associated with development of
NBAF: 1) the current proposal; 2) a scaled back version; and 3) remaining at
Plum Island and utilizing international bio-safety level (BSL)-4 capabilities.
The key outcome was an endorsement of the need for an NBAF facility. The
panel felt that the options to remain at Plum Island and/or utilize international
resources were not viable options. It was felt that it might be feasible to scale
back the project utilizing a model similar to NAHNL if the full-scale NBAF
project could not move forward.

Committee Business:
The Committee passed three resolutions on the following subject matter:
1. NAHNL Coordinator support
2. Standardization of equine herpes virus (EHV)-1 polymerase
   chain reaction (PCR) Testing at Diagnostic Facilities
3. State Animal Laboratory Messaging Service
These resolutions were forwarded to the Committee on Nominations and
Resolutions.
REPORT OF THE COMMITTEE ON NOMINATIONS AND RESOLUTIONS

Chair: Steven Halstead, MI

J Lee Alley, AL; George Badley, AR; Philip Bradshaw, IL; Richard Breitmeyer, CA; William Brown, KS; Jones Bryan, SC; Clarence Campbell, FL; Joe Finley, TX; Robert Gerlach, AK; Thomas Hagerty, MN; Steven Halstead, MI; Bob Hillman, ID; Heather Hirst, DE; Donald Hoenig, ME; Maxwell Lea, Jr., LA; James Leafstedt, SD; Donald Lein, NY; Bret Marsh, IN; Michael Marshall, UT; Richard McCapes, CA; Lee Myers, GA; John Ragan, MD; Glenn Rea, OR; John Shook, PA; Scott Stuart, CO; H. Wesley Towers, DE; Max Van Buskirk, PA; Richard Willer, HI; Larry Williams, NE; Ernest Zirkle, NJ.

Nominations

OFFICERS
PRESIDENT.................................................. David L. Meeker, Alexandria, VA
PRESIDENT-ELECT........................................ Stephen K. Crawford, Concord, NH
FIRST VICE-PRESIDENT.............................. Bruce L. King, Salt Lake City, UT
SECOND VICE-PRESIDENT....................... David D. Schmitt, Des Moines, IA
THIRD VICE-PRESIDENT............................ Boyd H. Parr, Columbia, SC
TREASURER................................................. Annette M. Jones, Sacramento, CA

DISTRICT DELEGATES
NORTHEAST........S. “Buzz” Klopp, Delaware; Ernest W. Zirkle, New Jersey
NORTH CENTRAL...............Velmar Green, Michigan; Howard Hill, Iowa
SOUTH......................L. “Gene” Lollis, Florida; A. Gregario Rosales, Alabama
WEST......................Bill Sauble, New Mexico; H. M. Richards, Ill, Hawaii

Resolutions

RESOLUTION NUMBER: 1 and 25 Combined – APPROVED

SOURCE: USAHA/AAVLD Committee on Animal Emergency Management Committee on Livestock Identification

SUBJECT MATTER: Use of 840 Radio frequency identification Ear Tags for Use in Identification of Foot-and-Mouth Disease “Vaccinated-to-Live” Livestock

BACKGROUND INFORMATION:
If the United States experiences a foot-and-mouth disease (FMD) outbreak within its borders, it will require an effective and efficient collaborative response from state and federal government and the livestock industry. The scope and severity of the outbreak will determine what particular methods of control, mitigation, and eradication are chosen. One of
the key decisions will be the need to utilize FMD vaccination to mitigate disease spread and assist in controlling the outbreak. If a decision to use FMD vaccination is chosen one of the vaccination options is a “vaccination-to-live” strategy. One important component of a “vaccination-to-live” strategy is the permanent identification and subsequent tracking of livestock that have been vaccinated for FMD. Because a “vaccination-to-live” strategy may be used in dairy herds, breeding herds, and seed-stock operations, the most efficient method of identifying and managing those livestock would be through the use of an official electronic identification (ID) ear tag. Official 840 radio frequency identification (RFID) ear tags are “connected” to an official state livestock premises registration number and have proven advantages in speed and efficiency over official metal ID ear tags. It has been demonstrated that the official 840 RFID tags have a greater capability to assist animal health officials to trace, control, and contain livestock diseases. Livestock movements documented through 840 RFID ear tags would help to minimize the negative economic impacts of interstate transport restrictions that will occur during a significant foreign animal disease outbreak.

Currently, the only FMD vaccination ear tags in the National Veterinary Stockpile are pink, metal clip-on tags. It is acknowledged that the metal ear tags are considerably less expensive than 840 RFID ear tags and could be effectively used in animals where a “vaccination-to-slaughter” option is implemented. However the management of the FMD “vaccinated-to live” animals would be more difficult and time-consuming without the use of 840 RFID ear tags. If Veterinary Services engaged in indefinite delivery/ indefinite quantity contracts with tag manufacturers to supply 840 RFID tags in the event of an FMD outbreak, then an inventory would not have to be maintained. It is important that these tags do not interfere with or supplant traceability requirements at the State or Federal level, and be synchronized with any existent or future traceability strategy. Tags could also be of a color with high visibility and bear the acronym “FMD” in a highly contrasted color-type to avoid any confusion and issues with those who are color blind.

RESOLUTION:

The United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians urge the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to develop contracts with appropriate vendors to supply unique 840 radio frequency identification ear tags on demand for use in appropriate livestock that have been vaccinated for foot-and-mouth disease (FMD) in a “vaccination-to-live” strategy as part of the unified state-federal FMD response operations. Tags should be visually identifiable and easily differentiated from tags used for other programs or purposes.

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RESOLUTION NUMBER: 2 – APPROVED

SOURCE: USAHA/AAVLD Committee on Animal Emergency Management

SUBJECT MATTER: Support for the National Bio and Agro-Defense Facility

BACKGROUND INFORMATION:
If the United States incurs a foreign animal disease outbreak from a significant livestock pathogen, it will have a major impact on the entire country, could negatively affect animal and public health, may pose environmental risks if disposal of mass mortalities of livestock occurs, and could dramatically affect food security and the United States (US) economy.

In January 2009, the United States Department of Homeland Security and the United States Department of Agriculture completed an extensive site selection process for the National Bio and Agro-Defense Facility (NBAF), a new animal disease research and diagnostic facility to replace the aging Plum Island Animal Disease Center. Manhattan, Kansas was selected as the site for the NBAF.

In July 2012, the National Academy of Sciences affirmed the vital need for the NBAF and determined that the Plum Island Animal Disease Center cannot meet US agro-security needs due to size limitations and inability to meet zoonotic disease and biosafety level-4 (BSL-4) needs.

NBAF will improve the nation’s ability to study foreign animal diseases and emerging and zoonotic pathogens. It will aid in the improvement of diagnostic testing and the development of effective vaccines and other countermeasures for responding to highly significant livestock diseases. Further delay in initiation of NBAF construction will result in higher construction costs and critical gaps in national security from threats to animal agriculture and the public’s health and well-being.

RESOLUTION:
The United States Animal Health Association and American Association of Veterinary Laboratory Diagnosticians affirm the decision for National Bio and Agro-Defense Facility (NBAF) construction and urge Congress to fully appropriate funds in the next funding cycle to enable the United States Department of Homeland Security to move forward in the planned construction and continued maintenance of the NBAF to ensure protection of animal agriculture and the public from potentially devastating diseases.

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REPORT OF THE COMMITTEE

RESOLUTION NUMBER: 3 – APPROVED

SOURCE: USAHA/AAVLD Committee on Animal Emergency Management

SUBJECT MATTER: Evaluate Foot-and-Mouth disease Vaccine Response Policy and Capabilities

BACKGROUND INFORMATION:

If the United States experiences a foot-and-mouth disease (FMD) outbreak within its borders, a prepared response will be required for optimum control of the disease and continuity of business for agricultural producers and associated industries. The scope and severity of the outbreak will determine the particular strategy of response, control, and mitigation chosen. The North American Foot-and-Mouth Disease Vaccine Bank (NAFMDVB) has limited quantities of vaccine available. Emergency vaccine stocks are far below what would be required to address a livestock-dense state or multi-state outbreak. The public-private-academic partnerships formed as part the Secure Food Supply projects and work that has been conducted have brought the need for additional FMD vaccine and other response strategies and capabilities to a broader audience. In addition, there are other corollary issues that surround the decision to use FMD vaccine in an outbreak that need broad stakeholder input prior to an outbreak.

RESOLUTION:

The United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians urge the United States Department of Agriculture, Animal and Plant Health Inspection Service to:

• Expeditiously evaluate foot-and-mouth (FMD) vaccine quantity and capability, times to delivery, methods of distribution, electronic identification of vaccinates, and other vaccine priority issues to meet FMD response needs.
• Provide a mechanism for broad stakeholder input to enhance FMD vaccine preparedness and response including exercises.

RESOLUTION NUMBER: 4 – Combined with 8

SOURCE: USAHA/AAVLD Committee on Animal Emergency Management

SUBJECT MATTER: Support for Research on Mycobacterial Diseases in Animals

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RESOLUTION NUMBER:  5 – APPROVED

SOURCE: USAHA/AAVLD Committee on The National Animal Health Laboratory Network

SUBJECT MATTER: National Animal Health Laboratory Network Coordinator

BACKGROUND INFORMATION:
The National Animal Health Laboratory Network (NAHLN) was established in 2002 and at that time a NAHLN coordinator was selected to coordinate the activities of the NAHLN. This is a United States Department of Agriculture (USDA) position and has been occupied by Barbara Martin for the last ten years. We recognize the outstanding job she has done as coordinator and congratulate her on her retirement. This position is critical in the continued success and progress of the NAHLN. When the original coordinator was appointed the American Association of Veterinary Laboratory Diagnosticians had representation on the selection committee.

RESOLUTION:
The United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians (AAVLD) strongly urges the United States Department of Agriculture (USDA) to with utmost haste implement the necessary process to identify a new National Animal Health Laboratory Network coordinator and urges USDA to allow AAVLD to have input again in the selection process.

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RESOLUTION NUMBER:  6 and 11 Combined—APPROVED

SOURCE: USAHA/AAVLD Committee on The National Animal Health Laboratory Network
USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems

SUBJECT MATTER: State Animal Laboratory Messaging Service

BACKGROUND INFORMATION:
The speed of commerce now demands that information move as expeditiously and efficiently as possible from point A to point B to meet client expectations and demands. The veterinary diagnostic laboratory community in the United States has been struggling to accomplish such information transfer for years. Many parts of the necessary infrastructure to support these transfers exist (Laboratory Information Management Systems [LIMS], messaging software, messaging standards, State and Federal databases, etc.), but there is currently no overall linkage between these parts.
The development of a State Animal Laboratory Messaging Service (SALMS) is meant to complete the linkages and therefore provide an end-to-end infrastructure for the electronic transfer of information. The “missing link” at this point is a central message routing site. SALMS is intended to address this and bridge the gap between what are now isolated systems.

The SALMS will:

- provide a routing/messaging service for any/all State or Federal veterinary diagnostic laboratories;
- be a controlled, secure pathway. Registration and approval will be required to participate, but will be less complicated than government requirements;
- create a communication path for both order and result messages between any two or more participants, for any testing service;
- improve the efficiency and accuracy of information transfer between participants;
- utilize industry standards for messaging which will require messages in a standardized, published extensible markup language (XML) format. This may not be strictly a Health Level Seven (HL7) standard but will follow best practices of the informatics standards development community and use existing standards wherever appropriate;
- require a participant to have the capability to create and receive the standard XML message. How each participant handles the data that goes into or comes out of a message is up to them locally. SALMS participants will provide technical support, if needed, to other laboratories;
- be built using open-source, industry vetted and accepted, free components;
- be independent of source mechanisms for generating or receiving messages, i.e. no specific software or mechanism is mandated for a laboratory to participate;
- be hosted (server and software) and administered by Cornell University, inside its secure firewall on redundant, secure systems with 24/7 availability;
- be free to qualified participants.

SALMS will not:

- be a data repository. Messages and the data they contain are passed through the routing service and are not retained longer than necessary to facilitate secure transfer;
- necessarily replace the National Animal Health Laboratory Network Information Technology system, although it could serve the routing needs for these messages.
RESOLUTION:
The United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians support the development, testing and assessment of the State Animal Laboratory Messaging Service and request that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) fully engage and cooperate with this development, testing and assessment, and enabling interoperability with USDA-APHIS-VS information systems including the National Animal Health Laboratory Network, Emergency Management Response System, Surveillance Collaboration Services, and the USDA-APHIS-VS National Veterinary Services Laboratory.

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RESOLUTION NUMBER: 7 and 18 Combined – APPROVED

SOURCE: USAHA/AAVLD Committee on The National Animal Health Laboratory Network
Committee on Infectious Diseases of Horses

SUBJECT MATTER: Standardization of Equine Herpes Virus-1 Polymerase Chain Reaction Testing at Diagnostic Facilities

BACKGROUND INFORMATION:
The National Assembly of State Animal Health Officials (National Assembly) requested in early 2012 that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Veterinary Services Laboratory (NVSL) perform a brief survey of United States (US) veterinary diagnostic laboratories across the country to determine the type of test methods in use for detection of neuropathic strains of Equine Herpes Virus-1 (nEHV-1). The survey summary results are:

1. **Response rate:** 21 of 26 laboratories completed the survey
2. **EHV-1 Test Method:** Real-time polymerase chain reaction (PCR) (17/21), Conventional PCR (6/21), Nested PCR (4/21). (Some laboratories conducted more than one PCR method.)
3. **Target Gene:** Glycoprotein B (12/21), Glycoprotein H (2/21), ORF (7/21), Polymerase gene (8/21)
4. **References:** Eleven different peer-reviewed publications from eight different authors were referenced as sources of the PCR methods.
5. **Number of laboratories with interest in participating in a neuropathic EHV-1 PCR Ring Trial:** 16/21

This survey highlights the National Assembly assumption that laboratories across the country were using different test methods to diagnose nEHV-1 infection. From a regulatory standpoint, it is difficult to make
regulatory decisions with the differing nEHV-1 test methodologies currently in use. The National Assembly seeks standardization of nEHV-1 testing. Since nEHV-1 is not a regulated program disease within USDA-APHIS-VS, it is unlikely that standardization of nEHV-1 laboratory test methods will be forthcoming from USDA-APHIS-VS. Therefore, perhaps the American Association of Veterinary Laboratory Diagnosticians, USDA-APHIS-VS-NVSL and diagnostic laboratories can provide assistance to gain consensus for standardization for nEHV-1 testing.

The USDA-APHIS-VS-NVSL has agreed to conduct an inter-laboratory comparison nEHV-1 ring trial. A ring trial would be a good first step in determining whether or not the various nEHV-1 PCR tests in use across the US perform similarly. USDA-APHIS-VS-NVSL could develop and implement the ring trial, but would need assistance from participating laboratories in providing EHV-1 virus isolates for optimal design of the ring trial with multiple isolates, potentially with differing genetics. This approach could provide more information about equivalent performance of the various PCR methods, across strains encountered in the field, than a ring trial using a single isolate.

RESOLUTION:

The United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians request that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, National Veterinary Services Laboratory proceed with the neuropathic strains of Equine Herpes Virus-1 (nEHV-1) ring trial and make every effort to standardize testing methodology for nEHV-1 polymerase chain reaction testing at diagnostic facilities in the United States.

RESOLUTION NUMBER: 8, 4 and 33 Combined – APPROVED

SOURCE: Committee on Johne’s Disease
USAHA/AAVLD Committee on Animal Emergency Management
Committee on Tuberculosis

SUBJECT MATTER: Support for Research on Mycobacterial Diseases in Animals

BACKGROUND INFORMATION:

Maintaining research and outreach programs is imperative to continued advancement of diagnostics, vaccines, and methods to prevent mycobacterial disease complexes – paratuberculosis (i.e. Johne’s disease; JD) and the tuberculosis complex of diseases (TBc) from devastating livestock production.

The Mycobacterial Diseases of Animals (MDA) – Multistate Initiative has recently begun operation and is focused on these two complexes. The MDA
draws on the excellent research and outreach infrastructure that has been developed through the Johnne’s Disease Integrated Program (JDIP). The consortium has been expanded by including additional individuals with expertise in the TBc.

While the MDA is well positioned to effectively address research and outreach needs related to these disease complexes, funding needed to move forward in these areas is lacking. JDIP was funded primarily through competitive grants from United States Department of Agriculture (USDA), National Research Institute/National Institute of Food and Agriculture, leveraging these funds to obtain other grants and also coordinating closely with expertise and projects that are part of USDA, Agricultural Research Service. The MDA is positioned to operate in a similar manner; however, funding for agricultural research needs to be available and obtainable for MDA to be successful.

**RESOLUTION:**

The United States Animal Health Association requests that the United States Congress continue to fund agricultural research and extension at least at Fiscal Year 2012 levels and that levels available for animal research and extension be maintained. We further request that the United States Department of Agriculture, National Institute of Food and Agriculture include work on mycobacterial diseases of animals in their future requests for proposals, and that the United States Department of Agriculture, Agricultural Research Service continue to include work on mycobacterial diseases as a priority in their animal health programs.

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**RESOLUTION NUMBER: 9 – Combined with 26**

**SOURCE:** Committee on Import Export

**SUBJECT MATTER:** Exports of Sheep and Goats

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**RESOLUTION NUMBER: 10 and 34 Combined – APPROVED**

**SOURCE:** Committee on Import Export
Committee on Tuberculosis

**SUBJECT MATTER:** Tuberculosis Testing of Export of Cattle and the Requirement for a Negative Culture of *Mycobacterium bovis* from Histopathologically negative tissues

**BACKGROUND INFORMATION:**
Between 1987 and 2011 exporters were following rules as per Veterinary Services (VS) Memorandum 592.102 dated 10/29/93:

“The test is valid for 90 days unless specified by the importing country. The CFT test should not be repeated less than 60 days following the previous tuberculin injection. The comparative cervical (CC) test must be run on CFT suspects and all must be negative before the remaining negative animals can be shipped. CFT suspects cannot be shipped even if negative on the CC test. CC test suspects may be sent to slaughter under permit, and if found without internal evidence of TB including histopathological examination of selected lymph nodes, the animals in the rest of the shipment may be considered free of TB.”

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) is now telling exporters that if a caudal fold test (CFT) suspect undergoes the comparative cervical (CC) test and responds as a suspect on this test, the remaining animals are not permitted to be exported until the tissues from the CC suspect undergo a negative culture for *Mycobacterium bovis* even if they are histopathologically negative. This culture takes 6-8 weeks to complete (Russia requires Tuberculosis [TB] testing during the 21 days prior to embarkation), and because all of the remaining animals are rendered ineligible for export until a negative culture is completed, an exporter is at risk of losing $5-6 million. If this happens, the remaining exporters will be unwilling to face such a huge risk and will abandon the export business.

To date and after many requests, USDA-APHIS-VS has been unable to produce any documentation of cases in which a positive culture was obtained from tissues that were histopathologically negative for TB. Therefore, the probability of the remaining “test negative” animals in the shipment being capable of transmitting TB is insignificant. In all the years of following VS Memorandum 592.102, there has not been an incidence of a TB-positive animal being exported to another country.

**RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS) to eliminate the requirement for a culture for *Mycobacterium bovis* on histopathologically negative tissues, and to return to the Tuberculosis directives of VS Memorandum 592.102 dated 10/29/93.

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RESOLUTION NUMBER: 11 – Combined with 6

SOURCE: USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems

SUBJECT MATTER: State Animal Laboratory Messaging Service

RESOLUTION NUMBER: 12 - Not Approved

SOURCE: USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems

SUBJECT MATTER: Establishment of an Animal Health Data Standards Subcommittee

BACKGROUND INFORMATION:
Recently the importance of exchanging animal health data between dissimilar systems throughout the animal health system has become clear. The National Animal Health Laboratory Network (NAHLN) has established the concept of system-to-system communication of laboratory results for key diseases of national importance. The proposed United States Department of Agriculture (USDA) Animal Disease Traceability program will demand extensive state-to-state communication of data such as contents of Interstate Certificates of Veterinary Inspection (ICVI). Managing routine disease surveillance programs with reduced funding makes the process of manual data transcription from one system’s reports into another system’s database unaffordable. In order to facilitate communication between government and private sector participants in animal health programs, a widely accepted set of consensus standards for data exchange is needed.

In most segments of the electronics, internet, and medical industries such standards are normally developed by non-profit organizations certified by the American National Standards Institute (ANSI) or the International Organization for Standardization (ISO) as Standards Development Organizations (SDO). What ANSI/ISO certified SDOs provide is a neutral environment in which input from all market segments is ensured while avoiding either commercial anticompetitive collusion or violations of government ethics rules. The resulting standards are more likely to receive widespread acceptance than those developed by a single entity, either commercial or governmental.

The animal health information systems community needs a similar process for development of the standards for system-to-system communication of animal health data. The NAHLN took the approach of adopting a set of standards widely accepted by the human health system. With input from veterinary informaticists working with the NAHLN, these
standards made modifications and extensions needed to support this activity. However, these standards include many features that are better optimized for the human medical system and only made to work for veterinary medicine. The full ANSI/ISO accreditation process may not be necessary for such a process. There is a precedent for a successful consensus standards process by a loosely formed consortium VetXML to develop standards for the pet insurance industry in the United Kingdom. For the animal health community, the United States Animal Health Association/American Association of Veterinary Laboratory Diagnosticians Joint Committee on Animal Health Surveillance and Information Systems is a logical convening body for a subcommittee to develop consensus standards for data exchange between systems. It will be critical that this subcommittee have representation from all segments including both government and private sectors. Because the standards developed will deal with the technical issues of data interchange rather than the policy issues of what information can be or must be exchanged, the representatives should be those with a solid grasp of their constituent’s technical needs and capabilities.

The standards development process works best when several organizations present their ideas of what the ultimate standard should be. The committee then uses these sources, along with input from the rest of the group, to develop an abstract conceptual model of the information exchange process. This abstract information model is then used as the basis for developing an implementable model that includes the important features of all the inputs in a form that all participants can support. Often it is not ideal for any of the participants but having functional communication partners in data interchange is more important than design elegance. Often, even those who submitted their “ideal” versions as input find things in the consensus standard that benefits their offerings.

USDA recently published a document with data standards for ICVIs. Although this document provides a good start to the process, it falls short of meeting the needs of several stakeholders. This document could serve as the catalyst to the development of a wider set of standards.

With proper representation from across the animal health community, a subcommittee under USAHA/AAVLD could provide these benefits and move true system-to-system data communication forward.

COMMITTEE ACTION:

To establish an Animal Health Data Standards Subcommittee under the United States Animal Health Association/American Association of Veterinary Laboratory Diagnosticians Joint Committee on Animal Health Surveillance and Information Systems. This subcommittee will consist of informaticists and information technology technical expert representatives of state and federal animal health authorities, commercial animal health software and service providers, academia, and other interested industry representatives. This group will respond to needs for information exchange among various animal health information systems, by development of consensus standards
for information exchange. It will not place requirements on any individual system's technical implementation or company business practice.

RESOLUTION:
The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services send appropriate technical experts to participate in an Animal Health Data Standards Subcommittee under the United States Animal Health Association/American Association of Veterinary Laboratory Diagnosticians Joint Committee on Animal Health Surveillance and Information Systems and to cite standards developed by this group when it needs to standardize system-to-system integration.

Editor's Note: The resolution was directed, by the membership, to follow course of action from the Committee on Livestock Identification as a recommendation, as reflected in that report approved by the Board of Directors.

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RESOLUTION NUMBER: 13 and 23 Combined – APPROVED

SOURCE: Committee on Wildlife Diseases
Committee on Captive Wildlife and Alternative Livestock

SUBJECT MATTER: Funding for Indemnity of Chronic Wasting Disease-Positive or Exposed Animals

BACKGROUND INFORMATION:
The Administrator is authorized to pay for the purchase and destruction of Chronic Wasting Disease (CWD) positive animals, CWD exposed animals, and CWD suspect animals (9 CFR 55.2). Subject to available funding, the amount of the Federal payment for any such animals will be 95 percent of the appraised value established in accordance with 55.3 of this part, but the Federal payment shall not exceed $3,000.00 per animal.

In the past, the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services has provided funding to pay for the purchase of farmed cervids that tested positive for CWD, were exposed to CWD positive animals, or were suspect animals, in order to mitigate the risk of the spread of CWD to other captive and wild cervids. Federal funding for this purpose is no longer available and farmed cervid producers are no longer indemnified for the destruction of their animals. Without federal funding for the purchase of destroyed animals, producers will suffer considerable financial damages.
RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to provide funding for a federal program to pay indemnity for animals euthanized because of infection or exposure to Chronic Wasting Disease.

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RESOLUTION NUMBER: 14 – APPROVED

SOURCE: Committee on Transmissible Diseases of Swine

SUBJECT MATTER: Research on Seneca Valley Virus

BACKGROUND INFORMATION:
Swine exhibiting vesicular lesions similar in appearance to Foot-and-mouth Disease (FMD) have recently been observed in commercial pork production operations in multiple states. Diagnostics conducted at the Plum Island Animal Disease Laboratory have excluded foreign animal diseases and isolated Seneca Valley Virus as the etiologic agent. Little is known about the epidemiology of this virus in swine but the similarity in clinical presentation to FMD results in the initiation of foreign animal disease investigations and potential disruptions in domestic markets, animal movements and access to international markets. There is an urgent need for basic and epidemiological research to further the swine industry’s understanding of this disease complex.

RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture (USDA), Agricultural Research Service to conduct research on Seneca Valley Virus (SVV) and the idiopathic vesicular disease (IVD) complex in swine, and that USDA, Animal and Plant Health Inspection Service, Veterinary Services initiate epidemiologic studies, outreach and education to all stakeholders, including USDA, Food Safety and Inspection Service, enhancing awareness of the occurrence of SVV and IVD in swine. USDA should work with all stakeholders to develop and implement plans that will mitigate the consequences on markets in the United States and internationally when vesicular lesions not associated with foreign animal diseases are found at ante-mortem inspections or on the farm.

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RESOLUTION NUMBER: 15 and 22 Combined – APPROVED AS AMENDED

SOURCE: Committee on Bluetongue and Related Orbiviruses
        Committee on Captive Wildlife and Alternative Livestock

SUBJECT MATTER: Vaccine for the Various Strains of Epizootic Hemorrhagic Disease in Cervids

BACKGROUND INFORMATION:
Epizootic Hemorrhagic Disease is a detrimental threat to the farmed cervid populations, especially whitetail deer. The committee encourages the United States Department of Agriculture, Agricultural Research Service to develop a vaccine that will protect against all known strains of this disease.

RESOLUTION:
The United States Animal Health Association requests the United States Department of Agriculture, Agricultural Research Service allocate resources to support Epizootic Hemorrhagic Disease (EHD) research at the Arthropod-Borne, Animal Diseases Research Laboratory, focusing on understanding the pathogenesis of the disease to facilitate the development of a vaccine to adequately protect the farmed cervid population from all strains of EHD.

RESOLUTION NUMBER: 16 – APPROVED

SOURCE: Committee on Bluetongue and Related Orbiviruses

SUBJECT MATTER: National Review of Research Needs for Bluetongue and Related Orbiviruses

BACKGROUND INFORMATION:
Bluetongue and Epizootic Hemorrhagic Disease viruses are of concern to producers in North America because of: a) new serotypes b) increased reports of clinical disease and c) increased geographical range.

RESOLUTION:
The United States Animal Health Association requests the United States Department of Agriculture, and United States Department of Interior arrange a diversified blue-ribbon panel (including: industry stakeholders, university and federal researchers, federal and state regulatory agencies) to determine research needs and identify and prioritize intervention strategies.
RESOLUTION NUMBER: 17 – APPROVED

SOURCE: Committee on Brucellosis

SUBJECT MATTER: Brucellosis in the Greater Yellowstone Area

BACKGROUND INFORMATION:

The state and federal governments and the livestock industries have spent billions of dollars since 1935 to eradicate *Brucella abortus* (*B. abortus*) infection from cattle in the United States (US). The presence of *B. abortus* in the US has significant economic impact upon the livestock industry and may have an impact on international trade.

The only known remaining focus of brucellosis caused by *B. abortus* in the US is the bison and elk in the Greater Yellowstone Area (GYA). The United States Animal Health Association (USAHA) supports the efforts of the GYA state and federal agencies in their efforts to prevent exposure of livestock to brucellosis from elk and bison in the GYA and encourages the efforts of the GYA state agencies to control brucellosis in bison and elk in the GYA. Through the significant efforts of the federal/state/industry bovine brucellosis eradication program, Wyoming was declared bovine brucellosis Class Free in 1983, Montana in 1985, and Idaho in 1991. No cattle brucellosis affected herds were detected in the GYA for over a decade.

A brucellosis affected cattle herd was then detected in 2002 in Idaho, followed by the disclosure of additional affected herds in subsequent years in all three states in the GYA. Wyoming lost its Brucellosis Class Free status in 2004, Idaho lost its Brucellosis Class Free status in 2006, and Montana lost its Brucellosis Class Free status in 2008, all due to transmission of *B. abortus* from wildlife to cattle. All three states subsequently regained Class Free status. Due to recent program changes, at this time, the states can still remain designated as “Class Free”, and additional program status definition changes are pending. However, brucellosis continues to spread to livestock herds in the GYA. Since 2002, 21 brucellosis affected cattle and bison herds in the vicinity have been identified. Animals from herds disclosed in Fiscal Year 2011 and 2012 have been traced out to 14 states. This trend is not only extremely costly to the affected cattle herd owners and states, but seriously threatens the brucellosis free status of the rest of the country. The reasons for this alarming increase in brucellosis in cattle and domestic bison herds in the GYA are unclear and the large number of cases disclosed in the last decade is alarming. Without a better understanding of what has changed in the last ten years resulting in this surge of brucellosis affected herds, such as factors or changes in wildlife or livestock populations, it will be difficult to mitigate transmission and to arrest the continued spread of brucellosis.

RESOLUTION:

As part of understanding the apparently changing dynamics of brucellosis in the Greater Yellowstone Area (GYA), The United States Animal
Health Association (USAHA) strongly urges that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services in partnership with the state and federal wildlife agencies, undertake a comprehensive epidemiologic study to determine why the frequency of cases of transmission from elk to cattle has increased so dramatically in recent years. The information learned from this study can then be used to develop steps to more effectively prevent the risk of brucellosis spread to cattle and domestic bison and to eliminate brucellosis from cattle and domestic bison in the GYA and the United States.

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RESOLUTION NUMBER: 18 – Combined with 7

SOURCE: Committee on Infectious Diseases of Horses

SUBJECT MATTER: Standardization of Equine Herpes Virus-1 Polymerase Chain Reaction Testing at Diagnostic Facilities

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RESOLUTION NUMBER: 19 – APPROVED

SOURCE: Committee on Infectious Diseases of Horses

SUBJECT MATTER: Dourine and Glanders Testing of Domestic Equids at the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, National Veterinary Services Laboratory

BACKGROUND INFORMATION:

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Center for Import and Export (NCIE) requires that all horses entering the United States (US) test negative for dourine and glanders (among other diseases). On the USDA-APHIS-VS-NCIE equine importation webpage USDA states “…importers may wish to verify that the horse is not positive for dourine, glanders, equine piroplasmosis, and equine infectious anemia (EIA) before exporting. Horses that test positive by USDA for any of these diseases will be refused entry.” For this reason, many shippers recommend that US clients test their animals for dourine/glanders prior to exporting them out of the US to know their horse’s status before shipping since a false positive test result for re-entry into the US could occur resulting in refused re-entry of the horse upon return. Additionally, this testing recommendation provided valuable national equine herd passive surveillance for these diseases with the testing expense being paid by the submitter.
In April 2012, a USDA-APHIS-VS-NCIE policy change was instituted dictating that the USDA-APHIS-VS, National Veterinary Services Laboratory (NVSL) would no longer test horses residing in the US for dourine or glanders, unless they were suspected of having the disease or were required to be tested by law (e.g., plasma donor horses). USDA-APHIS-VS-NVSL, the only US laboratory that performs these tests, is now prohibited from doing so on healthy horses residing in the US. So, despite the USDA recommendation that US horses be tested for these diseases prior to shipping out of the country, there is no longer a way to test them and the passive surveillance for these diseases is lost. This USDA-APHIS-VS-NCIE testing policy change was not communicated to diagnostic laboratories or equine exporters.

**RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to re-evaluate the dourine and glanders testing policy change for United States domestic equids and allow this testing recommended by USDA-APHIS-VS, National Center for Import and Export upon request, at the owner’s expense. This testing provides United States (US) owners exporting horses the opportunity to pre-test domestic horses and possibly avoid a domestic horse returning home from being denied entry into the US due to a false positive test. Reinstitution of the USDA-APHIS-VS, National Veterinary Services Laboratory testing of domestic equids for these diseases is necessary and valuable for the passive surveillance of our national equine herd.

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**RESOLUTION NUMBER: 20– APPROVED**

**SOURCE:** Committee on Captive Wildlife and Alternative Livestock

**SUBJECT MATTER:** Chronic Wasting Disease Control

**BACKGROUND INFORMATION:**

It has been stated by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services that (1) the goal of the Chronic Wasting Disease (CWD) program in the United States has now changed from eradication to controlling its spread, (2) there is no longer federal funding available to pay for CWD testing or to pay indemnity for CWD infected or exposed animals, and (3) depopulation of infected herds will no longer be required or expected.

With this major change in objectives, it is critical that we change the way we implement the CWD program in the United States. We now need a program that minimizes the risk of spreading CWD in farmed and wild cervidae without putting farmed cervidae producers out of business if their...
herds become CWD infected or exposed. We need a CWD control program that includes plans for how to (1) handle infected or exposed herds, (2) clean up infected herds without depopulation, and (3) provide outlets so producers can continue to sell velvet antler and live animals to slaughter or specified terminal facilities.

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services and state animal health regulatory officials to develop protocols for the Chronic Wasting Disease (CWD) control program that mitigate the risk of the spread of CWD and allow producers with CWD infected or exposed herds to continue operations under quarantine and which allow (1) addition of cervidae from CWD certified herds, (2) participation in herd plans such as test and removal, and (3) movement of velvet antler and live animals to slaughter or other approved terminal facilities.

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RESOLUTION NUMBER: 21 – APPROVED AS AMENDED

SOURCE: Committee on Captive Wildlife and Alternative Livestock

SUBJECT MATTER: Funding for Chronic Wasting Disease Testing

BACKGROUND INFORMATION:

The requirements for Chronic Wasting Disease (CWD) herd certification (9 CFR 55) and for interstate movement of farmed cervidae (9 CFR 81) specify that all farmed cervidae greater than 12 months of age that die or are slaughtered must be tested for CWD.

The CWD testing protocol that is recommended for farmed cervidae is the immunohistochemistry test using formalin fixed samples of brain stem or a retropharyngeal lymph node. The test on either of these tissues is highly sensitive and specific for detecting the presence of CWD prion. The test costs at least $25.00 per slide to perform at United States Department of Agriculture (USDA) approved laboratories.

In the past, USDA, Animal and Plant Health Inspection Service, Veterinary Services has provided funding to pay for CWD testing of wild and farmed cervids in the United States. Federal funding for this purpose is no longer available and farmed cervidae producers in most states must pay the entire cost for required CWD tests. Without federal funding for CWD testing, producer compliance with program requirements is likely to decrease. Without producer support, the program to control the spread of CWD in the United States may become less effective.

Funding for CWD testing was requested and approved in United States Animal Health Association 2011 resolution number 14.
REPORT OF THE COMMITTEE

RESOLUTION:
The United States Animal Health Association urges Congress to appropriate federal funding to pay the laboratory costs of testing farmed and wild cervidae for Chronic Wasting Disease.

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RESOLUTION NUMBER: 22 – Combined with 15

SOURCE: Committee on Captive Wildlife and Alternative Livestock

SUBJECT MATTER: Vaccine for the Various Strains of Epizootic Hemorrhagic Disease in Cervids

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RESOLUTION NUMBER: 23 – Combined with 13

SOURCE: Committee on Captive Wildlife and Alternative Livestock

SUBJECT MATTER: Funding for Indemnity of Chronic Wasting Disease Positive or Exposed Animals

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RESOLUTION NUMBER: 24 – APPROVED

SOURCE: Committee on Captive Wildlife and Alternative Livestock

SUBJECT MATTER: Chronic Wasting Disease Program Standards

BACKGROUND INFORMATION:
It has been stated by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) that the goal of the Chronic Wasting Disease (CWD) program in the United States has now changed from eradication to controlling its spread.

The document entitled, "Chronic Wasting Disease Program Standards" was published by USDA-APHIS-VS in July 2012. It was developed before the shift of the CWD program from eradication to control and without adequate input from state wildlife and animal health officials or farmed cervidae producers. Sections of the document suggest placing restrictions on farmed cervidae producers that do nothing to further the effort to control the spread of CWD. The restrictions are not based on current scientific knowledge and could undermine the success of CWD control programs that have been in place in many states for more than a decade.
RESOLUTION:  
The United States Animal Health Association urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to revise the document entitled, "Chronic Wasting Disease Program Standards", and establish a Chronic Wasting Disease (CWD) Program Standards Committee to review and rewrite the document within 90 days so that it more appropriately reflects the needs of producers and regulatory officials charged with implementation of a program to control, not eradicate, CWD in the United States.

The United States Animal Health Association suggests that the CWD Program Standards Committee should be made up of representatives from and appointed by each of the following organizations: (1) the Exotic Wildlife Association, (2) the North American Elk Breeders Association, (3) the North American Deer Farmers Association, (4) the Association of Fish and Wildlife Agencies, (5) the National Assembly of State Animal Health Officials, and (6) the USDA-APHIS-VS.

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RESOLUTION NUMBER: 25 – Combined with 1

SOURCE: Committee on Livestock Identification


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RESOLUTION NUMBER: 26, 9 and 30 Combined – APPROVED

SOURCE: Committee on Scrapie  
Committee on Import Export  
Committee on Sheep and Goats

SUBJECT MATTER: Export of Sheep and Goats

BACKGROUND INFORMATION:
Under the National Scrapie Eradication Program the prevalence of scrapie in the United States flock has decreased significantly over the past 10 years. The funding for the Scrapie Flock Certification Program (SFCP) has been reduced and participation by sheep and goat breeders has dramatically decreased. It has become increasingly difficult to find breeding sheep and goats for export shipments that meet importing country protocols that rely on SFCP participation. Additionally, new tools such as genotyping and live-animal testing can be used to identify sheep that are at low risk for
REPORT OF THE COMMITTEE

scrapie. These approaches may provide an appropriate basis for revised export protocols.

RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture, Animal Health and Plant Inspection Services, Veterinary Services to expand their negotiating tools for the export of sheep and goats beyond those that rely on the Scrapie Flock Certification Program participation alone and to encourage other countries to recognize current National Scrapie Eradication Program prevalence and surveillance data along with the use of other tools such as genotyping when appropriate.

*****

RESOLUTION NUMBER: 27 – APPROVED

SOURCE: Committee on Public Health and Rabies

SUBJECT MATTER: Increased Fiscal Year 2014 Funding for the United States Department of agriculture, Animal and Plant Health Inspection Service, Wildlife Services Oral Rabies Vaccination Program

BACKGROUND INFORMATION:
Wildlife rabies is a serious public health concern. Globally, the World Organization for Animal Health (OIE) now estimates that 70,000 people worldwide die each year from rabies. ProMED (September 28, 2011) states that rabies is one of the world’s most lethal zoonotic diseases, killing more people than severe acute respiratory syndrome, H5N1 influenza, and dengue fever combined. Domestically, wildlife rabies is still responsible for 92% of all reported rabies cases in the United States (Blanton, et al. JAVMA, 2012).

The use of licensed oral rabies vaccine (ORV) has been effective in controlling rabies in certain terrestrial wildlife reservoir species since the early 1990’s. Rabies control continues to be the embodiment of a One Health initiative and the United Nations Food and Agriculture Organization now believes that rabies and foot-and-mouth disease should be the next global diseases targeted for eradication.

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Wildlife Services, ORV program is designed to reduce transmission of wildlife rabies to domestic pets, livestock, and humans. The United States Animal Health Association agrees with OIE that the best place to address rabies control is at the animal source. Regular distribution of ORV to immunize target wildlife species increases the percentage of rabies immune animals in ORV baiting zones. Creating a reservoir population of immune animals results in a decrease in rabies cases and prevents the spread of rabies to new areas. Rabies programs in the United States that have integrated ORV with traditional public and animal
health measures have successfully eliminated the transmission of the canine variant of rabies in south Texas coyote populations, halted the westward expansion of raccoon rabies variant at the Appalachian Mountains, and resulted in no reported cases of gray fox rabies variant cases in Texas since May of 2009. Today, federal and state sponsored ORV programs continue to monitor areas where rabies variants have been eliminated while addressing new challenges. The funding level requested would allow the USDA to maintain ongoing logistical support and wildlife rabies case surveillance necessary for the program, while maintaining existing operational programs to control rabies in target wildlife populations.

RESOLUTION:
The United States Animal Health Association requests the 114th Congress continue to support level funding in the Fiscal Year (FY) 2014 budget line item for the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, National Rabies Management Program. However, consideration for additional funding in FY 2014 may be warranted to cover increased costs associated with operational programs that are successfully controlling wildlife rabies in 14 States and emergence of rabies in new locations or species.

RESOLUTION NUMBER: 28 – APPROVED AS AMENDED

SOURCE: Committee on Transmissible Diseases of Poultry and Other Avian Species

SUBJECT MATTER: Support for Foreign and Emerging Animal Disease Funding

BACKGROUND INFORMATION:
The United States Department of Homeland Security (DHS) has become a major source of funding for both basic and applied research on foreign animal diseases, supports two Centers for Excellence (Kansas State University and Texas A&M University), and owns and operates the Plum Island Animal Disease Center. The DHS support has provided for useful advances in diagnostic tests and vaccines for several important foreign animal diseases. This funding has been applied primarily to mammalian diseases with limited support for diseases of poultry.

RESOLUTION:
The United States Animal Health Association urges that the United States Department of Homeland Security support funding for avian influenza vaccine projects.

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RESOLUTION NUMBER: 29 - APPROVED

SOURCE: Committee on Sheep and Goats

SUBJECT MATTER: Minor Use Animal Drug Program

BACKGROUND INFORMATION:
The approval of animal drugs for use in minor species is critical to the appropriate treatment of sheep and goat disease and to the maintenance of animal health. The National Research Support Program-7 (NRSP-7) provides much-needed and valuable services to the sheep and goat industries throughout the United States. The continued work of this program will be essential to the sustainability and growth of the industry through the availability of the United States Food and Drug Administration (FDA)-approved medications for use in sheep and goats.

The United States Animal Health Association (USAHA) supports and appreciates the efforts of the NRSP-7. The research conducted under this program will be essential to the sustainability of the small ruminant industries and to the maintenance of sheep and goat health. The USAHA acknowledges the importance of research conducted under the NRSP-7.

RESOLUTION:
The United States Animal Health Association urges Congress to include a permanent funding mechanism for the National Research Support Program-7 (NRSP-7) program and urges the United States Food and Drug Administration and the United States Department of Agriculture to include funding for the NRSP-7 in their budget requests at a level that meets the needs of minor use and minor species requests.

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RESOLUTION NUMBER: 30 – Combined with 26

SOURCE: Committee on Sheep and Goats

SUBJECT MATTER: Export of Sheep and Goats

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RESOLUTION NUMBER: 31 and 35 Combined – APPROVED

SOURCE: Committee on Foreign and Emerging Diseases
Committee on Parasitic Disease

SUBJECT MATTER: Sterile Screwworm Fly Production and Distribution

BACKGROUND INFORMATION:
Screwworm larvae have been identified annually in the United States (US) over the last 12 years. These larvae are found in imported horses or dogs and cats originating in screwworm infested countries of South America or the Caribbean. Most detections have been found in Florida soon after importation, requiring steps to be taken to prevent further dissemination.

During a screwworm training exercise, conducted with state, federal, and industry responders in Florida, response planning included provision of sterile flies for release in Florida that were produced by both the Pacora, Panama plant and the Tuxtla Gutierrez plant in Mexico. Flies from both plants were needed to contain and control this simulated Florida outbreak.

During the past year, the United States Department of Agriculture discontinued US funding for the screwworm production plant in Mexico. The loss of production capabilities at this plant has raised serious concerns as to the ability of the US to respond to screwworm incursions into the US.

Production at the Panama facility is needed to maintain the barrier zone in the Panama area to prevent normal migration of flies from the south and reestablishment of natural populations in Central America and Mexico.

It is critically important that plans be in place to meet the needs of state and federal responders in the event of a screwworm outbreak in the US.

RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture to have in place written emergency response plans to be shared with state cooperators for producing and distributing adequate sterile flies in the event of the reemergence of screwworm in the United States.

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RESOLUTION NUMBER: 32 and 36 Combined – APPROVED AS AMENDED

SOURCE: Committee on Pharmaceuticals
Committee on Animal Welfare

SUBJECT MATTER: Controlled Substances Act Regulations Applying to Drug Enforcement Administration Registrants Acting Remotely from Registrant’s Principle Place of Business
BACKGROUND INFORMATION:

Many pharmaceuticals, which are used for a variety of indications, including sedation, anesthesia, pain management, and euthanasia, are classified as controlled substances because of their potential for misuse or abuse. The purchase, use, and disposal of these pharmaceuticals are controlled by the United States Drug Enforcement Administration (DEA) as directed by the United States Department of Justice and authorized by the Controlled Substances Act (CSA). Registrations are issued to qualified applicants for use of specified classes of these pharmaceuticals.

United States Code (U.S.C.) Title 21 Section 822 (a) and (e) of the CSA outline who is required to register with the DEA to manufacture, distribute, or dispense controlled substances. Per 21 U.S.C. § 822 (e), a separate registration is required at each principal place of business or professional practice where the applicant dispenses controlled substances. This means it is illegal to transport, administer, or dispense controlled substances outside of the premises listed on the applicant’s registration. Historically, the DEA has applied regulatory discretion to enforcement of this limitation, allowing registrants to use controlled substances at remote locations as medical needs indicate. During the past six months, some DEA field offices have indicated an interest in scrutinizing or enforcing the regulations. The potential impacts of such enforcement on animal welfare are serious because it may preclude the use of controlled drugs (for which there may be no satisfactory substitute) to relieve animal suffering. Because DEA contends that the current law does not permit practitioner registrants to dispense controlled substances in mobile or ambulatory practice in a realistic or practical way, it is impossible to provide appropriate care within the confines of the law in the event that animals need treatment at a remote location.

In 2010, combined United States Animal Health Association (USAHA) resolutions 12 and 25 (approved as resolution 12) attempted to address the corollary issue of veterinarians who deliver services in states other than those in which they have physical principal places of business (e.g., veterinarians in ambulatory or travelling specialty/special-interest practices, who are on or near state borders and hold veterinary licenses in more than one state; practitioners acting as part of emergency service teams; practitioners participating in programs that provide services to underserved populations). That resolution asked the Attorney General to exercise authority granted by the Controlled Substances Act of 1970, 21 U.S.C. § 822 (d), to promulgate regulations that would waive the requirement for veterinarians in ambulatory practices to have a separate United States Department of Justice Drug Enforcement Administration registration in each state in which they are licensed or authorized to practice.

Two important points have been made clear from the DEA’s response to the 2010 USAHA resolution, as well as its response to requests from stakeholders to modify regulatory requirements and allow registrants to transport controlled substances to locations remote from registrants’ principal place of business (which may be necessary either within a given state or
across state lines). The first is that this is a complex issue affecting many dispensers including, but not limited to, veterinarians. The second is that the authority accorded by 21 U.S.C. § 822 to the Department of Justice is insufficient to allow concerns to be resolved through a regulatory process—statutory change is required.

RESOLUTION:

The United States Animal Health Association urges Congress to amend the Controlled Substances Act to provide a legal means by which the United States Department of Justice, Drug Enforcement Administration registrants or authorized agents may appropriately transport and utilize controlled substances when acting in the normal course of business or employment pertaining to the treatment of animals (domestic and wildlife) in locations outside of the principal place of business listed on their registration.

RESOLUTION NUMBER: 33 – Combined with 8

SOURCE: Committee on Tuberculosis

SUBJECT MATTER: Support for Research on Mycobacterial Diseases in Animals

RESOLUTION NUMBER: 34 – Combined with 10

SOURCE: Committee on Tuberculosis

SUBJECT MATTER: Tuberculosis Testing of Export Cattle and the Requirement for a Negative Culture of Mycobacterium Bovis from Histopathologically Negative Tissues

RESOLUTION NUMBER: 35 Combined with 31

SOURCE: Committee on Foreign and Emerging Diseases Committee on Parasitic Disease

SUBJECT MATTER: Sterile Screwworm Fly Production and Distribution
RESOLUTION NUMBER: 36 Combined with 32

SOURCE: Committee on Pharmaceuticals
Committee on Animal Welfare

SUBJECT MATTER: Controlled Substances Act Regulations Applying to Drug Enforcement Administration Registrants Acting Remotely from Registrant’s Principle Place of Business

*****
Heartwater is a pernicious and frequently fatal disease of livestock and wild ungulates caused by the rickettsial bacterium *Ehrlichia ruminantium*. The bacterium is widespread in sub-Saharan Africa where it is vectored by several species of bont ticks (*Amblyomma* spp., Ixodidae), and has been introduced to three islands in the Lesser Antilles. The southeastern United States is considered a high risk area for Heartwater. In 1999, leopard tortoises (*Geochelone pardalis*) imported from Africa to Florida for the reptile trade were found to be infested with *A. variegatum*, a prominent Heartwater vector. Subsequently, the national reptile industry implemented voluntary best practices, accompanied by the development of effective acaracides, which substantially reduced the incidence of imported ticks. In November 2011, *A. variegatum* were found on Savannah monitors (*Varanus exanthematicus*) from West Africa, leading to quarantines in several locations. In response, the major US reptile importers met with USDA and the Florida Department of Agriculture and Consumer Services to explore improved best management practices for imported reptiles. The reptile industry developed a tick interception protocol that 1) all reptiles must be inspected for ticks in the exporting country; 2) all wild harvested Savannah monitors and ball pythons (*Python regius*) must be treated with an acaricide even if no ticks are discovered; 3) a health declaration signed by a veterinarian in the country of origin must accompany all shipments; 4) certain tick-prone species must be isolated and inspected on import; 5) shipping
containers and packing materials must be treated; 6) if ticks are discovered on imported reptiles, all animals in a shipment must be isolated and treated; 7) USDA must be notified within 24 hours of any ticks found on imported reptiles; and 8) ticks will be preserved by the importer and submitted to USDA for identification.

Update on ARS Screwworm Research Activities
Steven R. Skoda
USDA-ARS

Screwworm myiasis is devastating to warm blooded animals. Eradication of the screwworm from mainland North America using the sterile insect technique is an unprecedented achievement; reinvasion is prevented by maintenance of a barrier at the Panama – Colombia border. Molecular genetic techniques are providing an understanding of the genetic diversity of screwworms sampled from across their current range. Transgenic techniques are being used to develop a males-only, genetic sexing strain of screwworms. Potassium permanganate has been shown useful in reducing ammonia production from larval developmental media and to be a viable replacement for formaldehyde as an antimicrobial in the larval diet. SRU recommended updates to navigation and dispersal equipment have been installed on the aircraft that disperse sterile screwworms in the barrier zone; more efficient placement of flies will result. Volatiles that attract female screwworms have been identified from wounds of animals. Research has been initiated to develop a chemically defined diet for screwworm larvae; this will allow for economical substitutes to be identified for use in mass rearing screwworms. The SRU has consistently reached research milestones established in the interest of providing updated or novel answers to critical questions posed by the Panama – US Commission for Eradication of Screwworms.

Update on ARS Tick and Biting Fly Research Activities
Steven R. Skoda
USDA-ARS

Ticks and biting flies cause tremendous economic damage to the US livestock industry while also being a health concern to humans. Research on their biology and control is done at the Knipling-Bushland US Livestock Insects Research Laboratory, Tick and Biting Fly Research Unit with scientists located in Kerrville, Texas and the Cattle Fever Tick Research Laboratory near Edinburg, Texas. The current five-year research cycle emphasizes research on the biology and control of ticks of veterinary and human importance, mining the genome of *Rhipicephalus microplus* to develop novel control technology and vaccines, and molecular biology and physiology of biting flies affecting livestock. Four talented scientists were added to the research team this past year. We documented the positive effect of Ravop® on tick strains resistant to organo-phosphates, identified and reported resistance of ticks to fipronil, and reported the value of ivermectin
for tick control when added to molasses feed supplement. Vaccines developed against cattle ticks were tested and shown effective. Activities were expanded towards completion of the tick genome project. Work progressed to determine the physiology of tick resistance to insecticides while analysis of doramectin levels in cattle serum showed that the current recommended treatment regimen is valid. The potential was demonstrated of the growth inhibitors pyriproxyfen and buprofezin as well as a novel benzoylphenyl urea pesticide (novaluron) in fly management programs. Improvements were developed to bait stations used to apply tick control on local deer populations and activities initiated to determine the potential for dogs to be trained to detect cattle fever ticks. Methods to accurately sample native tick populations were investigated while also working to determine the areas of favorable tick habitat in the quarantine zone and develop methods to control invasive plants that contribute to tick survival. Finally, we described vulnerabilities induced by changes in the global society that necessitate retooling and fully integrating the approach to the cattle fever tick eradication effort.

Florida Screwworm Training Exercise and Response Planning
Thomas J. Holt
Florida Department of Agriculture, State Veterinarian

The New World Screwworm was successfully eradicated from the United States, Mexico, and other countries north of Panama utilizing a sterile fly production and release program. Importations of live animals from South America and the Caribbean continue to occur annually bringing infested animals into the United States. Thus far, such introductions have not resulted in a reemergence of this devastating pest. A training exercise with state, federal, and industry representatives was held in Florida to acquaint responders with the biology of the screwworm and to improve understanding of surveillance and response measures, should a reintroduction and establishment occur.

The exercise highlighted the need to improve planning at both the state and federal levels. The decision during the past year to discontinue USDA support for the screwworm production plant in Tuxtla Gutierrez raises concern about the availability of flies that could be used to gain control of established flies circulating again in North America. It is very questionable whether the single plant in Panama can produce enough flies to maintain the barrier zone and respond to a future outbreak.

USDA Screwworm Sterile Fly Production and Distribution in a US Outbreak
John Shaw
USDA-APHIS-International Services (IS)

New World Screwworm (NWS) is still present in five islands of the Caribbean and most countries of South America. NWS spread north to Central and North America. It is prevented by a sterile fly barrier in the
country of Panama, a program in which APHIS-IS is a principal partner. The Panama program includes the only remaining laboratory for the production of sterile NWS flies. Introduction of the pest to the US is extremely infrequent (23 detections in the 30 years since eradication, with 12 of the 23 inside Federal quarantine). Those interceptions found outside quarantine are usually pets (dogs and cats) or people, all of which are most likely to be detected early. Never the less, APHIS-IS and VS must be prepared to partner with the states to detect, investigate, control and eradicate any infestation of cattle screwworm in the US. Projections show that there is sufficient “surge capacity” in the routine Panama programs as well as in extra production capacity in the Panama laboratory to provide the US with sufficient sterile flies to eradicate a US infestation. APHIS-IS is prepared to provide the sterile flies and technical expertise in the case of a US outbreak. APHIS-VS is prepared to conduct the surveillance and analysis necessary to assist the states in detecting a screwworm infestation, in the design of an appropriate response, and in the logistic planning to mount an eradication.

South Texas Tick Surveillance Project Overview
Joseph Corn
Southeaster Cooperative Wildlife Disease Study (SCWDS), University of Georgia

Dr. Corn gave a report on SCWDS Arthropod Surveillance. The SCWDS, in collaboration with the USDA-APHIS-VS, conducts surveys for exotic arthropods on free-ranging wildlife in the southeastern United States. Past surveillance has been focused on detection of exotic ectoparasites on wildlife in Florida and mapping the distribution of Culicoides vectors of bluetongue virus and epizootic hemorrhagic disease virus in the Southeast. Examples of exotic ticks and other arthropods found in the southeastern United States were given. The current objectives of SCWDS surveys are to determine the wildlife host range of Amblyomma cajennense and other possible equine piroplasmosis vectors in South Texas; to determine if wildlife currently serve as hosts for Rhipicephalus (Boophilus) annulatus and R. (B.) microplus in South Texas; and to continue to map the distribution of Culicoides vectors of bluetongue virus and epizootic hemorrhagic disease virus in the Southeast. Preliminary results from the initial tick collections in Texas were discussed.

Texas Cattle Fever Tick Eradication Program Update
Kevin Varner
USDA-APHIS-VS

During FY 2012 the Cattle Fever Tick Eradication Program (CFTEP) continued to see elevated tick activity along the Texas – Mexico border. At the same time the overall trend lines were in the positive direction as the overall number of infested pastures continued to decline.

This trend was most dramatic in the free area of Texas as the number of infested pastures dropped from 86 in 09/09, to 26 in 09/10, to 22 in 09/11, to 11 at the end of September 2012. The location of the infested free area
pastures also shifted towards the permanent Quarantine zone. With at least half of the current infested free area pastures located directly adjacent to the permanent Quarantine line.

The number of infested pastures in the permanent quarantine zone remains elevated and has been essentially unchanged for the past four years: 43 in 09/09, to 51 in 09/10, to 43 in 09/11, to 37 at the end of September 2012.

In FY 2012 the CFTEP worked with the Texas Animal Health Commission (TAHC) and USDA, Agricultural Research Service (ARS) to introduce two new technologies into the program:

**Ivermectin Tubs:** FDA approval requires the completion of pasture studies that treat at least 200 head. The CFTEP has two study pastures in progress and has identified the third and final study pasture. Additionally, in August and September 2012 the CFTEP began to employ the tubs in the field under the Investigational New Animal Drug (INAD) designation that FDA provided for the product. The INAD designation allows the CFTEP to begin to treat entire infested neighborhoods with the product. The Ivermectin tubs allow the cattle to self-medicate and we anticipate that their use will encourage the retention of cattle on infested pastures.

**Vaccine:** In FY 2012 ARS conducted successful tests of Gavac anti-tick vaccine. Unfortunately, since this vaccine is manufactured in Cuba, the more widespread use of the product by the CFTEP proved very difficult. During 2012 TAHC, VS and ARS worked with a US-based major pharmaceutical company to produce a similar vaccine that could be more easily deployed in the program. By year’s end, an agreement had been reached between ARS and the company. Pen trials of the new vaccine began in October 2012. The “vaccine vision” of the CFTEP is to deploy a product that can be used to boost the immunity in cattle throughout the permanent quarantine zone on an annual basis.

**Report on Efficacy of Ivermectin-Molasses Cattle Supplement for Control of Cattle Fever Ticks**
Dan R Baca
USDA-APHIS-VS

The Cattle Fever Tick Eradication Program (CFTEP) and the Texas Animal Health Commission (TAHC) partnered with a commercial feed company to conduct field studies to assess the efficacy of an ivermectin-molasses product for the control of cattle fever ticks (CFT). The Food and Drug Administration (FDA) granted approval for implementation of a protocol to carry out the study with the objective of obtaining a restricted-use label limited to use by the CFTEP on CFT infested and high risk premises.

The protocol required a significant level of infestation, defined as at least ten CFT per animal on average within the herd. The product was required to be used as a stand-alone treatment over a period of nine months duration. Proof of efficacy was defined as $\geq 95\%$ reduction in CFT counts. The FDA required a 48 day withholding period for treated cattle prior to slaughter.
Evaluation of the product was required for both species of CFT, *R.boophilus annulatus* and *R.boophilus microplus*.

The initial study herd, infested with *R.boophilus microplus*, began treatment in September 2011. Follow-up inspections were conducted at 28 day intervals for three subsequent dates, then at 42 day intervals for the duration of the study period. Greater than 95% reduction in CFT counts were observed by Day 56, and 100% reduction by Day 210 of the study, and remained at eradication levels for the remainder of the study period.

The second study herd, infested with *R.boophilus annulatus*, began treatment in April 2012. Follow-up inspections were conducted on the same schedule as the initial herd. Greater than 95% reduction in CFT counts were observed by Day 128 and maintained at Day 170. Follow-up inspections are scheduled for the duration of the study period which expires in January 2013.

The FDA also granted the company an Investigational New Animal Drug (INAD) permit to allow use of the product in other infested and high-risk herds outside of the formal study. Under terms of the INAD, the CFTEP could employ other approved acaricides in conjunction with the test product to evaluate its efficacy in an integrated pest management format. The CFTEP implemented limited use under the INAD in September 2012, to treat select herds with a combination of Coumaphos and the test product under conditions approved by the TAHC.

Preliminary results indicate the product demonstrates a high level of efficacy with reduced costs to producers compared to standard treatment with Coumaphos or Doramectin alone.

**National Cattle Fever Tick Program Update**

Matthew Messenger
USDA-APHIS

Dr. Messenger gave a series of updates, which included finalization of the cooperative agreement to fund an identification guide to ixodid tick larvae in the US, and technical updates to the Bovine Babesiosis section (Part 72) of the Code of Federal Regulations. In addition, updates were given regarding current progress on formal consultations with the US Fish and Wildlife Service for the Cattle Fever Tick Eradication Program river trail patrols, the SCWDS tick surveys, and the Tick Control Barrier.

In addition, an update on the potential recognition of two Mexican States (Sonora and Baja California) as being free of cattle fever ticks was given during the presentation. The regulatory work plan is underway to recognize both states, and publication of the final rule after the public comment period is expected during 2013. A formal review of the tick eradication program for the State of Chihuahua was conducted during July 2012, and completion of the risk assessment document is currently underway. Finally, the Mexican government has proposed a new National Tick Agreement, which will replace the current tick campaign regulations that were published in 1994. The proposed agreement allows for federal control of movement, inspection, and treatment for control, eradication, and cattle fever tick-free areas of Mexico.
Tick Acaricide Update
Matthew Messenger
USDA-APHIS

Dr. Messenger gave an update on currently available acaricides for potential use against cattle fever ticks. Coumaphos remains the only approved acaricide for the Cattle Fever Tick Eradication Program; however, macrocyclic lactones are currently being evaluated on both cattle and white-tailed deer in south Texas. There are other commercially available organophosphates labeled and currently available for use against ticks on cattle and other livestock. These products contain phosmet, tetrachlorvinphos, malathion, dichlorvos, and diazinon. There are over 180 commercially available products that contain pyrethroid formulations. Commercially available macrocyclic lactone products contain ivermectin, doramectin, eprinomectin, moxidectin, and abamectin. There is one product available that contains permethrin and diflubenzuron, an insect growth regulator. Finally, amitraz remains registered within the United States, but the manufacturer is currently re-evaluating the registration and future business options.

Geospatial Approaches for the Analysis of the Distribution of the Cayenne Tick
Angela James
USDA-APHIS-VS

The cayenne tick, *Amblyomma cajennense*, is a new vector of equine piroplasmosis and currently established in Texas. The natural range of the cayenne tick in the United States likely follows the coastline of the southern United States based on a preliminary habitat overlay analysis. The cayenne tick maybe moved via equine and cattle movement throughout the southeastern US-based on host preferences of this tick species however, host movement data sources are not currently readily available to determine the tick risk associated with this movement.

Equine Piroplasmosis – Texas Update
Andy Schwartz
Texas Animal Health Commission

The epidemiological investigation of the 2009 index case of Equine Piroplasmosis (EP) on a south Texas ranch was completed two years ago. Since that time, movement testing has led to the disclosure of 64 affected horses. The majority of these horses fall into two primary categories: Those imported prior to the change of entry test requirements in 2005; and Quarter Horse racehorses. Risk assessment and subsequent testing in south Texas has led to the discovery of an additional 17 affected ranch horses. Though none of these horses are directly linked to the index ranch, some of them may have commingled with horses that had been on the index ranch in years past and likely exposed to EP.
Currently, Texas requires a negative test for *Theileria equi* (within the past 12 months) for horses entering racetracks. An EP test is not required for state entry. Testing for EP must conducted under direct veterinary supervision. The TAHC EP laboratory test document must be completed and submitted with samples to the testing laboratory. Affected horses are permanently quarantined, and must be identified by a 74P brand, a microchip, or unique tattoo approved by the Texas Animal Health Commission (TAHC). Artificial insemination of affected mares is permitted, but not live cover. Negative horses being moved from affected premises must be isolated for 30 days in a tick-free environment, and tested negative at least 30 days after any possible exposure.

Treatment of affected horses is one option available for owners. Treatment, which consists of a series of intramuscular injections of imidocarb dipropionate, is conducted by an accredited vet, and follows a protocol approved by the TAHC (follows the outline in USAHA 2011 Resolution #21). All affected horses remaining on the index ranch have been treated: Almost half are now negative on all tests.

The procedure for moving negative horses from premises where a positive horse was found involves spraying the horse for ticks, and isolation in a tick free environment for at least 30 days. The horse to be released must be tested negative for EP 30 days after possible exposure. This procedure is followed in all parts of the state, though ticks are believed to be a factor in transmission of EP in only a few counties in south Texas.

In 2011, epidemiological investigation of a positive stallion implicated horses in a communal pasture in Kenedy County. Tests on 55 horses in the pasture disclosed nine positive horses, all with different owners. Because these horses were used on local ranches, Kennedy county was declared high risk for EP. All 159 horses in the county were tested, and eight additional positive horses were found on two ranches. Horses on both of these ranches and on the communal pasture were heavily infested with *Amblyomma cajennense* ticks, believed to be the major in disease transmission in this area of the state.

Testing of horses in the surrounding area, where there are established populations of *A. cajennense* ticks will be conducted as agency resources allow.

**Committee Business:**

There was one resolution passed encouraging USDA-APHIS-Veterinary Services to develop and distribute written response plans for the distribution of sterile flies needed to control any future screwworm incursions into the US.
The Committee met on October 23, 2012 at the Sheraton Greensboro Hotel, Greensboro, North Carolina, from 8:00 to 11:15 a.m. There were ten members and six guests present.

VCPR Update
Christine Hoang
American Veterinary Medical Association (AVMA)

An update was provided of the Veterinarian-Client-Patient-Relationship (VCPR) changes within the Model Veterinary Practice Act (MVPA). The exact verbiage can be found at https://www.avma.org/KB/Policies/Pages/Model-Veterinary-Practice-Act.aspx within Section 2. Definitions. Additional information is also contained under the commentary to Section 2, where is it also clearly noted that this VCPR is “now different from that embodied in federal regulation 21 CFR 530.3(i) relating to extra-label drug use.” The Principles of Veterinary Medical Ethics which also contains the VCPR will be considered in the near future with the intent to harmonize AVMA documents. Individual states must now consider whether or not to adopt the verbiage contained within the MVPA. It is possible that states may have differing definitions for VCPR.

Effects of Over-the-Counter (OTC) to Veterinary Feed Directives (VFD) on Veterinary Workforce
Tom Burkgren
American Association of Swine Veterinarians (AASV) and Gatz Riddell
American Association of Bovine Practitioners (AABP)

Both swine and bovine perspectives were presented providing information on potential impacts on veterinarians given the pending transition of over-the-counter medically important antimicrobial feed additives to veterinary feed directives (VFDs). A brief overview was provided of the existing VFD system and challenges as currently many veterinarians are unfamiliar with the process. Discussion of the proposed rule on VFDs noted both benefits and challenges. Among them, decoupling of the VCPR, yet
perhaps still onerous for the veterinarian if millions of VFDs must be written every year. Furthermore, workforce concerns remain and underserved areas continue to lack a sustainable business model.

**Committee Business:**

The Committee reviewed a proposed resolution on Drug Enforcement Administration (DEA) registrants operating remotely from the registrant’s principal place of business. United States Code (U.S.C.) Title 21 Section 822 (a) and (e) of the Controlled Substances Act outline who is required to register with the DEA to manufacture, distribute or dispense controlled substances. Per 21 U.S.C. § 822 (e), a separate registration is required at each principal place of business or professional practice where the applicant dispenses controlled substances. This means it is illegal to transport, administer or dispense controlled substances outside of the premise listed on the applicant’s registration. Historically, the DEA has applied regulatory discretion to enforcement of this limitation, allowing registrants to use controlled substances at remote locations as medical needs indicate. However, the DEA’s response to the USAHA’s resolution in 2010 asking the Attorney General to exercise authority granted by the Controlled Substances Act of 1970, 21 U.S.C. § 822 (d), to promulgate regulations that would waive the requirement for veterinarians in ambulatory practices to have a separate United States Department of Justice Drug Enforcement Administration registration in each state in which they are licensed or authorized to practice would indicate that the authority accorded to the Department of Justice is insufficient to allow concerns to be resolved through a regulatory process and thus a statutory change is required. After thorough review of the background and discussion, the Committee approved a resolution urging Congress to amend the Controlled Substances Act to provide a legal means by which Drug Enforcement Administration practitioner registrants or their authorized agents may appropriately transport and utilize controlled substances when acting in the normal course of business or employment pertaining to the treatment of animals in locations outside of the principal place of business listed on their registration.

The Committee also reviewed its mission statement with potential for revision. After conscientious consideration, a motion was made and seconded to reaffirm the Committee’s mission statement as it is currently written.
REPORT OF THE COMMITTEE ON PROGRAM

Chair: David Meeker, VA

Lisa Becton, IA; Charles Brown, IL, WI; Bonnie Buntain, CAN; Stephen Crawford, NH; William Edmiston, TX; Dee Ellis, TX; Mark Engle, TN; James Evermann, WA; John Fischer, GA; Tony Forshey, OH; W. Kent Fowler, CA; Paul Gibbs, FL; Michael Gilsdorf, MD; Gail Golab, IL; Andrew Goodwin, AR; Steven Halstead, MI; William Hartmann, MN; Julie Helm, SC; Christine Hoang, IL; Donald Hoenig, ME; Annette Jones, CA; Bruce King, UT; Jim Logan, WY; N James Maclachlan, CA; David Marshall, NC; Michele Miller, FL; Sandra Norman, IN; Charles Palmer, CA; Elisabeth Patton, WI; Barbara Powers, CO; Wilson Rumbeiha, IA; David Schmitt, IA; Marilyn Simunich, ID; Kevin Snekvik, WA; Harry Snelson, NC; Nick Striegel, CO; Larry Thompson, MO; Doug Waltman, GA; James Wolfram, FL.

The Committee on Program met on Saturday, October 20 at 6:00 p.m. at the Greensboro Sheraton Hotel in Greensboro, North Carolina. There were 30 members present and three staff. A dinner was provided for the Committee. Chair Dr. David Meeker called the meeting to order, welcoming everyone and introductions of each attendee were made.

Meeker reviewed general procedures for committee meetings, referring Committee Chairs to the Manual of Operating Procedures and discussed quorums, proxies and mission statements.

Ben Richey, executive director, reviewed the process for submitting committee reports, stating they should be in within 24 hours of their meeting adjournment. He also reviewed templates and structure of the reports, and other related details. This was followed by a discussion on security if needed during the meeting.

Steve Halstead, chair of the Committee on Nominations and Resolutions, reviewed the process for resolutions and submitting those. He discussed general guidelines for resolution content.

Don Hoenig commented on the World Organization for Animal Health (OIE) and the anticipated review of chapters. The timeline for comments is very short, so chairs can be looking for pertinent chapters to be sent in the next several weeks.

Several questions and suggestions were offered to the Executive Committee for consideration. They include:

- Evaluating the program to include Foreign and Emerging Diseases to be available to AAVLD members
- Consider moving USAHA and AAVLD meetings more concurrently
REPORT OF THE COMMITTEE

- For the Committee on Government Relations, take into account planning around the Western States District Meeting
- Have Committee sign-in sheets pre-populated with members to initial/change contact information

Bruce King reminded chairs to be thinking about meetings they would like to arrange for the Committee on Government Relations meeting in the spring. He extended an invitation for everyone to attend if they are able.

Meeker then recognized chairs that were stepping down or have reached their five year tenure:
- Charles Brown, II - Committee on Import-Export, 2006-2012
- Stephen Schmitt - USAHA Committee on Wildlife Diseases, 2009-2011
- Andrew Goodwin - USAHA/AAVLD Committee on Aquaculture, 2008-2011
- Michele Miller - USAHA Committee on Captive Wildlife and Alternative Livestock, 2008-2012

The meeting was then adjourned with no further business.
The Committee met on October 23, 2012 at the Sheraton Hotel in Greensboro, North Carolina, from 1:00 to 5:30 p.m. There were 23 members and 30 guests present. Dr. Norman welcomed committee members and guests. She reviewed the committee purpose and guidelines for conducting the meeting.

Presentations

Serosurveillance for *Yersinia pestis* and *Francisella tularensis* in Wildlife From Across the United States

Sarah Bevins
Colorado State University

Co-Authors: Tom Gidlewski, Brandon Schmit, and Thomas DeLiberto

Abstract

Plague (*Yersinia pestis*) and tularemia (*Francisella tularensis*) are bacterial pathogens that are characterized both by their ability to infect a wide-range of vertebrate hosts and by their potential for zoonotic disease transmission. Both are found in the United States, where human cases often involve arthropod vectors; however, infections can come through multiple transmission routes and the dynamics that maintain both plague and tularemia across the landscape are ecologically complex and difficult to isolate. In an attempt to better understand plague and tularemia presence in the environment, a large scale study was initiated by USDA/APHIS/WS to collect samples from probable host species across broad portions of the US. The wildlife sampled for this study was unprecedented in both scope and
geographic scale. Samples were collected year round, from January 2005-December 2010, in cooperation with state and other federal agencies, from 47 US states that had previously documented plague or tularemia activity. Multiple Nobuto strips were collected from each animal, with extra strips archived in the National Nobuto Sample Archive, created and housed at the USDA, Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS), National Wildlife Research Center (NWRC) in Fort Collins, Colorado.

Overall, plague seroprevalence across all regions and species was 8.60%, although region specific plague exposure is often much higher, with some well-sampled counties in Wyoming and New Mexico having coyote exposure rates of 35% and 37% respectively. The data suggest a substantial amount of plague activity across large spatial scales, with carnivores in particular being continually exposed or re-exposed. The degree to which carnivores and omnivorous species are being exposed (Tables 2,3) suggests that prey consumption is driving the plague exposure reported here, although flea-borne transmission occurs as well and cannot be ruled out. On the other hand, F. tularensis was very rarely detected, with an average overall seroprevalence of 0.6%. Any seropositive animals that were detected were often spread out over space and time. Retrospective cluster analyses on plague data lined up with known plague epizootics in prairie dogs. These data provide unique insight into plague and tularemia exposure in wildlife from across the US and demonstrate that sampling a small number of wide-ranging carnivores can provide a broad snapshot of disease activity.

Field Evaluation of Raboral V-RG as an Oral Rabies Vaccine in Striped Skunk (Mephitis mephitis)
Joanne Maki, Merial Limited
Ernest Oertli, Texas Department of State Health Services
Bruce Leland, USDA-APHIS, Texas Wildlife Services

Abstract
Skunk variant rabies is believed to be the last terrestrial rabies variant in Texas. Oral rabies vaccination (ORV) programs implemented in the State over the past 17 years appear to have eliminated both the domestic dog/coyote and Texas gray fox variants.

ORV involves the distribution of consumable vaccine-filled baits into the environment to induce a protective immune response in targeted species. ORV is regarded as a cost-effective strategy for controlling rabies outbreaks in wild mesocarnivores (Slate et al., 2009; Sterner et al., 2009). Different types of vaccine and baits are currently used for the control of wildlife rabies in North America. The vaccinia-rabies glycoprotein recombinant virus, RABORAL V-RG® (Merial, Athens, Georgia, USA) has been used for many years in the USA (e.g., Sattler et al., 2009) and Canada (Rosatte et al., 2008) to control rabies in wildlife species, primarily raccoons.

In the US, the striped skunk (Mephitis mephitis) is the primary skunk reservoir for rabies. Other skunk species: the hooded skunk (Mephitis
macroura), spotted skunks (*Spilogale sp.*), and hog-nosed skunks (*Conepatus sp.*) can contract the disease but their populations are smaller and geographically limited. Skunks often live in close proximity to humans (e.g., Prange et al., 2004). Thus, in order to decrease public health risks and associated costs for post-exposure rabies prophylaxis, control activities are being implemented to reduce rabies prevalence and spread in skunks (Sterner et al., 2009). The primary skunk species in Fort Bend County, Texas is the striped skunk.

The effectiveness (i.e., field efficacy) of ORV campaigns using these vaccine-baits can be estimated, short-term, by the percentage of live-trapped animals that test positive for rabies virus antibodies (i.e. seroprevalence), and long term, by a significant reduction in the number of rabies cases detected in the vaccinated areas. Although laboratory methods and serology results often differ markedly among the regions where ORV have been used (Robbins et al., 1998; Boulanger et al., 2008; Ramey et al., 2008; Rosatte et al., 2009, see Fehlner-Gardiner et al. 2012 for a comparative study) the most important parameter is the reduction in rabies cases over time.

In addition to the obvious physical and behavioral differences between ORV target species, other factors can impact field effectiveness of an ORV. For example, variation associated with the individual (e.g., age and sex), population (e.g., animal density), control operations (e.g., bait density), and landscape (e.g., habitat composition) have been associated with variations in observed rabies seroprevalences (Robbins et al., 1998; Blackwell et al., 2004; Ramey et al., 2008; Rosatte et al., 2009a; Sattler et al., 2009). This field evaluation provides an opportunity to evaluate the degree to which these factors may impact seropositivity in skunks. This paper describes the first field application of Raboral V-RG in Texas in an area in which skunk rabies has been endemic for more than ten years.

**Influenza H3N2 at the Fair: An Outbreak in Animal and Human Populations**

Marianne Y. Ash
Indiana State Board of Animal Health

This presentation describes an outbreak of influenza in swine and people at fairs in Indiana during the 2012 fair season, featuring decisions made and actions taken.

On the afternoon of July 12, 2012 the Indiana State Board of Animal Health (BOAH) received a call from the attending veterinarian at the LaPorte County fair. He reported concern over a number of swine at the 4H fair exhibiting high fever and not eating. There were no other signs of illness. His primary concern was that the animals were scheduled to participate in the fair auction beginning at 8 a.m. the following morning and would be delivered for slaughter shortly thereafter. To avert delivery of febrile hogs to slaughter, the body temperature of each pig was taken the following morning. Febrile pigs were sent home and the children participated in the auction carrying a
picture or poster describing their 4H animal. Approximately 15% of the pigs were excluded from the auction.

On July 13, the morning of the auction, a local TV reporter called the Indiana State Board of Animal Health to report hearsay of illness in 4H exhibitors at the above mentioned fair. This prompted BOAH to contact the attending fair veterinarian and request random sampling of both healthy and sick pigs, with samples to be delivered to our state diagnostic laboratory.

Over the weekend a diagnosis of swine influenza was reported by the state animal disease laboratory. Concurrently, the local and state health departments were investigating the reported human illnesses. The collaborative efforts of local, state and federal partners readily determined that the virus in the people and animals was almost identical and ultimately classified as a variant H3N2 influenza virus with the matrix (M) gene from the 2009 H1N1 virus.

At this time, there were 27 county fairs and the Indiana State Fair, all scheduled to open in coming weeks. A swine health advisory was distributed to veterinarians, extension educators and industry stakeholders asking that they notify the BOAH of any illness in pigs or people at fair events. The state health department informed hospitals, physicians and county health officials to be alert for flu-like illness in people with swine contact. Between July 19 and 24, BOAH received reports of ill swine at three other Indiana county fairs. Swine check-in at the Indiana State Fair was to begin July 31, with approximately 1,900 swine expected to arrive.

In preparation for the Indiana State Fair, a meeting was held on July 30 with the State Fair leadership team, the State Department of Health, the Board of Animal Health and others to determine the course of action regarding the State Fair’s scheduled swine events. After consideration of all information gathered prior to the meeting, including information that the virus was producing relatively mild symptoms analogous to seasonal flu, a decision was made that the swine would be exhibited as scheduled with a few stipulations.

- Body temperatures of all swine would be determined using digital thermometers at check-in prior to unloading.
- For reasons of bio-security, the exhibitor or a member of the exhibitor’s family, would take the temperature and hand the thermometer to BOAH staff to be read.
- High temperatures would be confirmed with glass thermometers.
- In consideration of high environmental temperature and travel stress, a 20 minute cool down under BOAH supervision would be offered for swine showing elevated body temperature.
- Swine with body temperatures of >105° would be dismissed from the grounds.
- Contract veterinarians and barn staff would do daily inspections of swine.
- BOAH veterinarians would visit the barn daily.
Reporting of all sick pigs to the attending veterinarian for evaluation would be required.

Any pigs developing high fever and/or respiratory signs during the fair would be dismissed.

On days five and six post check-in, six pigs were sent home due to observed illness and high body temperature. Body temperature of the six pigs ranged from 105.4 to 106.6. All demonstrated evidence of respiratory disease. Samples sent to the state diagnostic laboratory confirmed the presence of H3N2 influenza in all six pigs. These samples were also tested pen-side at the fair using the newly released Swine Influenza Virus Type A Antigen Test Kit manufactured by Synbiotics Corporation and distributed by Pfizer Animal Health. Three of the six pigs were positive on the pen side test.

The decision was made to dismiss all pigs and cancel the open barrow show scheduled for the following day. The swine breed shows scheduled for a week later were not cancelled and occurred without incident. During the breed shows, the pigs arrived during the evening, showed the next morning and generally left by noon.

Analysis of the geographic origin of positive pigs, their distribution within the barn at the fair, their body temperatures upon arrival and other factors offered no clues to the source of infection. Anecdotal evidence based on information from outbreaks at other fairs in Indiana and the observations at the state fair suggests that duration of stay at the fair may increase the likelihood of an influenza outbreak.

The premises ID information required by the state fair and the presence of RFID 840 ear tags in all swine allowed for rapid access to swine origin data for use in epidemiologic analysis. The 1,983 pigs at the state fair came from 721 different farms representing 72 of Indiana’s 92 counties.

Confirmed human cases in Indiana associated with this 2012 outbreak totaled 138, with the last human case reported on August 16. These cases came from 24 counties and were associated with 14 fairs.

Discussions are ongoing with private swine veterinarians, the public health community, county and state fairs’ management, the swine industry and others regarding recommendations for swine exhibitions in 2013. Key topics for discussion have included: duration of swine event, influenza vaccination, health monitoring and dismissal parameters, management of public contact with swine and general bio-security guidance.

Preferences of Select Attractants in the Coating of ONRAB Vaccine Baits
S.R. Johnson 1, A.R. Berentsen 1, Bruce Leland 2, Ernest Oertli 3, Kurt VerCauteren 1
1USDA-APHIS-WS-National Wildlife Research Center, Ft. Collins, CO
2USDA-APHIS-Wildlife Services, San Antonio, TX
3Texas Department of State Health Services, Austin, TX

Rabies control managers and researchers in the United States are assessing how the Canadian vaccine ONRAB® may perform if integrated
into the United States oral rabies vaccination (ORV) program. A measurement of success of any ORV program is bait uptake by target species. The attractant used in the bait matrix surrounding a vaccine influences bait uptake and vaccination rate. Our objective is to determine which flavor of attractant in the ONRAB® coating is the most preferred by rabies reservoir species in the field. In Texas, we are evaluating four attractants (sweet, fish, egg, and cheese) in areas inhabited by raccoons (*Procyon lotor*), skunks (*Mephitis mephitis*), foxes (*Urocyon cinereoargenteus*), and coyotes (*Canis latrans*). In Puerto Rico, we are comparing the preference of mongoose (*Herpestes auropunctatus*) for cheese, coconut, and fish attractants. We monitored bait stations with animal-activated cameras and regular checks of bait status (untouched, disturbed, and removed). In Texas, our preliminary analysis of the camera data indicates target species consumed at least part of the bait to account for 88 of bait disturbances and removals of the 540 baits we offered. Cheese was manipulated most often (30%), followed by fish (24%), and then egg (19%). Sweet and unflavored were equally touched the least (14%). Raccoon accounted for most of the bait selection (77%) and coyotes the least (2%) with foxes (13%) and skunks (8%) between the two. In Puerto Rico, mongoose removed baits on 41 of 343 occasions. Though all data are not yet fully analyzed, it appears mongoose prefer cheese, followed closely by fish. Findings in both Texas and PR are suggesting that sweet flavors are least attractive to rabies reservoir species. To confidently state which attractants will likely perform the best, we need to complete the analyses of these data and do more extensive trials, especially in raccoon habitat in the eastern United States.

**Economic Analysis of the New York State Raccoon Oral Rabies Vaccination Program (Long Island, New York)**

Stephanie Schwiff, National Wildlife Disease Center  
Laura Bigler, Cornell University  
Joanne Maki, Merial Limited

**Abstract**

Enzootic raccoon rabies in the eastern US exerts a negative economic public health impact on the region. These impacts range from high rates of human post-exposure prophylaxis with associated costs, to the increased public health burdens attributed to managing rabies risk among human, pet, livestock and wildlife populations. As a means to address the national public health care burden of raccoon rabies, state and federal agencies have implemented and managed an oral rabies vaccination (ORV) program in the Eastern United States since the mid-1990s. The New York State program has been an essential part of the ORV effort, designed to impede the northward and westward spread of the disease and to establish wildlife vaccination zones in coordination with Canadian governmental agencies. An economic analysis will evaluate the Long Island portion of the New York State ORV program, where annual applications of the wildlife rabies vaccine,
Raboral V-RG®, have been applied since the onset of the epizootic in 2004. The analysis will compare the costs and benefits of the raccoon rabies-elimination program, including oral vaccine distribution parameters and projected costs associated with enzootic terrestrial rabies, versus the costs associated with rabies virus establishment in the densely-populated, suburban habitats outside of New York City (i.e., Long Island, New York).

**Multistate Outbreak of LCMV in Rodent Facilities and Associated Human Infection**
Sandra L. Norman
Indiana Board of Animal Health

Multiple agencies at the local state and federal level were involved in an outbreak of Lymphocytic Choriomeningitis virus (LCMV) in Indiana in April/May 2012. LCMV was diagnosed in two individuals in Vandeburgh County, Indiana in March 2012. Lymphocytic choriomeningitis virus is a rodent borne viral disease with about 5% of the house mice infected with the virus. Rats are resistant to infection but hamster, gerbils and guinea pigs are susceptible to infection with LCMV. There are no clinical signs in rodents and the virus is shed in mouse saliva, urine and feces. Infected mice will shed the virus for their entire lifetime.

People become infected by exposure to mouse droppings, bedding, saliva or urine via contact with broken skin, eyes, nose, mouth, or via an animal bite. About 2-5% of people in urban areas have a titer. Some people do not become ill once they are infected. After an 8-20 day incubation period, people present with flu like symptoms, pain in the chest, testicle and lymph nodes. Some infected individuals will progress to encephalitis and meningitis which can lead to hospitalization. Pregnant women are susceptible to infection with the risk of birth defects of mental retardation, fluid on the brain and spontaneous abortion. Death in transplant recipients in 2005 shows the susceptibility of immune suppressed people.

Investigation into the cause and possible source of infection was initiated by the Indiana State Board of Animal Health (BOAH) in cooperation with the Indiana State Department of Health (ISDH). The index individual is employed at rodent supply facility that raised mice and rats primarily for food to be given to reptiles at zoos and other reptile facilities. The other individual cohabitated with the index person. There were no rodent problems found when the initial investigation was done at the home of the index cases. The initial thought had been contact with wild rodents around the residence of the index case.

Interviews with the owner and manager of the rodent facility indicated 52 employees at a facility that produced live and frozen rodent product for food. At the time of the initial investigation, the owner of the facility indicated he did not provide rodents to pet stores or live sale to the general public and that he had no new introductions into his population for years. There was fairly good bio-security on the premises with good wild mouse control around four
buildings, one of which contained only rats, two which had only mice and one which contained mice and rats.

Testing was initiated for both people and animals at the rodent handling facility. The Vandeburgh County Health Department (VCHD) obtained blood samples from all employees and the Centers for Disease Control and Prevention (CDC) agreed to do all the testing. Following guidelines from the CDC, a random sample size was determined from each building and rodents were sacrificed by the employees and forwarded to CDC for analysis. Since the business was in the business of euthanizing and freezing mice for product, the facility provided this service.

Test results for the employees indicated that 13 of the 52 people had titers indicating recent infection and three had titers indicating old infection. Nine of the thirteen people indicated symptoms compatible with LCMV and a few developed neurologic signs consistent with encephalitis. The manager was among those with severe signs and a few had to be hospitalized. There were no fatalities. Using CDC guidelines, 399 rats and 1,421 mice were tested with all rats testing negative and 296 mice testing positive for LCMV indicating a 21% infection rate. Euthanasia was recommended for all mice and rats with contact to the mice. The owner elected to euthanize all animals on the premises.

One of the challenges was educating the employer/employee about personal protective equipment (PPE) which was not offered previously to the ill people being identified. Gloves and masks were initially offered by the employer but BOAH and the county health department worked with the employer and employees to don facemask, gloves, overalls and shoe covers to conduct the cleaning and disinfection process. The employer eventually provided these to all employees.

Separate quarantines were written on each building and all mice and rats were depopulated and buried on site. Bedding and feed materials were burned on site. Indiana Department of Environmental Management (IDEM) helped permit and approve these disposal processes. Buildings and equipment were cleaned and disinfected with bleach and wooden racks were power washed and set in the sun. Buildings were to be swept, dusted and power washed. All buildings had to be inspected by BOAH following cleaning and disinfection. This was important as initial inspection showed mice still in the building and debris evident throughout. Use of poison laced water containers and removal of food and water sources resulted in adequate cleaning and disinfection.

When the Vandeburgh County Health Department requested records, the facility indicated it had sold live mice to pet stores which resulted in Indiana and 21 other states receiving trace back information. CDC recommended euthanasia of mice, clean and disinfect equipment, employees wear PPE and susceptible employees be tested for LCMV. Educational material was developed and shared with these pet stores in Indiana. The owner also admitted to importing large numbers of breeding mice from a facility in Kentucky where the mice were collected and tested
and found to be 60% infected. The Food and Drug Administration (FDA) assisted in depopulation of that facility in Kentucky.

Lessons learned include having the state veterinarian having authority over all animals in the state and establishing relationships with state, local and federal agencies before these incidents. The Incident Command System was used throughout the process and verification of facts early in the investigation would have helped in resolving the situation in a timely manner. Cooperation and communication with all the agencies involved including daily and weekly conference calls was critical to obtaining information, test results and planning actions to resolve the case.

**Wildlife Rabies in the United States: Reservoirs, Surveillance and Control**

Richard Chipman  
National Rabies Management Coordinator, USDA-APHIS-Wildlife Services  
Dennis Slate  
USDA-APHIS-Wildlife Services  
*Extended Abstract*

Over the past century, rabies in the US has undergone dramatic change. Prior to 1960, as dog rabies was brought under control, most cases were reported in domestic animals. Since the 1960’s, wildlife has supplanted domestic animals in reported rabies cases and account for more than 80 percent of all reported cases annually since 1975. However, since the 1980’s, reported cases in wildlife have accounted for more than 90 percent of animal cases annually reported to CDC. The principal rabies reservoirs today are represented by several species of wild carnivores (*Carnivora sp.*) and insectivorous bats (*Chiroptera sp.*). Cats (*Cattus domesticus*) continue to be the most common domestic animal reported with rabies as a result of abundant, unvaccinated or under-vaccinated free roaming cat populations throughout the US that are at an increased risk of rabies resulting from interactions with raccoons, skunks and bats.

Since raccoon (*Procyon lotor*) rabies rapidly spread from the mid-Atlantic epizootic focus beginning in the late 1970’s, raccoons have been the most frequently reported species with rabies in the US. This epizootic is most likely a function of rabid raccoons being translocated from Florida to western Virginia and West Virginia. Raccoon rabies has subsequently spread and now occupies a range that extends east to the Atlantic Ocean from a line that stretches from southwest Alabama to northeast Ohio. This area is settled by about 70 percent of the US human population. In 2010, raccoons accounted for 36 percent (n=2,246) of reported cases to CDC. For the past several years, rabies in skunks (primarily the striped skunk *Mephitis mephitis*) has ranked either number two or three, behind bats, followed by rabies reported in foxes (primarily gray fox (*Urocyon cinereoargenteus*) and arctic fox (*Vulpes lagopus*)).

Human deaths from rabies acquired in the US declined from greater than 100 in the early part of the 20th century to one to two cases annually in the
1990’s, and remains at that level today. From 1997-2006, 17 of 19 human cases from rabies acquired in the US were associated with insectivorous bats. In the US, human fatalities from rabies typically occur in people who fail to seek medical assistance, often because they were unaware of their exposure.

Timely administration of post exposure prophylaxis has proven nearly 100% successful in preventing rabies. However, the financial cost of living with wildlife rabies in the US is conservatively estimated to exceed $300 million/year (USD). Associated impacts such as anxiety, fear, and trauma are difficult to quantify but often manifest with rabies.

Prior to the proof of concept of oral rabies vaccination (ORV) by the late Dr. George Baer in the late 1960’s at the Centers for Disease Control and Prevention (CDC), population reduction was the primary method for rabies control in wild carnivores. However, population reduction proved to be labor intensive, generally with only transient effects. Its current niche in rabies control in North America is as a tactic that may be integrated into specific emergency actions to prevent rabies from spreading, such as in “Point Infection Control” first applied in Ontario, Canada in response to an incursion of raccoon rabies from the US in 1999. Use of ORV as the central component of the rabies management strategy has led to rabies control and elimination successes at the landscape scale, with examples in: the raccoon dog (*Nyctereutes procyonoides*) and red fox (*Vulpes vulpes*) in several European countries; the red fox and raccoon in Canada; and, the coyote (*Canis latrans*), gray fox and raccoon in the US.

Since the late-1990’s, Wildlife Services (WS) has coordinated wildlife rabies management with oral rabies vaccination (ORV) as the central tactic. The need for effective coordination has mandated the establishment of frameworks that bring together multiple jurisdictions and disciplines from municipal, county, state, federal and international agencies; universities; and the private sector to ensure collaborative, science-based approaches to rabies management in wild carnivores. A Rabies Management Team and associated WS Business Plan and US National Plan Wildlife Rabies Management (2008-2012) and the formalization of a North American Rabies Management Plan with partners in Canada, Mexico, the Navajo Nation, and the US provide a national and continental frameworks for the exchange of information; collaboration on surveillance and control; collaborative studies; and training.

From 2005 through 2011, enhanced rabies surveillance has become a critical program component as a complement to public health surveillance, which is based largely on rabies exposure events to human and domestic animals brought to the attention of the public health community. During that period, 62,168 suspect animals were tested from about 24 states within or near ORV zones, with 897 confirmed rabid; of these, 48,605 samples were diagnosed through the direct rapid immunohistochemistry test (dRIT) developed at CDC and applied in the field by WS in collaboration with CDC. Knowledge of the GPS coordinates and rabies virus variant from these
additional 897 cases from enhanced surveillance has improved rabies management decision making capability for ORV.

To date, ORV in the US has focused predominantly on canine rabies in coyotes and gray fox rabies in Texas and raccoon rabies in the eastern US from Alabama to Maine. Currently, only one oral rabies vaccine is licensed for use—a live, recombinant *Vaccinia*-rabies glycoprotein recombinant, Raboral V-RG® (Merial Limited, Athens, Georgia, US). Key successes resulting from the integration of ORV into other rabies management strategies include the elimination of canine variant of rabies from sources in Mexico that had spilled over into coyote populations in south Texas. This accomplishment led to the declaration that the US was again canine rabies free in 2007. In addition, a unique variant of gray fox rabies in west-Texas is on the verge of elimination, with no reported cases since 2009 and there has been no appreciable spread of raccoon rabies through the coordinated use of ORV and emergency contingency actions in high risk corridors for racies spread. Raccoon rabies has proven more difficult to control than rabies in wild *Canidae* for a variety of factors including: high raccoon population densities, especially along the suburban interface; access to a wide variety of competing food items when baiting occurs; translocation, and vaccine spillage when they consume ORV baits, as well as others potential factors.

Given the need to move more aggressively toward raccoon rabies elimination, WS and cooperators initiated a field trial in West Virginia with ONRAB® (human adenovirus 5, Artemis Technologies, Guelph, ON, CA) in 2011 with favorable safety and immunogenicity results (49% seroconversion after the first baiting) and no safety related issues. Field trials were expanded in 2012 to determine if there is an increasing role for ONRAB® in raccoon rabies elimination in the US. One limitation of Raboral V-RG® is a general lack of a rabies virus neutralizing antibody (RVNA) response in skunks under field conditions where ORV baiting occurs for raccoons. This limitation is magnified by high levels of spillover of raccoon rabies virus variant into skunks and a lack of a thorough understanding of the potential role skunks may have in virus maintenance and reinfection of raccoons.

To date about 140 million doses of oral rabies vaccine have been distributed in the US, with at least 80 percent applied toward control of raccoon rabies in 15 eastern states. Baits are the single largest cost driver for ORV and wildlife rabies management. Currently, WS and collaborators are conducting a new, comprehensive economic analysis to reevaluate the benefit: costs of ORV using Regional Economic Modeling (REMI, Regional Economic Models Inc., Amherst, Massachusetts, US). Putting costs in the context of benefits is an increasingly critical component for evaluating the merits and sustainability of government coordinated programs such as wildlife rabies management and ORV.

While key wildlife rabies management successes have been realized, several challenges remain. Among these are: finding the most effective, safest and least expensive bait-vaccine to achieve rabies management goals in a timely manner; preparations for the effects of climate change, which
could lead to a northward range expansion of the vampire bat (*Desmodus sp.*) from Mexico into the southern US with the attendant rabies impacts to public and animal health; understanding and managing the effects climate change may have on the rabies dynamics between arctic and red foxes in the far north as polar ice coverage diminishes; illegal and unintentional translocation of rabies reservoir species; addressing rabies in the introduced small Asian mongoose (*Herpestes javanicus*) on Puerto Rico or other islands, and other exotics globally; risk modeling for resource allocation to rabies management; and research prioritization to ensure that surveillance and control methods and strategies may be enhanced.

**Canine Leptospirosis Outbreak Investigation in Southeast Michigan: A One Health Perspective**

Marta Guerra  
Bacterial Special Pathogens Branch, CDC

Leptospirosis, caused by infection with a spirochete of genus *Leptospira*, is considered the most widespread zoonosis in the world. In the United States, 100-200 human cases of leptospirosis were reported annually through 1994, when it ceased to be a nationally notifiable disease. In June 2012, the Council of State and Territorial Epidemiologists (CSTE) approved to reinstate leptospirosis as a Nationally Notifiable Condition. Reinstatement of national surveillance will facilitate the assessment of the incidence, geographic distribution, trends, and risk factors associated with human cases, and the identification of outbreaks and potentially new animal reservoirs. Surveillance for human leptospirosis is important for early detection of cases, since early treatment is crucial to decrease morbidity and mortality.

An outbreak of leptospirosis in dogs in southeast Michigan with 61 cases occurring between October and December 2011 was reported by Michigan State University’s Diagnostic Center for Population and Animal Health. During this time period no human cases were reported to Michigan Department of Community Health; however, there was concern that this outbreak could be attributed to a particularly virulent serovar of the disease (*L. interrogans* Icterohaemorrhagiae) which could be transmitted to the human population, especially to pet owners, and veterinary and animal shelter/kennel staff. Michigan Department of Community Health and Michigan Department of Agriculture and Rural Development requested CDC assistance for an investigation, to conduct animal case finding, evaluate surveillance, investigate potential routes of exposure, identify risk factors and develop prevention and control strategies for both human and animal populations.

Owners and veterinarians of canine cases were contacted by the investigation team to assess potential exposures and development of illness consistent with leptospirosis. No additional potential human cases with symptoms of leptospirosis were identified. A knowledge, attitudes, and practice (KAP) survey about leptospirosis and use of vaccines was sent out by mass email through the Michigan State Veterinarian Association to
member veterinarians. Vaccination of canines for leptospirosis was recommended by 221/299 (74%) of veterinarians. A majority of veterinarians (87%) also reported having observed adverse reactions in canines following leptospirosis vaccination.

An environmental assessment was conducted by City of Detroit Public Works (DPW), Environmental Division, Rodent Control in an urban area where canine cases were clustered. Increased populations of stray dogs and rodents were noted in this area by DPW staff. Samples from trapped rodents (5/5) were positive for leptospirosis.

Evaluation of results from surveys and animal trapping and testing led to the following recommendations. Control of stray dogs, vermin and wildlife reservoirs is necessary to reduce the risk of transmission of leptospirosis to canine companion animals. Vaccination of canines in areas determined to be high-risk for leptospirosis is encouraged, as well as educating pet owners about transmission and risk factors of the disease. These measures will reduce the transmission of leptospirosis among animals, and, therefore, reduce the likelihood of transmission to the human population. As with all zoonotic diseases, it is important to recognize early the occurrence of outbreaks in animals before humans become exposed and/or ill. Continued surveillance efforts will ensure that cases are detected early and measures can be instituted in a timely manner to prevent further transmission among animal populations and spillover into the human population.

This investigation serves as an example of the utilization of a one health approach to investigate a zoonotic disease outbreak. Multiple agencies, including veterinary and human health at the local, state and federal levels collaborated closely and effectively. The investigation also demonstrates the importance of interagency cooperation for surveillance and control efforts.

Committee Business
The Committee had one Recommendation: The committee recommends that a One Health based symposium be held again next year. The symposium would be similar to the Rabies Symposium held in 2011 and the Raw Milk Symposium held this year, but on a different topic. The Committee believes this is an effective means to provide an opportunity for in-depth discussion on a topic and to encourage participation of the public health community.

The Committee passed one resolution, and forwarded to the Committee on Nominations and Resolutions.
REPORT OF THE COMMITTEE ON SALMONELLA

Chair: Doug Waltman, GA
Vice Chair: Richard Sellers, VA

Deanna Baldwin, MD; Marilyn Balmer, MD; Stacey Bosch, GA; Richard Breitmeyer, CA; Paul Brennan, IN; Jones Bryan, SC; Kevin Custer, IA; Sherrill Davison, PA; Brandon Doss, AR; Tracy DuVernoy, MD; James Foppoli, HI; Rose Foster, MO; Tony Frazier, AL; Richard Gast, GA; Eric Gingerich, IN; Eric Gonder, NC; Jean Guard, GA; Rudolf Hein, DE; Julie Helm, SC; Bill Hewat, AR; Danny Hughes, AR; Annette Jones, CA; Barry Kelly, CA; Spangler Klopp, DE; Jennifer Koeman, IA; Elizabeth Krushinskie, DE; Dale Lauer, MN; Elizabeth Lautner, IA; Tsang Long Lin, IN; Edward Mallinson, MD; Beth Mamer, ID; Sarah Mason, NC; Patrick McDonough, NY; James McKean, IA; Hugo Medina, MN; David Meeker, VA; Thomas Myers, MD; Kakambi Nagaraja, MN; Steve Olson, MN; Kristy Pabilia, CO; Lynn Post, TX; Shelley Rankin, PA; G. Donald Ritter, DE; C. Stephen Roney, GA; John Sanders, WV; Joni Scheftel, MN; Tom Sidwa, TX; Bruce Stewart-Brown, MD; Hilary Thesmar, DC; Belinda Thompson, NY; Bob Tully, KS; Liz Wagstrom, DC; Don Waldrip, TN; Scott Wells, MN; Nora Wineland, MO; Ching Ching Wu, IN.

The Committee met on October 23, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 8:00 a.m. – 12:00 p.m. There were at least 14 members and 28 guests present. After the Chair opened the meeting and welcomed the attendees, he reminded those present to sign the attendance sheets and if a member to check to see that their contact information was correct and if they were not members to indicate if they would like to become a member of the committee. The Chair briefly overviewed the requirements of becoming a member and that only members could propose resolutions, recommendations and vote. However, everyone was encouraged to participate in the discussion.

Salmonella in Unpasteurized Dairy Products
Stacey Bosch
Division of Foodborne, Waterborne, and Environmental Diseases, US Centers for Disease Control and Prevention (CDC),

In 1987 the Food and Drug Administration (FDA) banned interstate sale of unpasteurized dairy products, however the intrastate sale is regulated by states. From 1993 – 2006 25 states permitted the sale of unpasteurized dairy products. There have been many attempts to circumvent these regulations. From 1993 – 2006 there were 121 dairy product outbreaks involving 4,413 cases, 232 hospitalizations and three deaths. These can be divided into unpasteurized and pasteurized outbreaks. Of the total, 73 were unpasteurized consisting of 1,571 cases, 202 hospitalizations and two deaths, compared to 48 pasteurized involving 2,842 cases, 37 hospitalizations, and one death. The top three etiologies of unpasteurized
dairy products were 54% due to *Campylobacter*, 22% due to *Salmonella*, and 13% due to Shiga Toxin-Producing *Escherichia coli* (STEC).

One example of outbreak due unpasteurized dairy products was due to *Salmonella newport* in Utah in 2009. Seventy-nine illnesses were linked to consuming a soft Mexican-style cheese called queso fresco. The proponents of raw milk say that it produces a creamier cheese than if pasteurized. It is legal to sell raw milk in Utah, but dairies and sellers must have a permit. The cheese was made by a home-based manufacturing business that did not have a license from raw milk from an unlicensed dairy. The cheese was sold to a local restaurant/deli that sold it to the public. The cheese was made in unsanitary conditions.

Other examples were the *Salmonella typhimurium* outbreak in Pennsylvania in 2007 due to raw milk and unpasteurized cheese that resulted in 15 illnesses and the multidrug resistant *Salmonella newport* outbreak in Illinois in 2006-2007 sickened 85 people.

**Update: Outbreaks of Human Salmonella Infections linked to Live Poultry from Mail-Order Hatcheries**

Stacey Bosch  
Division of Foodborne, Waterborne, and Environmental Diseases, US Centers for Disease Control and Prevention, Atlanta, Georgia

A network of more than 85 public health and regulatory laboratories isolate and identify *Salmonella*. These isolates are molecular subtyped using pulse field gel electrophoresis (PFGE) to produce DNA fingerprints. These fingerprints are monitored by PulseNet USA looking for clusters which would signal a possible outbreak. The Centers for Disease Control and Prevention (CDC) investigate these potential outbreaks using questionnaires and interviews.

In the United States there is an increasing interest in people owning poultry, whether as pets, a hobby, for eggs or for meat. This is not restricted to rural areas, but fully includes urban homes where the term “urban chickens” have been adopted. There are about 20 mail-order hatcheries that supply the baby chicks. Over 50 million chicks are sold annually and may be purchased from catalogs, the internet or feed stores. Millions of these chicks are shipped through the mail.

Since 1990 there have been 42 *Salmonella* outbreaks associated with live poultry consisting of 1,340 illnesses, 129 hospitalizations and three deaths. More recent outbreaks include:

<table>
<thead>
<tr>
<th><em>Salmonella montevideo</em> outbreak strain A (2005-2011)</th>
<th>source: Hatchery A</th>
<th>316 cases</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Salmonella montevideo</em> outbreak strain B (2007-2010)</td>
<td>source: Hatchery B</td>
<td>370 cases</td>
</tr>
<tr>
<td><em>Salmonella johannesburg</em> (2009)</td>
<td>source: Hatchery C</td>
<td></td>
</tr>
</tbody>
</table>
Salmonella thompson (2009) source: Hatchery D
Salmonella typhimurium (2009-2010) source: Hatchery C 62 cases
Salmonella altona and johannesburg (2011) source: Hatchery C 68 and 28 cases, respectively
Salmonella hadar (2011)
Salmonella berta (2011)
Salmonella lille, Infantis, and newport (2012) source: Hatchery C 175 cases
Salmonella montevideo (2012) source: Hatchery D 87 cases
Salmonella hadar (2012) source: Hatchery E 44 cases

Some hatcheries, especially Hatchery C, have been implicated in multiple outbreaks. Typically the mean age of patients is very young due to young children playing or even kissing the chicks. Often these chicks are kept indoors.

The resolution of these outbreaks is complicated by the production practices of these hatcheries. There are multiple source flocks that produce the eggs for hatching. In addition drop shipping, which is another hatchery supplying chicks under the original hatchery’s name, and trans shipping, which is another hatchery delivering chicks to a hatchery that then ships them out under their name, all make it difficult to determine the sources of contamination.

Efforts to reduce these outbreaks have taken two routes. First, through the efforts of the National Poultry Improvement Plan (NPIP) and veterinary consultants the hatcheries have instituted various intervention strategies in their hatchery and their source flocks, such as biosecurity, rodent and pest control, hatching egg disinfection, the use of autogenous vaccines and routine monitoring, to reduce the level of Salmonella. Second, the NPIP and CDC have worked together to produce literature and brochures to educate the hatcheries, the feed stores, petting zoos, and especially the consumers of the risk of Salmonella in baby poultry.
SALMONELLA

NVSL Salmonella Update
Kristina Lantz
Diagnostic Bacteriology Laboratory – Bacterial Identification, National Veterinary Service Laboratory (USDA, APHIS, NVSL), Ames, Iowa

Salmonella serotypes isolated from animals in the United States:
January 1 - December 31, 2011
Diagnostic Bacteriology Laboratory, National Veterinary Services Laboratories (NVSL), USDA

The Diagnostic Bacteriology Laboratory within the National Veterinary Services Laboratories (NVSL) routinely serotype Salmonella isolates submitted by private, state, and federal laboratories as well as veterinarians, researchers and other animal health officials. Most submissions were from diagnostic laboratories across the US, and although only counted as a single submitter, these laboratories typically submitted Salmonella isolates from a variety of sources, herds, or flocks. This report summarizes Salmonella serotyping submissions to NVSL from January 1 through December 31, 2011. The Salmonella isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (herd and flock monitoring programs, environmental sources, food). Serotyping data from isolates submitted for research purposes are not included in the source specific summaries. Based on information provided by the submitter the isolates were divided into animal source categories for analysis. The animal sources include Avian (avian of unknown origin, condor, crow, finch, hawk, goose, sparrow, partridge, parrot, pheasant, pigeon quail, duck, and owl), Cattle, Chicken, Dog/Cat, Horse (horse, donkey, mule), Other Domestic (alpaca, ferret, goat, sheep, guinea pig, llama, mink), Pigs, Reptiles/Amphibians (iguana, lizard, reptile, snake, turtle, tortoise, amphibian, frog, alligator, crocodile), Turkey, Wild/Zoo (antelope, deer, fish, marine mammals, opossum, rabbit, raccoon, rodent, camel, monkey, lemur, tiger, zebra, rhinoceros, wallaby, cervid, cheetah, coyote, gazelle, jaguar, leopard, lion, warthog), and Other (environment, unknown).

Salmonella serotyping at the NVSL is an ISO 17025 accredited test. Sera used for typing Salmonella isolates consists of polyvalent sera against the O serogroups and single factor sera against the individual O and H antigens. Approximately 50% of the sera used at the NVSL is produced in house as previously described (Ewing), and the rest is purchased from commercial vendors. All sera are subjected to quality control testing prior to use. Salmonella antigenic formulae are determined essentially as previously described (Ewing) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I. Those serotypes previously reported as “Arizona” are now listed with “III” (both monophasic and diphasic) followed by the antigenic formula. Those serotypes belonging
to subspecies II or IV that had been previously named are now listed with their antigenic formula preceded by II or IV.

In 2011 there were 15,977 submissions for Salmonella serotyping originating from 40 different states and DC. Of these, 770 were identified as not Salmonella, contaminated, or mixed culture and were not further tested. The remaining 15,207 Salmonella isolates were divided into clinical isolates (6,589), non-clinical isolates (6,810), and research isolates (1,808). Salmonella rule-out isolates are included in the clinical and non-clinical counts. The sources of clinical and non-clinical Salmonella isolates are shown in Table 1. There were 289 different serotypes identified in 2011. Table 2 lists the ten most common serotypes when all animal sources were combined. The most common isolates from chickens, turkeys, cattle, pigs, horses, and dog/cat are listed in Tables 3-8.

The NVSL provided a Salmonella Group D proficiency test in order for laboratories to assess their ability to isolate Salmonella from environmental samples and determine the serogroup (specifically group D) of any Salmonella isolated. The samples consisted of drag swabs spiked with Salmonella and/or common contaminants. The 2012 test included Salmonella serotypes Enteritidis, Berta, Heidelberg, 9,12: non-motile, Montevideo, Senftenburg, Escherichia coli, Citrobacter freundii, Pseudomonas aeruginosa, and Proteus mirabilis. The test consisted of seven samples which were shipped to laboratories overnight on ice packs. Laboratories were instructed to use whatever protocol they choose and to report the results within three weeks. The NVSL randomly retained 7% of the test kits and tested them blindly for quality assurance (QA) purposes. For the first time, a significant number of laboratories chose to use a screening test specific for Group D Salmonella. As a result, the grading method was changed to grade only based on the correct identification of the samples as Group D positive or negative. The results of the proficiency test are shown in Table 9.

The NVSL provided a Salmonella serotyping proficiency test in order for laboratories to assess their ability to serogroup or serotype Salmonella isolates. The samples consisted of ten pure Salmonella cultures which included Salmonella serotypes Heidelberg, 4,[5],12:i:-, Ouakam, Schwarzengrund, Oranienburg, Senftenberg, Dublin, Enteritidis, Newport, and Infantis. Participants were given the option to perform serogrouping, partial serotyping, or full serotyping of the isolates and were graded based on the appropriate identification to the level of typing they performed. The NVSL randomly retained 18% of the test kits and tested them blindly for QA purposes. The results of the proficiency test are shown in Table 10.
Table 1: Sources of submissions to the NVSL for Salmonella serotyping in 2011

<table>
<thead>
<tr>
<th>Source</th>
<th>No. Clinical Submissions</th>
<th>No. Non-Clinical Submissions</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avian</td>
<td>91</td>
<td>11</td>
<td>102</td>
</tr>
<tr>
<td>Cattle</td>
<td>1475</td>
<td>21</td>
<td>1496</td>
</tr>
<tr>
<td>Chicken</td>
<td>244</td>
<td>3696</td>
<td>3940</td>
</tr>
<tr>
<td>Dog/Cat</td>
<td>96</td>
<td>21</td>
<td>117</td>
</tr>
<tr>
<td>Horse</td>
<td>470</td>
<td>11</td>
<td>481</td>
</tr>
<tr>
<td>Other</td>
<td>131</td>
<td>607</td>
<td>738</td>
</tr>
<tr>
<td>Other Domestic</td>
<td>66</td>
<td>2</td>
<td>68</td>
</tr>
<tr>
<td>Reptile/Amphibian</td>
<td>80</td>
<td>9</td>
<td>89</td>
</tr>
<tr>
<td>Swine</td>
<td>1876</td>
<td>1299</td>
<td>3175</td>
</tr>
<tr>
<td>Turkey</td>
<td>226</td>
<td>1106</td>
<td>1332</td>
</tr>
<tr>
<td>Wild/Zoo</td>
<td>97</td>
<td>27</td>
<td>124</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4892</strong></td>
<td><strong>6810</strong></td>
<td><strong>11702</strong></td>
</tr>
</tbody>
</table>

Table 2: Most common serotypes in 2011: All sources

<table>
<thead>
<tr>
<th>Serotype</th>
<th>Clinical No. Isolates</th>
<th>Non-Clinical Serotype</th>
<th>Non-Clinical No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium var 5-</td>
<td>595</td>
<td>Enteritidis</td>
<td>694</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>359</td>
<td>Kentucky</td>
<td>668</td>
</tr>
<tr>
<td>Dublin</td>
<td>323</td>
<td>Senftenberg</td>
<td>458</td>
</tr>
<tr>
<td>Cerro</td>
<td>283</td>
<td>Heidelberg</td>
<td>406</td>
</tr>
<tr>
<td>Agona</td>
<td>272</td>
<td>Derby</td>
<td>350</td>
</tr>
<tr>
<td>Derby</td>
<td>218</td>
<td>Mbandaka</td>
<td>299</td>
</tr>
<tr>
<td>Newport</td>
<td>213</td>
<td>Anatum</td>
<td>194</td>
</tr>
<tr>
<td>Infantis</td>
<td>194</td>
<td>Typhimurium var 5-</td>
<td>178</td>
</tr>
<tr>
<td>Enteritidis</td>
<td>186</td>
<td>Typhimurium</td>
<td>175</td>
</tr>
<tr>
<td>Montevideo</td>
<td>173</td>
<td>Infantis</td>
<td>164</td>
</tr>
<tr>
<td>All others</td>
<td>2036</td>
<td>All others</td>
<td>3224</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4852</strong></td>
<td><strong>Total</strong></td>
<td><strong>6810</strong></td>
</tr>
</tbody>
</table>
**Table 3: Most common serotypes in 2011: Chickens**

<table>
<thead>
<tr>
<th>Serotype</th>
<th>Clinical No. Isolates</th>
<th>Non-Clinical Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteritidis</td>
<td>127</td>
<td>Enteritidis</td>
<td>649</td>
</tr>
<tr>
<td>Kentucky</td>
<td>40</td>
<td>Kentucky</td>
<td>586</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>13</td>
<td>Senftenberg</td>
<td>316</td>
</tr>
<tr>
<td>Rough O: g,m:-</td>
<td>10</td>
<td>Mbandaka</td>
<td>236</td>
</tr>
<tr>
<td>Infantis</td>
<td>8</td>
<td>Heidelberg</td>
<td>233</td>
</tr>
<tr>
<td>All others</td>
<td>46</td>
<td>Tennessee</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Typhimurium</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Schwarzengrund</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Newport</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Braenderup</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All others</td>
<td>1268</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>244</strong></td>
<td><strong>Total</strong></td>
<td><strong>3696</strong></td>
</tr>
</tbody>
</table>

**Table 4: Most common serotypes in 2011: Turkeys**

<table>
<thead>
<tr>
<th>Serotype</th>
<th>Clinical No. Isolates</th>
<th>Non-Clinical Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senftenberg</td>
<td>37</td>
<td>Hadar</td>
<td>142</td>
</tr>
<tr>
<td>Albany</td>
<td>34</td>
<td>Heidelberg</td>
<td>123</td>
</tr>
<tr>
<td>Ouakam</td>
<td>30</td>
<td>Saintpaul</td>
<td>102</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>23</td>
<td>Senftenberg</td>
<td>89</td>
</tr>
<tr>
<td>Montevideo</td>
<td>13</td>
<td>Muenster</td>
<td>80</td>
</tr>
<tr>
<td>All others</td>
<td>89</td>
<td>Orion</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Berta</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kentucky</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Albany</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ouakam</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All others</td>
<td>330</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>226</strong></td>
<td><strong>Total</strong></td>
<td><strong>1106</strong></td>
</tr>
</tbody>
</table>
### Table 5: Most common serotypes in 2011: Cattle

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dublin</td>
<td>319</td>
</tr>
<tr>
<td>Cerro</td>
<td>267</td>
</tr>
<tr>
<td>Montevideo</td>
<td>127</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>114</td>
</tr>
<tr>
<td>Newport</td>
<td>88</td>
</tr>
<tr>
<td>Typhimurium var 5-</td>
<td>83</td>
</tr>
<tr>
<td>Kentucky</td>
<td>46</td>
</tr>
<tr>
<td>4,5,12:i:-</td>
<td>39</td>
</tr>
<tr>
<td>Agona</td>
<td>35</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>35</td>
</tr>
<tr>
<td>All others</td>
<td>343</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1496</strong></td>
</tr>
</tbody>
</table>

### Table 6: Most common serotypes in 2011: Pigs

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serotype</td>
<td>No. Isolates</td>
</tr>
<tr>
<td>Typhimurium var 5-</td>
<td>450</td>
</tr>
<tr>
<td>Derby</td>
<td>210</td>
</tr>
<tr>
<td>Agona</td>
<td>206</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>148</td>
</tr>
<tr>
<td>Infantis</td>
<td>99</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>95</td>
</tr>
<tr>
<td>Worthington</td>
<td>54</td>
</tr>
<tr>
<td>Senftenberg</td>
<td>53</td>
</tr>
<tr>
<td>Anatum</td>
<td>50</td>
</tr>
<tr>
<td>Johannesburg</td>
<td>44</td>
</tr>
<tr>
<td>All others</td>
<td>467</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1876</strong></td>
</tr>
</tbody>
</table>
Table 7: Most common serotypes in 2011: Horses

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newport</td>
<td>72</td>
</tr>
<tr>
<td>Infantis</td>
<td>59</td>
</tr>
<tr>
<td>Javiana</td>
<td>32</td>
</tr>
<tr>
<td>Norwich</td>
<td>31</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>27</td>
</tr>
<tr>
<td>Anatum</td>
<td>26</td>
</tr>
<tr>
<td>4,5,12:i:-</td>
<td>22</td>
</tr>
<tr>
<td>Braenderup</td>
<td>20</td>
</tr>
<tr>
<td>Typhimurium var 5-</td>
<td>17</td>
</tr>
<tr>
<td>4,12:i:-</td>
<td>13</td>
</tr>
<tr>
<td>All others</td>
<td>162</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>481</strong></td>
</tr>
</tbody>
</table>

Table 8: Most common serotypes in 2011: Dogs and Cats

<table>
<thead>
<tr>
<th>Serovar</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>23</td>
</tr>
<tr>
<td>Senftenberg</td>
<td>14</td>
</tr>
<tr>
<td>Muenchen</td>
<td>10</td>
</tr>
<tr>
<td>Newport</td>
<td>10</td>
</tr>
<tr>
<td>Javiana</td>
<td>5</td>
</tr>
<tr>
<td>All others</td>
<td>55</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>117</strong></td>
</tr>
</tbody>
</table>

Table 9: Summary of NVSL Salmonella Group D proficiency test

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>40</td>
<td>55</td>
<td>70</td>
<td>73</td>
</tr>
<tr>
<td>Mean Score</td>
<td>93%</td>
<td>92%</td>
<td>97%</td>
<td>92%</td>
</tr>
<tr>
<td>Score Range</td>
<td>100-44%</td>
<td>100-44%</td>
<td>100-85%</td>
<td>100%-29%</td>
</tr>
<tr>
<td>Below Passing</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>N/A*</td>
</tr>
</tbody>
</table>

Because of the change in grading method, a pass/fail designation was not assigned. Seven participants scored less than 80%.
Table 10: Summary of NVSL Salmonella Serotyping proficiency test

<table>
<thead>
<tr>
<th></th>
<th>Serogrouping 2012</th>
<th>Serotyping 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>Mean Score</td>
<td>98%</td>
<td>92%</td>
</tr>
<tr>
<td>Score Range</td>
<td>100%-90%</td>
<td>100-70%</td>
</tr>
</tbody>
</table>


Salmonella in Animal Feed

Xin Li
Divison of Animal Feeds, Office of Surveillance and Compliance, Center of Veterinary Medicine (CVM), Food and Drug Administration (FDA)

The Draft Compliance Policy Guide (CPG) Section 690.800 Salmonella in Food for Animals was published August 2, 2010 and is still circulating within FDA. There is no date set for the final CPG document. The CPG represents FDA’s current thinking and contains nonbinding recommendations. It consists of two parts: pet food and animal feed. For pet foods, such as dog and cat food, aquarium fish food, raw meat formulations for pets, pet treats or chews, and nutritional supplements, if any Salmonella serotype is isolated (and there is no further kill step) the food is considered adulterated and FDA will act accordingly based on 402(a)(1) of the Food, Drug, and Cosmetic (FD&C) Act. For animal feed the focus is on Salmonella serotypes that are pathogenic to the animals receiving the feed. Therefore action is taken by FDA on animal feed only if the following serotypes are found:

- Poultry feed: pullorum, gallinarum, or enteritidis
- Swine feed: choleraesuis
- Sheep feed: abortusovis
- Horse feed: abortusequi
- Dairy and Beef feed: newport or dublin

FDA released a Salmonella Assignment for Poultry Feed for 2012. The intent was to collect and culture 100 feed samples and determine the Salmonella serotypes present. The assignment is not complete, but to date 33 samples of layer feed, 25 samples of broiler feed, and 17 samples of turkey feed have been sampled resulting in 18%, 28%, and 24% positive for Salmonella, respectively. Previous surveillance data for 2002-2009 was published by Li in Foodborne Pathogens and Disease Volume 9 No. 8, 2012.
Companion Animal and Big Cat Salmonellosis – Current Issues: Diets and Associated Problems

Patrick McDonough
Bacteriology and Mycology Laboratory, New York State Veterinary Diagnostic Laboratory, Cornell University

A literature search of salmonellosis in dogs and cats shows an increasing number of citations that are relating to their food or diets. Normally dogs and cats are naturally resistant to *Salmonella*; however, stress, immunological suppression, or antibiotic therapy may reduce their resistance and result in infection and even death.

An analysis of five vet hospital outbreaks in cats pointed to several risk factors: hospitalization, antimicrobial therapy, FPLV and or FeLV status, and diet (ex. raw meat). The outbreaks usually involve veterinary hospitals and include related human cases. Dog outbreaks have been linked to dog treats and peanut butter, pig ear treats, raw meat, and dog jerky treats. The significance of these infections is not solely an animal problem, but usually more significantly the shedding of *Salmonella* by these animals is a source of infection to humans, often the young and old who are the most susceptible.

FSIS Office of Field Operations Salmonella Perspective

Daniel Engeljohn
Office of Field Operations, Food Safety Inspection Service (FSIS), USDA

The FSIS is “responsible for ensuring that the nation’s commercial supply of meat, poultry, and processed egg products is safe, wholesome, and correctly labeled and packaged”. In 1997 the baseline case rate for *Salmonella* infections was 13.6/100,000 population. This rate actually increased to 17.6/100,000 in 2010. The targeted 2020 rate is 11.4/100,000 population. Even though the *Salmonella* case rate has not decreased, FSIS is finding decreases in the percentage of *Salmonella* positive samples in the processing plants. For example, the baseline prevalence rate for *Salmonella* in young chickens was 20%, but young chickens were only 6.5% *Salmonella* positive in 2011 (Data from FSIS 2011 Progress Report on *Salmonella* and Campylobacter Testing of Raw Meat and Poultry Products, 1998-2011).

There was a question concerning the ground turkey recall due to *Salmonella*. FSIS declared the product to be adulterated due to unsanitary conditions in the plant (i.e. failure of Hazard Analysis Critical Control Point (HACCP) to address contamination). Also a question was asked about when the new standard for chicken part would be coming out. Dr. Engeljohn said that it would probably be printed in the Federal Register early in 2013 and be open for comment.
Clarification on FDA’s View of Salmonella Heidelberg in Commercial Layer Flocks
Jerry Ramirez
Center for Food Safety and Applied Nutrition (CFSAN), FDA

A conference call was set up between the Committee and Dr. Ramirez, a spokesman for the Food and Drug Administration (FDA) Egg Rule. There is a substantial confusion within the poultry industry over FDA’s recent response to the presence of *Salmonella heidelberg* in commercial layer flocks. The following points were summarized from an earlier conversation the Chair had with Dr. John Sheehan and from this call:

*S. heidelberg* (SH) can be vertically transmitted in a similar fashion to *S. enteritidis* (SE) and thus could potentially result in contamination of eggs resulting in egg-associated Salmonellosis. The evidence for this possibility includes scientific papers that document the ability of SH to colonize or infect the reproductive system of chickens and to be deposited into the egg (several papers by Gast, *et al.*). There are other scientific papers that describe foodborne outbreaks due to SH, for example:

1. Hennessy, *et al.*, 2004 – Egg consumption is the principle risk factor for sporadic *Salmonella* serotype *heidelberg* infections: a case control study in FoodNet sites

Because of the potential for egg-borne transmission, the presence of SH in the environment of the layer house may pose a public health threat. If FDA identifies or becomes aware of the presence of SH in the environment of layer houses, FDA may consider this a violation of section 402(a)(4) of the Food, Drug, and Cosmetic Act (FD&C Act) 21 U.S.C. § 342(a)(4) in that the product has been prepared, packed, or held under insanitary conditions whereby it may have been rendered injurious to health and may respond accordingly. The finding or knowledge of SH in a layer house environment may result in the producer having to prove that eggs have not become contaminated with SH and are therefore safe for public consumption. One method of ensuring eggs are safe would be through an egg testing scenario, as described for SE within FDA’s egg rule.

Currently FDA does not have any plans, in the immediate future, to amend the egg rule to include SH, *S. typhimurium* or any other *Salmonella* serotype.

FDA does not require commercial layer operations to test for SH or any other *Salmonella* serotype other than SE.

FDA conducts two types of inspections under the egg rule: targeted and comprehensive. The primary difference is that comprehensive inspections include environmental testing by FDA. When these samples are taken, FDA typically will only test for Group D *Salmonella* and not for other serotypes. However, in a trace-back investigation where SH is involved, or when they have knowledge of the presence of SH in the environment (such
as in follow up inspections), or in special situations where SH had been previously identified at a facility, they may serotype all Salmonella that are isolated and may choose to respond to any potentially vertically transmitted Salmonella serotype.

Committee Business:
No Resolutions were brought forth from the Committee.

Additional Submitted Report
NPIP Report Salmonella FY2012
Denise L. Brinson
National Poultry Improvement Plan (NPIP)

The value of the US Poultry Industry is approximately $35 billion dollars in revenue for FY2012. The success of this industry is largely due to the ability to control diseases such as Salmonella pullorum and Salmonella typhoid. USDA-APHIS-NPIP’s Pullorum/Typhoid control program has contributed significantly to this success.

There were no isolations of Salmonella pullorum in commercial poultry in FY2012. There have been no isolations of Salmonella gallinarum in the US since 1987 in any type poultry. US Pullorum-Typhoid Clean participating hatcheries include: 253 egg and meat-type chicken hatcheries, 35 turkey hatcheries, and 772 waterfowl, exhibition poultry and game bird hatcheries.

NPIP US Pullorum-Typhoid Clean Participating Breeding Flocks and Number of Birds include:
• Egg-Type Chickens: 253 Flocks with 4,589,297 birds
• Meat-Type Chickens: 5,176 Flocks with 96,372,550 birds
• Turkeys: 597 Flocks with 4,951,611 birds
• Waterfowl, Exhibition Poultry, and Game Birds: 5,016 Flocks with 1,724,248 birds.

Salmonella control programs administered by the NPIP are:
Pullorum/Typhoid Clean for all poultry breeders and the basis of the program, Salmonella enteritidis clean (SE Clean) for egg type breeders and egg and meat type primary breeders, Salmonella Monitored for primary meat type breeders and Sanitation Monitored for meat type breeders and turkey breeders.

There were no isolations of Salmonella enteritidis reported in egg type or egg type primary breeders in FY 2012.

Pullorum-Typhoid Status:
There were no isolations of S. pullorum in commercial poultry in FY2010 or 2011. There were 2 isolations of Salmonella pullorum in backyard birds in FY2011. There were no isolations of Salmonella pullorum in any type of poultry in FY2012. There have been no isolations of Salmonella gallinarum since 1987 in any type poultry.
**Hatchery Participation in the National Poultry Improvement Plan**

Testing Year FY2012

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Egg and Meat-Type Chickens: Participating</td>
<td>253</td>
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<tr>
<td>Turkeys Participating</td>
<td>35</td>
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<tr>
<td>Waterfowl, Exhibition Poultry and Game Birds</td>
<td>772</td>
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</table>

**Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary**

Testing Year FY2012

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>US Pullorum-Typhoid Clean: Participating- Number</td>
<td>253</td>
</tr>
<tr>
<td>Birds in Flocks-Number</td>
<td>4,589,297</td>
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<tr>
<td>Birds tested</td>
<td>29,830</td>
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**Meat-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary**

Testing Year FY2012

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>US Pullorum-Typhoid Clean: Participating- Number</td>
<td>5,176</td>
</tr>
<tr>
<td>Birds in Flocks-Number</td>
<td>96,372,550</td>
</tr>
<tr>
<td>Birds tested</td>
<td>225,120</td>
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**Turkey Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary**

Testing Year FY2012

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>US Pullorum-Typhoid Clean: Participating –Number</td>
<td>597</td>
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<tr>
<td>Birds in Flocks-Number</td>
<td>4,951,611</td>
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<td>Birds tested</td>
<td>17,201</td>
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Waterfowl, Exhibition Poultry, and Game Birds Breeding Flocks
In the National Poultry Improvement Plan
Participation and Testing Summary
Testing Year FY2012

<table>
<thead>
<tr>
<th>U. S. Pullorum-Typhoid Clean Participating</th>
<th>5,016</th>
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<tbody>
<tr>
<td>Birds in Flocks</td>
<td>1,724,248</td>
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<tr>
<td>Birds tested</td>
<td>150,285</td>
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No. of flocks and birds in flocks by State with *Salmonella enteritidis* isolates, 1990-2012

<table>
<thead>
<tr>
<th>State</th>
<th>Environmental Germ</th>
<th>Dead Germ</th>
<th>Bird</th>
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</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td></td>
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</tr>
<tr>
<td>Flocks</td>
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</tr>
<tr>
<td>Birds in Flocks</td>
<td>6000</td>
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<tr>
<td>Georgia</td>
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<tr>
<td>Flocks</td>
<td>3</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>30400</td>
<td></td>
<td>46000</td>
</tr>
<tr>
<td>Illinois</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Flocks</td>
<td>3</td>
<td></td>
<td>2</td>
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<td>3900</td>
<td></td>
<td>1200</td>
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<tr>
<td>Indiana</td>
<td>Environmental</td>
<td>Dead Germ</td>
<td>Bird</td>
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<tr>
<td>Flocks</td>
<td>15</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Birds in Flocks</td>
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<td>27479</td>
<td>15092</td>
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<tr>
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<td>6625</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
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</tr>
<tr>
<td>Flocks</td>
<td>17</td>
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<td>Birds in Flocks</td>
<td>192700</td>
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<td>91600</td>
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<tr>
<td>Oregon</td>
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<tr>
<td>Flocks</td>
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<tr>
<td>Birds in Flocks</td>
<td>19516</td>
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<tr>
<td>Pennsylvania</td>
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</tr>
<tr>
<td>Flocks</td>
<td>16</td>
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<td>6</td>
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<tr>
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<td>166385</td>
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<td>78450</td>
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<tr>
<td>Phage type</td>
<td>Environmental</td>
<td>Dead Germ</td>
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<tr>
<td>------------</td>
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<td>-----------</td>
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<tr>
<td>US Salmonella enteritidis Clean- Egg-Type Chickens</td>
<td></td>
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</tr>
<tr>
<td>Phage type 13</td>
<td>Environmental</td>
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</tr>
<tr>
<td>Flocks</td>
<td>11</td>
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</tr>
<tr>
<td>Birds in Flocks</td>
<td>152000</td>
<td>3700</td>
<td></td>
</tr>
<tr>
<td>Phage type 13A</td>
<td></td>
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</tr>
<tr>
<td>Flocks</td>
<td>5</td>
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<tr>
<td>Birds in Flocks</td>
<td>54321</td>
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</tr>
<tr>
<td>Phage type 2</td>
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<tr>
<td>Flocks</td>
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<tr>
<td>Birds in Flocks</td>
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<td></td>
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<tr>
<td>Phage type 23</td>
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<tr>
<td>Flocks</td>
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<tr>
<td>Birds in Flocks</td>
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<td></td>
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<tr>
<td>Phage type 28</td>
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</tr>
<tr>
<td>Birds in Flocks</td>
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<td>46000</td>
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<tr>
<td>Phage type 34</td>
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<tr>
<td>Flocks</td>
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<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
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<td></td>
</tr>
<tr>
<td>Phage type RNDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flocks</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>7000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phage type Untypable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flocks</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>24000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phage type 8</td>
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</tr>
<tr>
<td>Flocks</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>237701</td>
<td></td>
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</tbody>
</table>
Egg-type Chicken breeding flocks with isolates of *Salmonella enteritidis* by phage type and by year 1989-2012

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Flocks</th>
<th>Phage Type</th>
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</thead>
<tbody>
<tr>
<td>1989</td>
<td>1</td>
<td>13A</td>
</tr>
<tr>
<td>1990</td>
<td>11</td>
<td>13A, 13, 8, 28</td>
</tr>
<tr>
<td>1991</td>
<td>12</td>
<td>13A, 13, 8</td>
</tr>
<tr>
<td>1992</td>
<td>10</td>
<td>Untypable, 13A, 8, 28, 34</td>
</tr>
<tr>
<td>1993</td>
<td>5</td>
<td>Untypable, 8, 2</td>
</tr>
<tr>
<td>1994</td>
<td>3</td>
<td>13A, 8</td>
</tr>
<tr>
<td>1995</td>
<td>2</td>
<td>13A, 28</td>
</tr>
<tr>
<td>1996</td>
<td>5</td>
<td>Untypable, RNDC, 13A, 8, 2</td>
</tr>
<tr>
<td>1997</td>
<td>2</td>
<td>8</td>
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<td>1998</td>
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<td>2008</td>
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<td>2009</td>
<td>0</td>
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<tr>
<td>2010</td>
<td>3</td>
<td>8(2), 13</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
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</tr>
<tr>
<td>2012</td>
<td>0</td>
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</table>

US *Salmonella enteritidis* Clean - Egg-Type Chickens
No. of flocks and birds in the flocks with *Salmonella enteritidis* isolates, 1990-2012

<table>
<thead>
<tr>
<th></th>
<th>Environmental</th>
<th>Dead Germ</th>
<th>Bird</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flocks</td>
<td>71</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>706,871</td>
<td>77,179</td>
<td>201,342</td>
</tr>
</tbody>
</table>
REPORT OF THE COMMITTEE ON SCRAPIE

Chair: Charles Palmer, CA
Vice Chair: Kristine R. Petrini, MN

Deborah Brennan, GA; Beth Carlson, ND; John Clifford, DC; Thomas Conner, OH; Walter Cook, WY; Stephen Crawford, NH; Linda Detwiler, NJ; Nancy East, CA; William Edmiston, TX; Anita Edmondson, CA; Dee Ellis, TX; Dave Fly, NM; Keith Forbes, NV; Michael Gilsdorf, MD; William Hartmann, MN; Susan Keller, ND; James Leafstedt, SD; Mary Lis, CT; Jim Logan, WY; Michael Marshall, UT; Shirley McKenzie, NC; Cheryl Miller, IN; Ron Miller, PA; Charles Palmer, CA; Kris Petrini, MN; Jewell Plumley, WV; Justin Roach, OK; Suelee Robbe-Austerman, IA; Paul Rodgers, WV; Joan Rowe, CA; Scott Stuart, CO; Diane Sutton, MD; Stephen White, WA; Nora Wineland, MO; David Winters, TX; Cindy Wolf, MN.

The Committee met on October 23, 2012 at the Sheraton Greensboro Hotel in Greensboro, North Carolina from 9:00 a.m. to 12:25 p.m. Thirteen members and 11 guests were present. Dr. Petrini chaired the meeting in place of Dr. Charles Palmer.

Presentations

Extended Scrapie Incubation Time in Goats Singly Heterozygous for PRNP S146 or K222
Stephen White
USDA, Agricultural Research Service (ARS)

Dr. Stephen White from USDA, Agriculture Research Service (ARS)Animal Disease Research Unit (ADRU) presented an update for Katherine O’Rourke (Washington State University) and David Schneider (USDA-ARS). The USDA-ARS unit in Pullman, Washington, conducts an integrated research program involving studies on scrapie transmission, diagnosis, and susceptibility genetics in domestic sheep and goats. A study on Nor98-like scrapie in breeding ewes is now in its fifth year. Ewes were experimentally inoculated via the intracerebral route with brain homogenate from a Nor98-like affected sheep and bred annually to examine the placenta for evidence of a transmissible agent. Placentas shed in 2009, 2010 and 2011 were negative for the abnormal form of the prion protein; placentas shed in 2012 are being analyzed.

Another investigation underway involves transmission of scrapie in goats. Current studies are underway to determine the roles of the goat placenta, milk and co-infection with small ruminant lentiviruses in transmission to other goats and to sheep. Analysis is underway with the goal of improving the application of tissue-based (rectal biopsy) live animal testing for scrapie in goats. In addition, a long-term study examining the effect of genotype on susceptibility to goat scrapie and the effect of genetic changes on accuracy of live animal testing are in their fourth year. Following oral
inoculation at birth with scrapie-positive goat tissues, recipient goats with the highly susceptible genotype all developed clinical disease within 24 months. Goats with the less susceptible or long incubation genetics (S146 or K222) are clinically normal with no evidence of prions in rectal biopsy tissues. These goats will be monitored for seven years.

Scrapie Research at the National Animal Disease Center

Justin Greenlee
USDA-ARS

Dr. Justin J. Greenlee from USDA-ARS, National Animal Disease Center (NADC), Virus and Prion Diseases Research Unit presented an update on scrapie research at the NADC.

Prion disease research at the NADC in Ames Iowa includes work done in scrapie, bovine spongiform encephalopathy, chronic wasting disease (CWD) of cervids, and transmissible mink encephalopathy. Research in scrapie can be divided generally into two categories: interspecies transmission studies and sheep scrapie pathogenesis studies. Interspecies transmission studies afford the opportunity to better understand the potential host range and origins of prion diseases. In the first of these studies, it was demonstrated that scrapie does not transmit to cattle by the oral route and that while it does transmit after intracranial inoculation, the resultant disease has features distinct from bovine spongiform encephalopathy. Subsequent studies demonstrated that scrapie does not transmit to domestic cats and scrapie in elk is distinct from CWD in that the abnormal prion is not present in lymphoid tissues. The most recent interspecies transmission studies demonstrated that scrapie transmits to white-tailed deer by intracranial or combined intranasal/oral routes of inoculation. In scrapie-affected deer, the abnormal prion is distributed throughout nervous and lymphoid tissues and shares some western blot and microscopic features of CWD. However, western blot using a panel of antibodies demonstrates the scrapie in white-tailed deer is distinguishable from both the original scrapie inoculum and CWD.

Numerous sheep scrapie pathogenesis studies have been performed at the NADC to better understand sheep scrapie and improve scrapie diagnostics. Important findings include demonstrating that neonates are far more susceptible to scrapie by oral route than weaned lambs, various routes (intralingual, conjunctival, intraperitoneal) can be used to transmit scrapie, and scrapie isolates exist with very rapid incubation times in some genotypes of sheep. In addition, we have demonstrated that when preferred samples are unavailable, acceptable western blot results can be obtained from formalin fixed tissue and genotyping, western blot, or ELISA can be performed from paraffin embedded, archived tissue. Studies focused on development of an animal-side scrapie screening test have focused on the retina and have led to the identification of the specific retinal cell types affected in sheep scrapie and development of a patented screening test that utilizes electroretinograms, a test of retinal function.
National Scrapie Eradication Program Update
Diane Sutton
USDA, Animal and Plant Health Inspection Service (APHIS) Veterinary Services, (VS)

Scrapie Eradication Program Results
• There has been a 96 percent decrease in the percent positive sheep sampled at slaughter adjusted for face color, from 0.15 to 0.0057 percent, since the start of Regulatory Scrapie Slaughter Surveillance (RSSS) in FY2003 thru September 30, 2012.
• There were eight new infected or source flocks reported in FY2012 as of September 30, 2012. A decrease of 47 percent compared to the same date in FY 2011.

Slaughter Surveillance
• The number of animals sampled through slaughter surveillance in FY 2012 through September 30, 2012 was 40,776 compared to 37,192 in FY2011; this represents an increase of 10 percent. The increase was due in part to increased sampling of goats.

Scrapie Surveillance Plan
• Implementation
  o States with Regulatory Scrapie Slaughter Surveillance (RSSS) collection sites will continue to sample all targeted sheep and goats
  o States have State-of-origin sampling minimums for sheep
  o The annual State-of-origin sampling minimum for sheep is 20 percent of the number required to detect a scrapie prevalence of 0.1 percent with 95 percent confidence or 1 percent of the breeding flock in the State, whichever is less. The objective is to sample sufficient sheep in a 5-year period to detect a scrapie prevalence of 0.1 percent with 95 percent confidence or 5 percent of the breeding flock in the State, whichever is less
  o States achieved improved sample numbers in FY2012, but approximately 20% will not achieve the sampling minimums this fiscal year. If this minimum number was not collected in FY2012 through RSSS, the State will be expected to find other sampling sources to meet the minimum in FY2013
  o Ongoing sampling of nonclinical goats 2, 3, 4 and 5 years old began in FY2011.
• VS plans to set annual State-of-origin sampling minimum for goats once the proposed rule revising title 9, Code of Federal Regulations (9 CFR) parts 54 and 79 is finalized. Proposed sampling minimums were provided for FY2012 and FY2013.

Note: These are minimums. Plans are to continue to collect samples from the maximum number of targeted animals given the available budget.

FY2013 Priorities
VS priorities for scrapie are to focus on improving the effectiveness and cost efficiency of surveillance and to increase animal identification compliance. This will be accomplished in part by publishing a proposed rule that would address gaps in identification and require States to meet reasonable surveillance targets to remain consistent States. States must meet these targets for VS to demonstrate geographically appropriate surveillance to meet the criteria for freedom and have confidence that all of the cases have been found.

The rule would propose to:
- Give the APHIS Administrator authority to relieve requirements for sheep and goats exposed to scrapie types, such as Nor98-like, that do not pose a significant risk of transmission
- Increase flexibility in how investigations can be conducted and allow the epidemiology in a specific flock to be given more consideration in determining flock and animal status
- Add a genetic-based approach to regulation
- Make goat identification requirements similar to those for sheep to support ongoing slaughter surveillance in goats; no changes will be made in the consistent State requirements regarding identification of goats in intrastate commerce
- Tighten the definition of slaughter channels
- Expand the individual identification requirement to all sexually intact animals unless moving as a group/lot (allows mixed-source groups moving in slaughter channels under 18 months)
- Limit the use of tattoos and implants to animals not moving through markets and not in slaughter channels
- Reduce recordkeeping requirements by making them similar to the current uniform methods and rules compliance guidance

APHIS is also revising its scrapie import regulations to bring them more in line with the World Animal Health Organization (OIE) scrapie chapter. This will ensure that we meet OIE criteria for free status and prevent the reintroduction of scrapie after free status is achieved.

Scrapie Flock Certification Program (SFCP) Standards
APHIS is revising the SFCP standards to increase the program’s ability to identify infected flocks quicker and to prevent infected flocks from becoming certified, to reduce costs associated with the program, and to increase SFCP contribution to scrapie surveillance. Scrapie program staff collected input from SFCP enrolled producers, industry representatives, and State and federal stakeholders. The public will have a final opportunity to comment on the revised standards through a federal register notice. The proposed revised SFCP structure eliminates the Complete category; revises the Select category, and slightly modifies the Export category.

Select category: APHIS will redirect monitoring from inspections to sampling. Select category flocks do not become certified. Specifics for this category include:
- There will be no annual inspections
Owners must report clinical signs of scrapie
Herd owners will follow 9 CFR 79 requirements for recordkeeping and animal ID for their flocks
Flock owners can acquire animals from any other flock, whether or not that flock is enrolled in the SFCP
The sampling and testing requirements include:
• Sheep or goats displaying clinical signs over 12 months of age;
• Animals of any age that either test suspect, inconclusive or positive on a live animal scrapie test or have been determined to be a scrapie suspect by a State, Federal or accredited veterinarian; and
• An annual minimum of 1 animal per 1-3 years, depending on flock size.

• Export Category: APHIS will continue a high level of monitoring including inspections and sampling. Flocks can become Export Certified. Specifics for this category include:
  o Annual inspections will be required
  o Owners must report clinical signs of scrapie
  o Animals must be identified with official scrapie flock certification program (SFCP) ID
  o Flock owners must meet rigorous recordkeeping requirements including maintaining records on every animal that leaves the flock for seven years
  o Flock owners must have all cull animals inspected, including home slaughtered animals, for clinical signs of scrapie at least 30 days before culling
  o Flock owners can acquire female animals and embryos only from other Export category flocks of equal or higher status
  o The sampling and testing requirements include:
    • Sheep or goats displaying clinical signs over 12 months of age;
    • Animals of any age that either test suspect, inconclusive or positive on a live animal scrapie test or have been determined to be a scrapie suspect by an State, Federal or accredited veterinarian;
    • All found dead mature animals, including euthanized animals;
    • An annual sampling minimum of one test eligible animal tested for each year of status held. A flock will be removed from the program if the flock owner fails to submit at least one test eligible animal for two consecutive years;
    • To gain six years in status, 15 test eligible animals must
REPORT OF THE COMMITTEE

be sampled; and

- The requirements for Export Certified status include:
  - Seven years in status
  - Meet one of three sampling protocols
    - Standard: 30 test eligible animals
    - Alternative 1: test all genetically susceptible animals sold
    - Alternative 2: test all foundation flock animals.

- Participants in the Complete category will have the following options once the revised proposed SFCP are implemented: 1) join the Export category with up to five years of status; 2) join the revised Select category; or 3) withdraw from the program.
  - If participants that hold “Certified” status in the Complete category join the Export category, APHIS will continue to publish their “Certified” status on its website for three years following the start date of the revised program, in addition to their new “Export Monitored” status, to allow them sufficient time to become Export Certified; and
  - If they join the Select category or withdraw from the program, APHIS will not continue to publish their “Certified” status on its website.

Committee Business:

The final responses from the Committee’s 2011 resolutions were reviewed. In response to Resolution 28 USDA-APHIS-VS requested a separate Sheep and Goat Health line item for fiscal year 2013, and it has been included in the President’s budget. Before the new line item can be established, it must be approved by Congress. In response to combined Resolution 29/33 from 2011, USDA-APHIS-VS confirmed its intention to maintain scrapie surveillance levels as high as possible, given the current and expected budget.

A resolution was introduced and discussed which urged the USDA-APHIS-VS to “replace the terminology Scrapie Flock Certification Program (SFCP) in any existing protocols when negotiating health protocols and replace it with language that the animals/flocks conform to the requirements of the National Scrapie Eradication Program”. After discussion, a vote was taken; the resolution did not pass. The Committee then drafted a related resolution encouraging USDA-APHIS-VS to expand their negotiating tools for the export of sheep and goats beyond those that rely on SFCP participation alone and to encourage other countries to recognize current National Scrapie Eradication Program prevalence and surveillance data along with the use of other tools such as genotyping when appropriate.
REPORT OF THE COMMITTEE ON SHEEP AND GOATS

Chair: William Edmiston Jr., TX
Vice Chair: Don Knowles, WA

Scott Bender, AZ; Deborah Brennan, GA; John Clifford, DC; Thomas Conner, OH; Walter Cook, WY; Stephen Crawford, NH; Linda Detwiler, NJ; Nancy East, CA; Effingham Embree, Jr., IL; Chester Gipson, MD; Joseph Huff, CO; Paul Jones, AL; Eileen Kuhlmann, MN; James Leafstedt, SD; Howard Lehmkuhl, IA; Mary Lis, CT; Jim Logan, WY; Linda Logan, TX; Francine Lord, CAN; David Marshall, NC; Michael Marshall, UT; Chuck Massengill, MO; Cheryl Miller, IN; Ron Miller, PA; Jeffrey Nelson, IA; Charles Palmer, CA; Kris Petrini, MN; Suelee Robbe-Austerman, IA; Paul Rodgers, WV; Joan Rowe, CA; Mo Salman, CO; A. David Scarfe, IL; William Shulaw, OH; Diane Sutton, MD; David Thain, NV; Peter Timm, CA; Stephen White, WA; Margaret Wild, CO; Ellen Wilson, CA; William Wilson, KS; George Winegar, MI; Nora Wineland, MO; David Winters, TX; Cindy Wolf, MN.

The Committee met on October 23, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 1:00 to 3:30 p.m. There were 13 members and 12 guests present.

Presentations

National Animal Health Monitoring System (NAHMS) Sheep 2011
Katherine Marshall
USDA, Animal and Plant Health Inspection Service (APHIS)

Dr. Marshall reported on questionnaires and resulting samples from producer flocks. Objectives of the study were to describe trends in sheep health and management practices from 1996 to 2011, describe management and biosecurity practices, determine producer awareness of the zoonotic potential of contagious ecthyma (sore mouth) and the management practices used to prevent transmission of the disease, provide serum to the serological bank for future research, examine enteric pathogen prevalence and antimicrobial resistance, and facilitate the collection of information and samples regarding zoonotic causes of abortion.

Participation by 2,369 producers produced several significant groups of information. Significant levels of *Coxiella* infection were discovered, with low levels producer awareness of disease processes or dangers. Enteric pathogens, including the emergence of a highly pathogenic and tetracycline resistant *Campylobacter jejuni* SA (Sheep Abortion) which affects many food animal and human species was discussed.
Fetal Loss in Goats: Take a Look at Bovine Viral Diarrhea (BVD) Virus
Kay Riddell
Animal Health Research, Auburn University

Dr. Riddell presented on Fetal Loss in Goats, taking a look at Bovine Viral Diarrhea Virus (BVD). The report concerned intranasal inoculation of does with BVD virus, the resulting viremia, abortion storm, and production of a persistently infected male offspring who consistently sheds BVD virus. Prospective work with transmission studies to cattle and goats were outlined.

Sheep Genetics to Assist Control of Ovine Progressive Pneumonia Virus: Emerging tools and possibilities
Stephen White
Animal Disease Research Unit, USDA, Agricultural Research Service (ARS)

Genetic marker tests in livestock species have great potential for use in marker-assisted selection to improve difficult to measure traits, including susceptibility to infectious disease. This potential is beginning to be realized to reduce susceptibility to ovine progressive pneumonia virus (OPPV). The first genetic marker test has already been developed in the TMEM154 gene by USDA-ARS scientists in Nebraska, Washington state, and Idaho, in collaboration with the Universities of Nebraska, Illinois, and Louisville. In addition to the initial discovery of association with infection under natural, field exposure shown by 69 case-control pairs, this test has been validated in over 2,700 sheep from Nebraska, Iowa, and Idaho from a variety of breeds and production environments. These animal sets all confirm the initial association, and suggest the undesirable, higher risk genotypes are 2.85 times as likely to become infected with OPPV under field exposure as the more desirable, lower risk genotype. It is important to note that the undesirable, higher risk alleles are dominant; only one copy is necessary to confer the full elevated risk of infection. However, incremental improvement in individual and flock risk should be possible through selective breeding. Theoretical considerations and genomic location suggest it is unlikely that selection to reduce susceptibility to OPPV would require tradeoffs like lower production, but there are currently no large-scale data to confirm that premise empirically. Future studies will be necessary to address that issue. Unlike the widely used genetic marker test for scrapie, strong resistance to infection has not been reported to date, but this first genetic test nonetheless enables selection for less susceptible sheep prior to any flock exposure. Further, additional studies have highlighted additional genes that suggest it may be possible to develop additional genetic marker tests for use in reducing both odds of infection and proviral concentration, a measure of viral replication associated with severity of pathology. A useful genetic marker test for susceptibility to OPPV is available today, and additional studies may improve and expand the utility of such tests in the future.
Committee Business

The Committee reviewed and passed two resolutions for presentation to the Committee on Nominations and Resolutions. The first was concerning Export of Sheep and Goats (Scrapie) and a second concerning Minor Use Animal Drug Program.

The Committee also adopted a recommendation titled: Support for National Association of State Public Health Veterinarians Coxiella burnettii Work Group, as follows:

BACKGROUND INFORMATION:

Q-Fever is a zoonotic disease caused by the bacterium Coxiella burnetii. Coxiella infection is found in many species in many countries of the world, including the United States. The disease is a major cause of abortion in sheep and goats, which results significant economic losses to producers, but also results in significant risk of transmission to human beings. Exposure to the products of abortion (or raw milk products) either directly or through environmental contamination pose a significant public health risk, as demonstrated by the recent Q-fever epidemic (human and goat) in the Netherlands.

In 2011 the National Association of State Public Health Veterinarians formed a working group to address the need for a comprehensive source of information and uniform recommendations for control of Coxiella burnetii infection and protection of public health.

RECOMMENDATION:

The United States Animal Health Association (USAHA) commends the work of the National Association of State Public Health Veterinarians Q-Fever Work Group. In the interest of animal and public health, USAHA urges publication of their work compiling knowledge and making recommendations regarding Coxiella burnetii infections, including risk mitigation, control, prevention and appropriate regulatory response.
REPORT OF THE COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

Chair: Dr. Julie Helm, Columbia, SC
Vice Chair: Vacant

Bruce Akey, NY; John Atwell, NC; George Badley, AR; Deanna Baldwin, MD; Marilyn Balmer, MD; Sue Billings, KY; Richard Breitmeyer, CA; Deborah Brennan, GA; Paul Brennan, IN; Max Brugh, GA; Nancy Chapman, MD; Bruce Charlton, CA; Steven Clark, NC; Max Coats, Jr., TX; Stephen Crawford, NH; Sherrill Davison, PA; Thomas Deliberto, CO; Brandon Doss, AR; Aly Fadly, MI; Naola Ferguson-Noel, GA; Tony Forshey, OH; Rose Foster, MO; Marion Garcia, WV; Eric Gingerich, IN; Eric Gonder, NC; Tanya Graham, SD; James Grimm, TX; Scott Gustin, AR; Jeffrey Hamer, PA; William Hartmann, MN; Rudolf Hein, DE; Michael Herrin, OK; Bill Hewat, AR; Dee Hilliard, OK; Heather Hirst, DE; Donald Hoenig, ME; Guy Hohenhaus, MD; Floyd Horn, MD; Danny Hughes, AR; Dennis Hughes, NE; John Huntley, WA; Mark Jackwood, GA; Jarra Jagne, NY; Eric Jensen, AL; Annette Jones, CA; Gary Kinder, WV; Bruce King, UT; Patrice Klein, MD; Spangler Klopp, DE; Michael Kopp, IN; Elizabeth Krushinskie, DE; Hiram Lasher, DE; Dale Lauer, MN; Randall Levings, MD; Anne Lichtenwalner, ME; Tsang Long Lin, IN; Mary Lis, CT; Edward Mallinson, MD; David Marshall, NC; Sarah Mason, NC; Todd McAloon, MN; Hugo Medina, MN; Thomas Mickle, GA; Gay Miller, IL; Kristi Moore Dorsey, KS; Lee Myers, GA; Thomas Myers, MD; Kakambi Nagaraja, MN; Steve Olson, MN; Kristy Pabilonia, CO; Mary Pantin-Jackwood, GA; Boyd Parr, SC; James Pearson, IA; Jewell Plumley, WV; Willie Reed, IN; G. Donald Ritter, DE; Keith Roehr, CO; Thomas Roffe, MT; C. Stephen Roney, GA; A. Gregorio Rosales, AL; Michael Rybolt, DC; Mo Saif, OH; John Sanders, WV; David Schmitt, IA; Andy Schwartz, TX; Jack Shere, NC; Marilyn Simunich, ID; John Smith, GA; Philip Stayer, MS; Bruce Stewart-Brown, MD; Darrel Styles, MD; David Suarez, GA; David Swayne, GA; Manoel Tamassia, NJ; Hilary Thesmar, DC; H. Wesley Towers, DE; Deoki Tripathy, IL; Susan Trock, GA; Jesse Vollmer, ND; Patricia Wakenell, IN; Don Waldrip, TN; Doug Waltman, GA; James Watson, MS; Steve Weber, CO; Richard Wilkes, VA; Ching Ching Wu, IN; Ernest Zirkle, NJ.

The Committee on Transmissible Diseases of Poultry and Other Avian Species meeting is dedicated to the memories of Dr. Hiram Lasher of Delaware and Dr. Alex Bermudez of Missouri.

The Committee met on October 22, 2012 from 1:00 to 6:00 p.m. and October 23, 2012 from 1:05 to 4:47 p.m. at the Sheraton Hotel in Greensboro, North Carolina. There were 47 Committee members and 53 guests in attendance, for a total of 100 participants. Chair Julie Helm
presided. The Chair welcomed the Committee, summarized the 2011 meeting, and reported on the responses to the 2011 Resolution:

Resolution 30 - USDA, APHIS’S ROLE IN PRE-HARVEST FOOD SAFETY: The United States Animal Health Association urges that the Secretaries of the United States Department of Agriculture (USDA), and the United States Department of Health and Human Services develop a collaborative, unified approach to federal pre-harvest food safety efforts, utilizing the expertise of the USDA, Animal and Plant Health Inspection Service, Veterinary Services.

RESPONSE FROM HHS-CVM: We appreciate you sharing your Resolution with us. Please be assured that USDA and HHS through the FDA’s Center for Veterinary Medicine work very closely on pre-harvest food safety efforts. Both agencies in your letter identify food safety hazards and encourage the development and approval of effective intervention strategies.

RESPONSE FROM APHIS and NIFA: USDA is committed to continue building its partnership with the Department of Health and Human Services (HHS) in support of a collaborative, unified approach to Federal pre-harvest food safety efforts. Drawing on its expertise in veterinary medicine, epidemiology, pathology, microbial biology, and other areas, APHIS’ Veterinary Services (VS) works closely with its partners, including HHS’ Food and Drug Administration and Centers for Disease Control and Prevention, to develop strategies to effectively address pre-harvest issues. In addition, Secretary Vilsack has created the USDA One Health Multiagency Coordination Group to ensure that APHIS VS and other USDA agencies with relevant responsibilities are working together on food safety issues and other issues where animal and human health are linked.

Dr. Eric Jensen, Aviagen, Inc, Huntsville, Alabama, presented the Mycoplasma Subcommittee report. The report is included in these proceedings.

Dr. Julie Helm, Chair, Clemson University Livestock Poultry Health, Columbia, South Carolina, presented the Infectious Laryngotracheitis (ILT) Subcommittee report in lieu of Dr. Maricarmen Garcia, Chair of the ILT Subcommittee. The report is included in these proceedings.

Dr. David Swayne presented the Subcommittee on Avian Influenza and Newcastle Disease report, which is included in these proceedings.

Dr. Don Ritter, Mountaire Farms Inc., Millsboro, Delaware, presented the annual industry report for the broiler industry and is included in these proceedings.

Dr. Eric N. Gingerich, Diamond V, Zionsville, Indiana, delivered the annual industry report for the table egg industry and included in these proceedings.

Dr. Steven Clark, Pfizer Animal Health Global Poultry, West Jefferson, North Carolina, gave the annual industry report for the turkey industry and is included in these proceedings.
Dr. John Glisson, US Poultry and Egg Association, Tucker, Georgia, presented the US Poultry and Egg Association Research Report and is included in these proceedings.

Dr. Katherine Marshall, in lieu of Dr. Lindsey Garber, USDA-APHIS-VS-CEAH-CNAHS, presented the National Animal Health Monitoring System Poultry Studies Updates on the Urban Chicken Study and Layers 2013 and is included in these proceedings.

Dr. Denise Brinson, USDA-APHIS-VS, National Poultry Improvement Plan (NPIP), Conyers, Georgia, presented the annual status report for the NPIP and is included in these proceedings.

Ms. Jan Pederson, USDA-APHIS-VS, National Veterinary Services Laboratory (NVSL), Ames, Iowa, delivered the annual status report for NVSL Avian Import Activities and Avian Influenza and Newcastle Disease Diagnostics and is included in these proceedings.

Dr. Kristina Lantz, USDA-APHIS-VS, NVSL, Ames, Iowa, delivered the annual NVSL Diagnostic Bacteriology report and is included in these proceedings.

Dr. Hugo Fragoso, Chief Veterinary Officer, Servicio Nacional de Sanidad, Inocuidad y Calidad Agralimentaria, presented an update on the Highly Pathogenic Avian influenza H7N3 event in Jalisco, Mexico. A summary of his update is included in these proceedings.

Dr. Darrell Kapczynski, USDA-APHIS-ARS, Athens, Georgia, presented an overview of a new USDA licensed Avian Influenza Vaccine (rHVT-AI) for protection against H5 avian influenza and a group discussion was facilitated by Dr. Heather Hirst, Delaware Department of Agriculture, Dover, Delaware. The presentation summary is included in these proceedings.

Dr. Jonathan Zack, National Center Animal Health Emergency Management, USDA-APHIS-VS, Riverdale, Maryland, gave an update on USDA Emergency Management concerning the Secure Egg Supply (SES) Summary Plan. His update is included in these proceedings.

Dr. Tim Snider, University of Minnesota, Center for Animal Health and Food Safety, St. Paul, Minnesota presented Proactive Risk Assessments from the Broiler and Turkey Sector Working Groups - 2012 Progress Report and is included in these proceedings.

The Monday session adjourned at approximately 6:00 p.m. The meeting reconvened at 1:05 p.m. on Tuesday, October 23, 2012.

Drs. Erica Spackman, Patti Miller, and Laszlo Zsak, USDA-ARS-SEPRL, Athens, Georgia, gave the Southeastern Poultry Research Laboratory (SEPRL) Update. The report is included in these proceedings.

Dr. Aly Fadly, Avian Diseases and Oncology Laboratory (USDA-ARS), Lansing, Michigan, presented an update on current research activities at the laboratory. The report is included in these proceedings.

Dr. Tom Deliberto, USDA-APHIS-Wildlife Services, National Wildlife Disease Program, Fort Collins, Colorado presented an overview of the US
surveillance for avian influenza in wild birds from 2006-2011. His report is included in these proceedings.

Dr. Michael David, Director of Sanitary International Standards, National Center for Import and Export, USDA-APHIS-VS, Riverdale, Maryland, presented an update on the World Organization for Animal Health (OIE) poultry activities.

Dr. Anne Lichtenwalner, in lieu of Dr. Jarra Jagne, Ithaca, New York, presented a backyard and small commercial flocks disease survey and is included in these proceedings.

Dr. Elena Behnke, Centurion Poultry, Inc., Talmo, Georgia presented veterinary accreditation limitations for exporting poultry and poultry products and her report is included in these proceedings.

Dr. Doug Waltman, Georgia Poultry Laboratory Network, presented an overview of the USAHA Committee on Salmonella meeting. His report is included in these proceedings.

**Committee Business**

In Old Business, Julie Helm, Chair, will follow up on the 2010 Resolution that did not receive a response from the Food and Drug Administration (FDA).

In New Business, there was a Committee discussion and a vote to sunset the Subcommittees of Mycoplasma and Infectious Laryngotracheitis until they are needed again in the future.

The Committee approved a Resolution entitled “Support for Foreign and Emerging Animal Disease Funding” urging that the Department of Homeland Security support funding of foreign and emerging animal disease projects that better represents the animal commodity sectors in the United States.
The subcommittee met at the Sheraton Greensboro, North Carolina on October 21, 2012 with 30 attendees.

**National Poultry Improvement Plan (NPIP) Update by Dr. Denise Brinson.** The number of *Mycoplasma gallisepticum* (MG) and *M. synoviae* (MS) cases in commercial egg and turkey breeder flocks decreased compared to the previous year, while the number of cases in meat type breeders were similar to last year. It was emphasized that these numbers are reported by the Official State Agencies to the NPIP and only represent cases in breeding flocks participating in the Mycoplasma “Clean” classifications. No *Mycoplasma meleagridis* (MM) cases were reported and this continues a long time trend that suggests MM may have been eradicated from the domestic turkey industry. Dr. Ferguson-Noel will continue to produce a panel of convalescent sera for use by NPIP authorized laboratories and also host the mycoplasma workshop in support of NPIP training requirements. A record number of 34 laboratories requested the most recent panel set. Also, for first time, a MG/MS proficiency panel for PCR testing was offered by a private laboratory in 2012. This support is invaluable for helping to maintain the high technical standards at NPIP authorized laboratories.

**Avian Mycoplasma Research Update by Dr. Naola Ferguson-Noel.** The current situation for *Mycoplasma gallisepticum* (MG) in the US is occasional outbreaks in boiler breeders and turkeys and endemic in commercial egg layers. The major method of control for commercial layers is vaccination. *Mycoplasma synoviae* (MS) outbreaks are more common than MG and about 70% of commercial layers are positive for MS. Traditional infections are not very virulent so most companies are willing to live with the disease. MS in several other countries tend to be more pathogenic as was the strain that was widespread in Arkansas broiler breeder industry 3-4 years ago and causes some concern that strains are becoming more virulent. An increasing incidence of MS plus *E. coli* infections leading to egg yolk peritonitis has been reported in Europe. Research was conducted on different types of swabs for PCR detection. There were no significant differences detected between the types of swabs (cotton, rayon, nylon, flocked or non-flocked). Also, there was equal sensitivity for dry swabs collected from either the trachea or choanal cleft. The method of extraction impacts the sensitivity of PCR testing for mycoplasma. Boiling is a commonly used method for extraction because of its low cost, but is one of the least sensitive methods because it does not remove inhibitors from the extract. All commercially available vaccines against MG still work well for control of clinical disease in chickens but there has been a move toward more use of the F-strain vaccines. Current F-strain vaccines were compared to the original laboratory strain and found to be less virulent in chickens, although they continue to be
highly virulent in turkeys. F-strain vaccines are most efficacious when administered by eye drop.
REPORT OF THE COMMITTEE

REPORT OF THE SUBCOMMITTEE ON INFECTIOUS LARYNGOTRACHEITIS (ILT)

Julie Helm

Presented on behalf of Maricarmen Garcia, Chair, University of Georgia Poultry Diagnostic Research Center

The Subcommittee met at the Sheraton Greensboro, North Carolina on October 21, 2012 following the Subcommittee on Mycoplasma with 33 attendees.

Introduction: Vaccinal Laryngotracheitis (VLT) is an acute viral respiratory disease primarily of chickens. Economic losses attributable to VLT have been important in many poultry producing areas throughout the United States and the world. Despite efforts to control the disease through vaccination and implementation of biosecurity measures, outbreaks of VLT are still a threat to the poultry industry. Dr. Maricarmen Garcia is the Subcommittee Chair and was unable to attend our meeting, so Dr. Naola Ferguson-Noel reviewed research that has been conducted by or in progress at University of Georgia (UGA)-Poultry Disease and Research Center, including:

Research Updates at UGA: (1) Vaccine evaluation -- Vaccines of recent development and introduction into the market have been evaluated extensively in SPF chickens, broilers and layers; (2) Currently in progress, the development of novel gene-deleted vaccines -- Gene deleted vaccine candidates have been developed and are currently under evaluation; (3) Development of a differentiation of infected from vaccinated animals enzyme-linked immunosorbent assay (DIVA ELISA) for Gene-Deleted-Vaccine Vaccinated Flocks; (4) Development of tissue culture origin (TCO) vaccines for mass application -- A TCO vaccine susceptible of propagation in unconventional cell cultures is currently being developed. The aim for this novel TCO vaccine is to be propagated in cells other than liver or kidney cells; and to be applied by mass application methods. A vaccine candidate has been adapted to an unconventional cell substrate and has been partially attenuated; and (5) Pathogenesis of ILT -- The pathogenesis of ILT is currently being re-visited using molecular methods, electron microscopy, conventional clinical laboratory methodologies and avian vocalization during infectious respiratory disease.

Research funding at UGA: A vaccine company is sponsoring research on gene-deleted vaccines and a DIVA ELSA privately. All other ILT research is funded with resources derived from clinical and diagnostic service at the University of Georgia.

Regional updates: There were a few regional updates discussing the cases and control programs being used.
High Pathogenicity Avian Influenza (HPAI): Since 1959, there have been 31 HPAI epizootics. For 2011-2012, H5N1 HPAI was enzootic in six countries: 1) self-declared enzootic (Egypt and Indonesia); 2) continue to report occurrences of outbreaks over multiple years (Vietnam and Bangladesh); or 3) have published data in the literature of continuous reports of infection and molecular evidence of virus continual presence in country (China and east India).

For 2011-2012 (through June 2012), 19 countries reported outbreaks of H5N1 domestic poultry: 16 with H5N1 (Bangladesh, Bhutan, Cambodia, China, Egypt, India, Indonesia, Iran, Israel, Japan, South Korea, Mongolia, Myanmar, Nepal, Palestine Territories, and Vietnam); two with H5N2 (South Africa and Chinese Taipei) and one with H7N3 (Mexico).

In 2011, there were five epicenters of H5N1 HPAI: 1) Egypt and Middle East (Israel and Palestinian Authority) with clade 2.2.1; 2) Ganges Delta (India, Bhutan, Nepal and Bangladesh) with clades 2.3.2.1 and 2.2.2, 3) Mekong Delta (south Vietnam and Cambodia) with clade 1, 4) Indonesia with clade 2.1.3, and 5) east to southeast Asia (China, northern Vietnam, Japan, Republic of Korea, Myanmar, Mongolia, and Iran) with clade 2.3.2.1.

For 2012, reports of H5N1 viruses continued in Africa, Middle East and Asia in poultry and wild birds: 1) subclade 2.3.2.1, most frequently reported with wide geographic dispersion including northern and central Vietnam, eastern India, Bangladesh, China, Hong Kong, India, Nepal, and Bhutan); 2) subclade 2.2.1 viruses in Egypt and Israel; 3) subclade 7.2 in northern China; 4) subclade 2.1.3.2 in Indonesia; and 5) subclade 1.1 in southern Vietnam and Cambodia. Human infections were reported with clades 2.3.2.1 (Bangladesh, Hong Kong,), 2.2.1 (Egypt), 2.1.3.2 (Indonesia) and 1.1 (Vietnam and Cambodia).

Three HPAI outbreaks have involved subtypes other than H5N1. An outbreak of H5N2 HPAI began in 2011 in South Africa, affecting only ostriches. The initial cases were serologically positive but lacked clinical disease. Later, virus was identified by H5 reverse transcriptase polymerase chain reaction, and a few clinical signs appeared but without high mortality. In total, 47 outbreaks have occurred, affecting 51,518 ostriches resulting in 13,991 cases with 1,178 birds being destroyed and 39,812 handled via controlled slaughtered.

A second, unrelated outbreak of H5N2 HPAI occurred in Chinese Taipei with the first report of mortality on February 27, 2012 on a broiler breeder farm which accumulated to 16.6% mortality rate at the time of depopulation. Additional outbreaks occurred in three chicken broiler farms and one layer farm. In total, five outbreaks occurred, affecting 46,320 chickens in 8,147
cases, resulting in 5,497 dead and 40,823 culled chickens. The H5N2 HPAI virus was closely related to H5N2 North American AIV. An outbreak of H5N2 low pathogenicity avian influenza (LPAI) virus was reported in October 21, 2008 in Hsin-Chu with the most recent case on November 20, 2011. The H5N2 HPAI virus was derived from this H5N2 LPAI progenitor lineage. The HPAI outbreak was resolved on August 7, 2012.

An H7N3 HPAI outbreak occurred in central Mexico in the state of Jalisco. The outbreak was diagnosed on June 21, 2012, in total 44 farms were affected with 1,016,844 chickens dead and 10,251,595 poultry were culled. The outbreak involved only layers and layer breeders in the commercial sector. The incidence rate was 25%, mortality rate 9.6% and fatality rate was 39.2%. An emergency vaccination program was initiated with 128m doses used by mid-October. Surveillance in the region has involved 64,498 samples from 537 premises with 44 farms having H7N3 isolations. There were no H7N3 HPAI viruses identified in commercial broilers or village poultry within the control and surveillance zones. Initially, farmers thought the high mortality was a return of H5N2 LPAIV or Fowl Cholera.

**Newcastle Disease:** In 2011, 77 countries had Newcastle disease in poultry or poultry and wild birds, either as suspect cases, infections without clinical disease, infections with clinical disease or limited infections of poultry. An additional seven countries had Newcastle disease in wild birds only. In 2012 (January to June), 23 countries had Newcastle disease in poultry or wild birds. Many developing countries are endemic. Few actual outbreaks were reported except in NDV-free countries that reported outbreaks.
Mortality versus Bird Size: Mortality for all bird sizes (small = 3.6-4.4 lbs, middle = 5.2 – 6.0 lbs, large = >7.5 lbs) remains low and in line with historical trends.

Ranking of Disease Concerns: The disease concerns of sixteen broiler industry veterinarians from the Association of Veterinarians in Broiler Production (AVBP) were ranked. Coccidiosis/gut health was listed as the top disease concern by a wide margin. Gangrenous Dermatitis was ranked second. Three disease issues tied for third: Infectious Laryngotracheitis, Novel Reovirus and Non-Infectious Lameness. Necrotic Enteritis was next, followed by Colibacillosis. Three diseases completed the list: Spinal Abscesses, Runtling Stunting Syndrome and Inflammatory Process.

Ranking of Non-Disease Concerns: Non-disease issues of concern to the broiler industry were ranked by sixteen broiler industry veterinarians as above. The top listed non-disease issue was Corn Prices/Renewable Fuel Standards Mandate closely followed by Salmonella/Campylobacter/Food Safety issues. Concern about the new FDA Antibiotic Guidelines was next. Completing the list were issues related to NPIP Charter Renewal, Animal Welfare and Genetic Trait Planning.

The unprecedented and sustained rise in feed grain prices, especially corn, was the top concern of many respondents. The current US Renewable Fuel Standards (RFS) policy overseen by the Environmental Protection Agency (EPA) virtually mandates that 40% of US produced corn be used to produce ethanol instead of being used for animal feeds. The drought of 2012 has severely reduced the total amount of corn available in the US and prices have hovered near historic highs of over $8.00 per bushel. The high price of corn and other grains due to the 2012 drought has negatively impacted the profitability of all animal agriculture industries. Thus the governors of many poultry and animal agriculture states have banded together to lobby the Administrator of the EPA to ask for a temporary waiver of the RFS until corn supplies are more plentiful. Grain traders believe that a relaxing of the RFS mandate could immediately reduce corn prices by over $1.00 per bushel and give animal agriculture some relief from recent record high corn prices. The EPA is set to rule on the governor’s waiver request before November 11, 2012.

Novel Reovirus: Classic Reovirus strains such as S1133 cause lameness due to tenosynovitis in broilers. Both live and killed vaccines are available for this strain of Reovirus and they are widely used in the broiler industry. However, recently an unusual form of lameness due to tenosynovitis involving the digital flexor tendon has emerged in the Southeastern US and other parts of the country, causing severe lameness with subsequently high mortality from humane culling of lame birds in
REPORT OF THE COMMITTEE

numerous broiler complexes. This condition appears to be caused by new strains of Reoviruses that are not immunologically covered by current commercial reovirus vaccinations and is an emerging disease syndrome of concern to the broiler industry.
Overall health of the national table egg layer flock continues to be very good. There are no major clinical disease problems occurring. This is due to the several resources and practices available to the industry:

- Continued availability of high quality vaccines
- Flock supervision from professional, well-trained flock service technicians
- Readily available veterinary technical assistance from primary breeder, vaccine company, diagnostic laboratory, feed additive suppliers, and consulting veterinarians
- High quality nutrition provided by professional nutritionists
- Housing of a majority of layers in environmentally controlled facilities in cages without exposure to litter
- Use of sound biosecurity practices.

Continual surveillance for foreign animal diseases or potentially highly pathogenic agents such as Newcastle and avian influenza is addressed by our state and federal laboratory system.

A poll of the Association of Veterinarians in Egg Production (AVEP) was conducted within the last month. The members were asked to rate a list of common diseases of caged and cage-free pullets (22 conditions listed) and caged and cage-free layers (31 conditions listed) as to their prevalence in their area of service on a scale of 0 to 3 with 0 = not seen, 1 = seen but not common, 2 = commonly seen, and 3 = seen in a majority of flocks. The survey revealed the following diseases of concern occurring in US:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Average</th>
<th>Condition</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caged Pullets</td>
<td></td>
<td>Cage-Free Pullets</td>
<td></td>
</tr>
<tr>
<td>1-Yolk infections</td>
<td>1.43</td>
<td>1-Yolk infections</td>
<td>1.47</td>
</tr>
<tr>
<td>2-Starveouts</td>
<td>1.33</td>
<td>1-Starveouts</td>
<td>1.47</td>
</tr>
<tr>
<td>3-Marek’s</td>
<td>1.00</td>
<td>1-Cocci</td>
<td>1.47</td>
</tr>
<tr>
<td>4-E. coli</td>
<td>0.86</td>
<td>4-Marek’s</td>
<td>1.27</td>
</tr>
<tr>
<td>5-Cocci</td>
<td>0.81</td>
<td>5-Roundworms</td>
<td>0.93</td>
</tr>
<tr>
<td>6-Inf. bronchitis</td>
<td>0.62</td>
<td>6-E. coli</td>
<td>0.80</td>
</tr>
<tr>
<td>7-ILT</td>
<td>0.60</td>
<td>6-NE</td>
<td>0.80</td>
</tr>
<tr>
<td>8-Necrotic enteritis</td>
<td>0.57</td>
<td>8-Aspergillosis</td>
<td>0.40</td>
</tr>
<tr>
<td>8-IBD</td>
<td>0.57</td>
<td>8-Inf. bronchitis</td>
<td>0.40</td>
</tr>
<tr>
<td>10-Peripheral neuropathy</td>
<td>0.57</td>
<td>8-IBD</td>
<td>0.40</td>
</tr>
<tr>
<td>10-Pox</td>
<td>0.57</td>
<td>8-Ms</td>
<td>0.40</td>
</tr>
</tbody>
</table>
Chick mortality problems are normally associated with small chicks, poor sanitation in the hatchery, or a lack of proper brooding management on the grow farm. As this problem continues high on the prevalence list, the emphasis on solving this issue is apparently not being addressed successfully. The rearing of flocks on litter and exposure to feces complicates coccidiosis in cage-free situations. Marek’s in cage-free flocks is also an issue due to the reduced ability to sanitize cage-free facilities between flocks compared to cage houses.

### Chick Mortality Problems

<table>
<thead>
<tr>
<th>Condition</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannibalism</td>
<td>1.52</td>
</tr>
<tr>
<td>E. coli</td>
<td>1.52</td>
</tr>
<tr>
<td>Ms</td>
<td>1.48</td>
</tr>
<tr>
<td>Calcium depletion</td>
<td>1.43</td>
</tr>
<tr>
<td>Mites</td>
<td>1.29</td>
</tr>
<tr>
<td>FDN</td>
<td>1.20</td>
</tr>
<tr>
<td>Gout</td>
<td>1.10</td>
</tr>
<tr>
<td>Mg</td>
<td>1.10</td>
</tr>
<tr>
<td>Tapeworms</td>
<td>1.10</td>
</tr>
<tr>
<td>Fatty Liver</td>
<td>1.00</td>
</tr>
<tr>
<td>Inf bronchitis</td>
<td>0.90</td>
</tr>
<tr>
<td>Cocci</td>
<td>0.86</td>
</tr>
<tr>
<td>NE</td>
<td>0.81</td>
</tr>
<tr>
<td>Pox</td>
<td>0.76</td>
</tr>
<tr>
<td>ILT</td>
<td>0.75</td>
</tr>
<tr>
<td>Marek’s</td>
<td>0.71</td>
</tr>
</tbody>
</table>

### Comparison of Caged vs. Cage-Free Layers

<table>
<thead>
<tr>
<th>Condition</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannibalism</td>
<td>2.06</td>
</tr>
<tr>
<td>E. coli</td>
<td>1.63</td>
</tr>
<tr>
<td>Roundworms</td>
<td>1.50</td>
</tr>
<tr>
<td>Mites</td>
<td>1.44</td>
</tr>
<tr>
<td>Cocci</td>
<td>1.19</td>
</tr>
<tr>
<td>Bumblefoot</td>
<td>1.06</td>
</tr>
<tr>
<td>Calcium depletion</td>
<td>1.00</td>
</tr>
<tr>
<td>Hysteria</td>
<td>0.88</td>
</tr>
<tr>
<td>Ms</td>
<td>0.88</td>
</tr>
<tr>
<td>Tapeworms</td>
<td>0.88</td>
</tr>
<tr>
<td>FDN</td>
<td>0.81</td>
</tr>
<tr>
<td>Gout</td>
<td>0.75</td>
</tr>
<tr>
<td>Calcium tetany</td>
<td>0.63</td>
</tr>
<tr>
<td>Fatty Liver</td>
<td>0.63</td>
</tr>
<tr>
<td>Marek’s</td>
<td>0.63</td>
</tr>
</tbody>
</table>
Cannibalism continues to be seen especially in high light intensity situation both caged and cage-free. In these cases, the 10-day or younger rule for beak trimming result in longer beaks than desired compared to a beak trim at four to eight weeks and results in an increase in incidence and severity of cannibalism. As this is a major problem for cage-free flocks, genetics companies are placing more emphasis on reducing this trait. The increasing use of large colony cages may also increase the level of cannibalism.

Colibacillosis is a problem mainly of young flocks with mortality rates of 0.5 to 4% per week starting shortly after housing can occur. It is felt that this condition is most often secondary to upper respiratory challenges with *Mycoplasma gallisepticum* (Mg), *Mycoplasma synoviae* (Ms), ammonia, infectious bronchitis (IB), etc. It also may be a primary problem if water lines are contaminated with *E. coli*. The overall incidence of early onset colibacillosis continues on the downward trend. A post-molt colibacillosis syndrome is also seen in some flocks due to declining immune system function, an ascending infection of the reproductive tract, upper respiratory infections, etc. The live *E. coli* vaccine, introduced in mid to late 2006, has been increasingly used successfully as both a preventative and as a treatment in the face of an outbreak in most areas.

Calcium depletion is normally associated with low intake of calcium, phosphorus, and/or vitamin D3 especially early in production with low feed intakes. This condition will be an ongoing issue with increasingly higher egg production rates through improvements in management and genetics.

An external parasite, the Northern Fowl Mite, has risen to prominence in cage layers in past years’ surveys. The difficulty in treating this condition, in cages and in cage-free flocks, has likely led to this increase. Spray treatment
of caged layers is difficult due to the configuration of equipment. Elemental sulfur in dust baths is being used very successfully in cage-free flocks. Feeding of elemental sulfur will aid in reducing numbers of mites on birds as well. Decontamination of pullet moving trucks and equipment may also be lacking especially if the equipment was used previously for mite-infested spent fowl movement.

Focal duodenal necrosis (FDN), felt to be due to Clostridium colinum, is an under-diagnosed problem. It is felt to be a widespread subclinical disease with lesions in the duodenum, and results in losses of egg weight gain and/or egg production depending on the severity of the infection. The use either of the antibiotics chlortetracycline or bacitracin is used successfully for treatment and/or prevention. Fermentation metabolite, probiotic, prebiotic, and botanical products are being evaluated for their usefulness in prevention of FDN.

Mycoplasma synoviae (Ms) is a very prevalent disease in multi-age complexes but has little significance in most cases due to its low pathogenicity.

Mycoplasma gallisepticum (Mg) continues as an issue in multi-aged facilities and is successfully controlled in most cases through vaccination. Each complex must customize its vaccination program to control the strain on the farm. Ts-11 and 6/85 live vaccines are used for controlling mild strains of Mg while F-strain live vaccine is being used to control more pathogenic strains. The live pox-vectored recombinant Mg vaccine is being used in a variety of situations and appears to be useful in low challenge situations. Vaccine failures with all vaccines are somewhat common and the unit must resort to medication programs using tylosin or tetracycline antibiotics. Some operators are now applying the F-strain vaccine by eyedrop in an effort to increase its efficacy.

Coccidiosis and necrotic enteritis continues as a problem in some caged pullet and layer units due to contamination of houses with coccidial oocysts from past outbreaks and delivery of these oocysts to the chickens in cages by feces laden manure belts, fecal dust, flies, or beetles. Coccidiosis vaccination of caged or cage-free pullets has met with challenges of high mortality due to poor uniformity of vaccine application and high litter moisture in cage-free housing.

Marek’s Disease was mentioned in the survey as being a minor problem. A handful of outbreaks have been seen in PA and the Midwest and could mean a loss of effectiveness of the presently used HVT + Rispens vaccine. Improper vaccination administration and/or inadequate grow house cleaning and disinfection may also be the culprits. One major outbreak reported last year in the Midwest with losses up to 60% at sell-off continued this year but is being controlled by improved vaccination and sanitation. Cage-free pullets tend to have more Marek’s Disease than caged pullets due to the inability to satisfactorily clean and disinfect some of the cage-free growing facilities.

Diseases under control and of low incidence are as follows: vaccinal infectious laryngotracheitis (vILT), IB, fowl coryza, and urolithiasis/gout.
These diseases tend to be localized to a region or a farm. The pox-vectored recombinant ILT vaccine has been determined to not be a replacement for chick embryo origin (CEO) vaccines in high challenge areas. The HVT-vectored ILT vaccine continues to show good results in high challenge regions and should reduce the amount of CEO vaccine used in layer flocks that may spread to broilers. Fowl coryza is a regional disease (Maine, southern California, Florida, and south Texas) and is controlled well by the use of commercial bacterin. Gout is almost exclusively due to feeding of excess calcium to birds not yet sexually mature or feeding inadequate phosphorus to birds at any stage of life.

Diseases that are very rarely a problem for table egg layers are pox, Newcastle, infectious bursal disease, chick anemia virus, erysipelas, and fowl cholera. The area where the very virulent IBD outbreaks (vvIBD) seen in northern California in Dec 2008 and May 2009 have not shown a recurrence of the disease.

The survey also asked about other issues and diseases of concern on a scale of 0 to 3 with 0 = no concern, 1 = some concern, 2 = moderately concerned, and 3 = very high concern. The opinions of the 20 respondents are as follows:

<table>
<thead>
<tr>
<th>Issue (20 respondents)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avian Influenza</td>
<td>1.55</td>
</tr>
<tr>
<td>Lack of Effective Treatments</td>
<td>2.15</td>
</tr>
<tr>
<td>SE and FDA Egg Safety Rule</td>
<td>2.55</td>
</tr>
<tr>
<td>S. heidelberg and Egg Safety Rule</td>
<td>2.45</td>
</tr>
<tr>
<td>Welfare in General</td>
<td>2.33</td>
</tr>
<tr>
<td>Beak Trimming</td>
<td>1.70</td>
</tr>
<tr>
<td>Disposal of male chicks</td>
<td>1.40</td>
</tr>
<tr>
<td>On-Farm Euthanasia</td>
<td>1.95</td>
</tr>
<tr>
<td>Molting of Layers</td>
<td>1.60</td>
</tr>
<tr>
<td>Banning of Cages</td>
<td>2.60</td>
</tr>
<tr>
<td>Supply of Useful Vaccines</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Concern for *Salmonella enteritidis* (SE) and its consequences continues due to the ongoing possibility of human outbreaks as occurred with the egg recall of 2010 involving two Iowa operations in August, 2010. The Egg Safety Rule was implemented on July 9, 2010 for flocks over 50,000 layers. Flocks of between 3,000 and 50,000 joined the program on July 9, 2012. The inspections for these smaller units will begin in late 2012 or early 2013. Many of these smaller operations are felt to be unprepared for complying with the requirements of the program.

The FDA Egg Safety Program entails obtaining chicks from National Poultry Improvement Plan (NPIP) SE Clean breeders, rodent and fly monitoring and control programs, biosecurity, cleaning and disinfection of premises, training of persons involved, testing of manure samples at 14-16
weeks, 40 to 45 weeks, and six weeks after molt. If any of the manure tests are positive for SE, egg testing must take place. The producer funds all testing and compliance efforts. Laboratories have managed to gear up to handle the increased testing load this requires. Producers with a manure positive swab test are holding eggs from the market until after the test results of eggs are obtained. The use of DNA based tests are now being used that minimize the time of testing from the formerly required ten days for culture to as low as 27 hours with the new tests. There is no provision in the program for compensating a producer who has an egg-positive flock and does not have a pasteurization or hard-cooking plant that will take their eggs. Producers are greatly ramping up measures to reduce risk of SE infection by increased use of vaccines, intestinal health feed additives, rodent and fly control measures, and biosecurity practices as was intended by the plan.

The possible addition of *Salmonella heidelberg* (SH) to the FDA Egg Safety Plan has the industry questioning why and how this will be initiated. SH in humans has not recently been attributed to eggs and the prevalence of SH in humans has dropped since the late 1990’s to 2011 from 1 per 100,000 population to 0.35 per 100,000 in Centers for Disease Control and Prevention (CDC) figures from FoodNet. Also, there is no breeder program as there is for SE and it may take five to ten years before one can be fully assured of a clean product once a breeder program is started. It is estimated that a much higher contamination rate of flocks with SH is present compared to SE which has been reduced to 2 to 6% at present with the pressure of state and federal programs.

Poultry welfare concerns continue to be of high to very high concern due to continued activities by activist groups. A surprising event occurred last year as the United Egg Producers (UEP) and the Humane Society of the United States (HSUS) agreed to work together to establish federal legislation to require an eventual switch from conventional cage systems to enriched cage systems by 2029. This should lead to the use of enriched cages in California where the issue of which type of system would be approved according to the Prop 2 ballot initiative was undecided. This agreement also negated the ballot initiatives that were planned by HSUS in Washington and Oregon. This agreement was attached to the 2012 Farm Bill as an amendment to the Egg Products Inspection Act. The 2012 Farm Bill has yet to be passed as of October 2012. If not passed, the agreement will be extended and wait for the next Farm Bill to be passed.

The lack of effective treatments for diseases such as colibacillosis, necrotic enteritis, ascarids, *Capillaria spp.*, fowl cholera, etc. is a very high concern and a welfare issue for the diseases that can cause much suffering due to illness. The list of antibiotics that can be used in egg layers is quite short – bacitracin, tylosin, and chlortetracycline. The lack of an anti-parasitic product for used in controlling ascarids during lay, or other nematodes, is especially troublesome as these conditions are becoming increasingly common in cage-free production. Amprolium continues to be available to prevent and treat coccidiosis. Also, there is an increase in usage of non-
antibiotic, preventative feed and water additives containing probiotics, prebiotics, and fermentation metabolites.

Avian influenza (AI) has fallen from very high concern to a high concern. Active and passive surveillance programs continue across the US in response to the threat of highly pathogenic H5N1 AI (HPAI) from Asia. As there is great concern in the layer industry in regard to the amount of time before egg movement can take place once quarantine is placed on a premise in a control zone, the industry and USDA have developed the Secure Egg Supply (SES) Plan that would allow movement of product within 48 hours after quarantine. This is done by assuring that a farm 1) has good biosecurity practices by being pre-approved; and 2) is negative for AI by a) testing five dead birds per house by AI real time polymerase chain reaction (PCR); and b) reporting daily mortality and egg production to the authorities. Discussion and research as to the best ways of bird euthanasia and disposal from large cage layer houses and complexes continues. The threat of H5 or H7 low pathogenic AI (LPAI) for layer flocks on the East coast is much reduced due to the efforts by NY and NJ Departments of Agriculture and USDA to reduce the positivity of the live bird markets from 60% positive markets in 2004 to near zero since. No significant AI isolations have been made in layer flocks in the US in the last year. A majority of egg operations are complying with the NPIP LPAI program for commercial layers.

Vaccine use continues to be the mainstay of disease prevention in the egg layer industry second to biosecurity. The supply of useful vaccines continues to be quite adequate and appears to be keeping up with the layer industry needs. It will be interesting to see if this good supply of vaccines continues with the consolidations now occurring in the poultry vaccine business.

This year is the first year that the AVEP members were asked for their ideas as to research needs for the layer industry. A summary of the responses of the 15 members is as follows:

<table>
<thead>
<tr>
<th>Research Need Area</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-S. heidelberg research</td>
<td>9</td>
</tr>
<tr>
<td>2-Increased supply of recombinant vaccines</td>
<td>4</td>
</tr>
<tr>
<td>3-Marek’s Disease</td>
<td>4</td>
</tr>
<tr>
<td>4-Focal Duodenal Necrosis</td>
<td>3</td>
</tr>
<tr>
<td>5-Coccidiosis and necrotic enteritis</td>
<td>3</td>
</tr>
<tr>
<td>6-Calcium depletion</td>
<td>2</td>
</tr>
<tr>
<td>7-Comparison of cage systems/cage density</td>
<td>2</td>
</tr>
<tr>
<td>8-Tapeworms</td>
<td>1</td>
</tr>
<tr>
<td>9-M. gallisepticum</td>
<td>1</td>
</tr>
<tr>
<td>10-Colibacillosis</td>
<td>1</td>
</tr>
<tr>
<td>11-Significance of oral ulcers</td>
<td>1</td>
</tr>
<tr>
<td>12-Interference of feed additives with live S.</td>
<td>1</td>
</tr>
</tbody>
</table>
typhimurium vaccines
13-Mite control 1
14-Reducing cannibalism 1
15-Reducing piling in cage-free flocks 1
16-Increasing treatment options for organic and conventional flocks 1
17-Additional methionine sources for organic flocks 1
18-Ammonia control products 1
19-vvIBD in California 1
Total respondents 15

The egg industry has experienced lower profits this year compared to last year. Feed price increases due to increases in corn prices due to the drought have hurt profits significantly. Egg price increases were seen this summer due to losses of birds due to heat (approximately 3% of the nation’s flock) plus losses of production and egg size. In addition, exports of eggs to Mexico due their losses of birds due to H7N3 HPAI led to a short-lived increase in egg prices. Iowa (50.8 million) continues to be the lead state in egg production followed by Ohio (26.3 million), Indiana (23.6 million), Pennsylvania (22.5 million), and California (19.2 million) according to the National Agricultural Statistics Service for September 2012.
Turkey Industry Annual Report -- Current Health and Industry Issues
Facing the Turkey Industry

Steven Clark, Chair
Pfizer Animal Health Global Poultry, Durham, North Carolina
Contributing authors: Michelle Kromm, Jennie-O Turkey Store
Andrew Bailey, National Turkey Federation (NTF)

In preparation for this report to the USAHA Committee on the Transmissible Diseases of Poultry and Other Avian Species, the subcommittee chairman, Dr. Clark, and turkey industry colleagues, Dr. Kromm and Mr. Bailey, surveyed turkey industry professionals and veterinarians representing a majority of the US turkey production regarding the health status of turkeys produced in August 2011 through August 2012. The turkey industry reports several disease challenges for this 12 months varying by geographic regions within a state and across the United States. This report will list, Table 1, the challenges by disease and issues. Of particular interest in 2012 are lack of efficacious drugs and issues with clostridial dermatitis, turkey coronavirus, blackhead and colibacillosis.

The “lack of approved efficacious drugs” continues to be the top disease issue (Table 1). The withdrawal of the New Animal Drug Application (NADA) for enrofloxacin in 2005 for use in poultry leaves the industry with no adequate therapeutic response to colibacillosis (ranked #3, unchanged from prior year), or fowl cholera (ranked #20 from #18). The controversy over the use of antibiotics in animal agriculture remains a major concern for the turkey industry and for all of animal agriculture.

Clostridial Dermatitis (CD), previously referred to as Cellulitis, remains a major disease issue across all geographic regions; as the survey average decreased slightly to a score of 3.8 (from 3.9 in prior year) and ranked #2 (no change), from 4.0 (#2), 3.8 (#2) and 3.3 (#3) in 2010, 2009 and 2008, respectively. Analysis indicates range of concern; 76% of respondents score CD a 4 or 5 (severe), 20% score it a 2 or 1 (mild). CD is most commonly seen in, but not limited to, commercial male turkeys nearing market age. Clstridium septicum, C. perfringens type A, or C. sordelli is isolated from fluid or affected tissue samples of affected or dead birds. Affected turkeys present with two or more of the following signs: subcutaneous emphysema (crepitus); serous or serosanguineous subcutaneous fluid; vesicles on the skin, especially on the breast/inguinal area; moist, dark, wrinkled skin, especially breast/inguinal area; cellular necrosis (microscopic); organ involvement (spleen/liver); vesicles on the skin, and/or moist, dark, wrinkled skin, on the tail area. The affected flock will have mortality greater than or equal to 0.5 dead per 1,000-birds, fitting the individual bird definition, for two consecutive 24-hour periods. Opinions vary as to risk factors and potential causes of the problem. Some of the key areas to control of CD include: early
recognition; removal of mortality 2-3 times per day; medicating affected flocks with appropriate antimicrobials; promptly managing all water spills and wet litter. There has been limited success with vaccinating at-risk flocks with autogenous bacterins and toxoids.

Poult enteritis of unknown etiologies has decreased in importance, to position #7 from #6, with a score of 2.9 (from 3.1). Turkey Coronavirus (TCV), as a defined cause of enteritis, was ranked #29 (Table 1), increasing from #34, with a record 221 reported cases (Table 2); we began reporting in 2008 with 10 cases (2009, 3; 2010, 91; 2011, 70). In April 2012 we conducted an Enteric Health supplemental survey; results are reported in Addendum - Table.

Late mortality ranked fifth (#5) health issue and increased from #8 the prior year. Late Mortality may be defined as mortality, in excess of 1.5% per week, in toms (males) 17-weeks and older; mortality is not diagnosed to a specific disease or cause. Excess cumulative mortality of 5 – 10% in toms prior to slaughter has been reported. Late mortality may be associated with physiologic or biomechanical deficiencies following early rapid growth in heavy toms achieving genetic potential; aggressive behavior noted in mature toms; cannibalism; leg problems and/or hypertension.

Leg problems (#6, prior year was #7) are ranked among the top concerns of the turkey industry. Leg problems are a common complaint, such as, spiral fractures of the tibia or femur. Leg Problems may be defined as lameness, particularly in toms, several weeks prior to slaughter. Leg problems are attributed to various conditions (refer to Table 1), including, pododermatitis, fractured femurs, fractured tibia, osteomyelitis (OM), tibial dyschondroplasia (TDC), spondylolisthesis, “Shaky Leg”, etc.

Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR) was recognized as a newly emerging disease in 2011. A unique reovirus has been isolated and identified as the cause of tenosynovitis and digital flexor tendon rupture in commercial turkeys. Clinical signs in young flocks are reportedly mild to nonexistent, but can develop into lameness and/or abnormal gait in older flocks, starting at about 12 weeks of age. Affected flocks may also report an increased incidence of aortic ruptures and poor flock performance (weight gain, uniformity). Research is on-going into pathogenesis, virus characterization, diagnostics and epidemiology. TR-DFTR was added to the survey in 2011 and ranked #11 (Table 1) with 106 “confirmed” cases or flocks (Table 2). In 2012 TR-DFTR dropped to #28 with 131 cases. A breeder company has implemented an autogenous reovirus vaccination program to induce the maximum production of antibodies and resulting transfer of maternal antibodies. Preliminary results show a significant reduction in associated clinical signs in those poults placed from vaccinated flocks. A commercial turkey lighting program of 4-8 hours of continuous dark in a 24-hour period has also been recommended. The combined efforts of breeder vaccination, commercial farm biosecurity and flock management appear to be controlling this disease.
Blackhead, also known as Histomoniasis, remained at position #14 (#13, 2010; #11, 2009; #16, 2008). It is one disease with no efficacious drug approved for use in turkeys. There were 80 reported cases of blackhead (Table 2) a decrease from 89, 2011, and a record 108 in 2010. Losses to blackhead have been severe and sporadic cases are occurring in North America. The disease can be devastating in the individual flocks affected. Dimetridazole was extremely efficacious and previously approved for use in turkeys for the prevention and treatment of blackhead; it was banned in 1987. The lack of any legal treatment for histomoniasis is of concern, especially in the case of valuable turkey breeder candidate flocks. Losses to blackhead have been severe in several areas of Europe, and sporadic cases are occurring in North America. It seems unconscionable that we are unable to prevent the suffering and death in flocks affected by histomoniasis when effective treatments exist.

Heat stress ranked #4 following another hot summer, compared to #4 the prior year. Poult Enteritis Mortality Syndrome (PEMS) ranked #30 versus #33 previously, Ornithobacterium rhinotracheale (ORT) ranked #17 versus #12 previously, and Avian Metapneumovirus (AmPV) ranked #34 versus #31.

Flagellated protozoal enteritis increased to #15 from #28. Several types of protozoa are associated with enteric disease of turkeys. Protozoal enteritis can present with general signs, including dehydration, loss of appetite (off-feed), loose droppings and watery intestinal contents. Flagellated protozoa include Cochlosoma, Tetratrichomonas, Histomonas and Hexamita. Eimeria and Cryptosporidia are non-flagellated protozoa. Cochlosoma and Hexamita are associated with enteritis, primarily in young turkeys, especially in the summer months. There are field reports of co-infections with Cochlosoma and Tetratrichomonas, or Cochlosoma and Hexamita, or flagellated protozoa and Eimeria. Most infectious causes result in diarrhea.

Mycoplasma synoviae (MS, infectious synovitis) infections, ranked #25 (#27, prior year), are one cause of synovitis. It may be present in flocks 10-12 weeks of age with typically low mortality and low morbidity. There were 49 cases of MS reported (Table 2) representing an increase from 39 the prior year. The primary breeders have remained free of M. gallisepticum (MG), M. meleagridis (MM) and MS. Sporadic, but increasingly frequent infections with Mycoplasma, both MG and MS, often in association with backyard poultry and broiler breeder flocks is an ongoing concern, having the greatest impact when a breeder flock is infected and has to be destroyed.

Over the past ten years the US animal agriculture industry has been continually challenged with numerous attempts to ban the use of antibiotics in livestock and poultry. The current attempt at the federal level is with the [112th Congress] Preservation of Antibiotics for Medical Treatment Act of 2011, introduced into both the House and Senate [H.R.965.IH; S.1211.IS], otherwise known as PAMTA 2011. The turkey industry opposes PAMTA, a bill that would devastate the ability to protect animal health by unnecessarily and inappropriately removing several classes of important antibiotics from the market. Prevention, control and growth promotion uses of antibiotics
minimize the therapeutic use of antibiotics in livestock and poultry. The turkey industry welcomes honest discussion of science-based, pragmatic options allowing producers to farm in the best interests of their animals and customers while providing consumers’ assurance our use of these vital, safe and effective production tools is professional, judicious and does not jeopardize these products’ effectiveness in human medicine.

The industry’s primary focus in 2011-2012 continues to be the protection of the few drugs approved for use in turkeys. In 2012, the Food and Drug Administration Center for Veterinary Medicine published the draft text of its proposed rule for the Veterinary Feed Directive, the Final Guidance #209, “The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals”, and the Draft Guidance #213, “New Animal Drugs and New Animal Drug Combination Products Administered in or on Medicated Feed or Drinking Water of Food Producing Animals: Recommendations for Drug Sponsors for Voluntarily Aligning Product Use Conditions with GFI #209”. CVM’s Guidance #209 addresses FDA’s current thinking regarding the judicious use of medically important antibiotics from human medicine in food producing animals, and Draft Guidance #213 provides recommendations for drug companies to voluntarily shift “production” (growth promotion and feed efficiency) claims to “therapeutic” claims, in order to conform to Guidance #209. Although voluntary, FDA will be working closely with companies to encourage them to make these changes. In addition to this, CVM also issued a number of other notices, including its order of prohibition on the extra-label uses of cephalosporin drugs in turkeys and other food-producing animals, and a proposal to collect data on antimicrobial sales by species.

The industry continued work on developing the Federal and State Transport (FAST) Plan for Movement of Commercial Turkeys in a High Pathogenicity Avian Influenza (HPAI) Control Area, and Turkey Risk Assessment. The goal of this work is to facilitate business continuity and economic survival of participating non-infected turkey operations in a Control Area after an outbreak of HPAI, and to help assure the continuous availability of safe turkey meat to consumers.

In early 2012 the Food Safety and Inspection Service (FSIS) issued its proposed rule for the New Poultry Inspection System (NPIS), which would modernize the inspection of turkeys and other poultry in the United States. Under this new inspection system, FSIS inspectors would be allowed more flexibility to patrol the processing plant and provide scientific oversight to ensure the plant is meeting the required food safety performance standards. Federal inspectors would be stationed at the end of the production line to verify every poultry carcass meets the federal regulations, and plant employees would have an expanded role in inspecting carcasses for quality standards on the inspection line. Given that the identification and removal of Turkey Osteomyelitis Complex (TOC) has been a concern for the industry in the past, NTF submitted a letter to FSIS in late 2010 requesting that the agency revisit the current policies on TOC identification, and to propose
potential solutions that might be more beneficial to the industry as well as to FSIS in-plant personnel. Although the agency has not yet given a formal response, the final NPIS rule could indicate a way forward on addressing issues such as TOC.

In 2011, turkey production increased to 7,319.25 from 7,110.53 million pounds (live weight) in 2010. Overall domestic per capita consumption for turkey products decreased to 16.10 lbs in 2011 from 16.40 lbs in 2010. The preliminary number for 2012 is 16.50 lbs turkey consumption per capita, which is the highest level since 2009. Production in 2011 increased to 246.844 million head with an average live weight of 29.45 lbs. In 2010, 242.619 million head were produced with an average live weight of 29.11 lbs. (Reference: National Turkey Federation Sourcebook, June 2012).

Table 1. Turkey health survey (August 2012) of professionals in US turkey production ranking current disease issues (1= no issue to 5 = severe problem). Survey response (reply) is 100% (n=25).

<table>
<thead>
<tr>
<th>Issue</th>
<th>Score Average (1-5)</th>
<th>Score Mode (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of approved, efficacious drugs</td>
<td>4.8</td>
<td>5</td>
</tr>
<tr>
<td>Clostridial Dermatitis (Cellulitis)</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>Colibacillosis</td>
<td>3.6</td>
<td>4</td>
</tr>
<tr>
<td>Heat stress</td>
<td>3.6</td>
<td>3</td>
</tr>
<tr>
<td>Late Mortality</td>
<td>3.0</td>
<td>3</td>
</tr>
<tr>
<td>Leg Problems</td>
<td>3.0</td>
<td>3</td>
</tr>
<tr>
<td>Poult Enteritis of unknown etiologies</td>
<td>2.9</td>
<td>4</td>
</tr>
<tr>
<td>Salmonella</td>
<td>2.7</td>
<td>2</td>
</tr>
<tr>
<td>Cannibalism</td>
<td>2.6</td>
<td>2</td>
</tr>
<tr>
<td>Bordetella avium</td>
<td>2.6</td>
<td>3</td>
</tr>
<tr>
<td>Breast Blisters and Breast Buttons</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>Coccidiosis</td>
<td>2.4</td>
<td>3</td>
</tr>
<tr>
<td>Newcastle Disease Virus (NDV)</td>
<td>2.4</td>
<td>3</td>
</tr>
<tr>
<td>Blackhead (Histomoniasis)</td>
<td>2.3</td>
<td>1</td>
</tr>
<tr>
<td>Protozoal Enteritis</td>
<td>2.3</td>
<td>2</td>
</tr>
<tr>
<td>Osteomyelitis (OM)</td>
<td>2.3</td>
<td>2</td>
</tr>
<tr>
<td>Ornithobacterium rhinotracheale (ORT)</td>
<td>2.2</td>
<td>3</td>
</tr>
<tr>
<td>Round Worms (Ascaridia dissimilis)</td>
<td>2.1</td>
<td>2</td>
</tr>
<tr>
<td>Bleeders (aortic, hepatic)</td>
<td>2.0</td>
<td>2</td>
</tr>
<tr>
<td>Condition</td>
<td>Frequency</td>
<td>Severity</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>Cholera</td>
<td>2.0</td>
<td>2</td>
</tr>
<tr>
<td>Tibial Dyschondroplasia (TDC, Osteochondrosis)</td>
<td>2.0</td>
<td>1</td>
</tr>
<tr>
<td>Mycoplasma gallisepticum (MG)</td>
<td>2.0</td>
<td>1</td>
</tr>
<tr>
<td>Fractures</td>
<td>1.9</td>
<td>1</td>
</tr>
<tr>
<td>Shaky Leg Syndrome</td>
<td>1.8</td>
<td>2</td>
</tr>
<tr>
<td>Mycoplasma synoviae (MS)</td>
<td>1.8</td>
<td>1</td>
</tr>
<tr>
<td>Avian Influenza</td>
<td>1.8</td>
<td>1</td>
</tr>
<tr>
<td>H3N2 (H1N1) Swine Influenza</td>
<td>1.7</td>
<td>1</td>
</tr>
<tr>
<td>TR-DFTR (Turkey Reovirus Digital Flexor Tendon Rupture)</td>
<td>1.6</td>
<td>1</td>
</tr>
<tr>
<td>Turkey Coronavirus</td>
<td>1.6</td>
<td>1</td>
</tr>
<tr>
<td>PEMS (Poult Enteritis Mortality Syndrome)</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>Necrotic enteritis</td>
<td>1.4</td>
<td>1</td>
</tr>
<tr>
<td>Mycoplasma iowae (MI)</td>
<td>1.4</td>
<td>1</td>
</tr>
<tr>
<td>Erysipelas</td>
<td>1.3</td>
<td>1</td>
</tr>
<tr>
<td>Avian Metapneumovirus</td>
<td>1.2</td>
<td>1</td>
</tr>
<tr>
<td>Spondylolisthesis (Kinky-Back)</td>
<td>1.2</td>
<td>1</td>
</tr>
<tr>
<td>Mycoplasma meleagridis (MM)</td>
<td>1.0</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2. Turkey health survey (August 2012) of professionals in US turkey production. Survey response (reply) is 100% (n=25).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackhead (Histomoniasis)</td>
<td>80</td>
<td>89</td>
<td>108</td>
<td>67</td>
<td>63</td>
</tr>
<tr>
<td>Mycoplasma synoviae (MS)</td>
<td>49</td>
<td>39</td>
<td>56</td>
<td>38</td>
<td>47</td>
</tr>
<tr>
<td>Turkey Coronavirus (TCV)</td>
<td>221</td>
<td>70</td>
<td>91</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR)</td>
<td>131</td>
<td>106</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Table 3. Turkey research priorities (August 2012) of industry professionals in turkey production (1= low to 5 = high). Survey response (reply) is 100% (n=25).

<table>
<thead>
<tr>
<th>Issue</th>
<th>Score Average (1-5)</th>
<th>Score Mode (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Safety</td>
<td>4.2</td>
<td>5</td>
</tr>
<tr>
<td>Disease</td>
<td>3.9</td>
<td>5</td>
</tr>
<tr>
<td>Welfare</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>Nutrition</td>
<td>3.2</td>
<td>3</td>
</tr>
<tr>
<td>Poultry Management</td>
<td>3.0</td>
<td>3</td>
</tr>
<tr>
<td>Environmental</td>
<td>2.8</td>
<td>3</td>
</tr>
<tr>
<td>Processing</td>
<td>2.4</td>
<td>3</td>
</tr>
<tr>
<td>Waste Disposal</td>
<td>2.4</td>
<td>2</td>
</tr>
</tbody>
</table>

Addendum - Table. Supplemental USAHA Turkey Survey for Enteric Health, April 2012. Survey response (reply) is 88% (n=22).

**Clinical Signs (Rank: 1 = Never, 5 = Always)**

<table>
<thead>
<tr>
<th>Clinical Signs</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-pitched vocalization in the brooder house</td>
<td>3.2</td>
</tr>
<tr>
<td>Pacing the feed line</td>
<td>3.0</td>
</tr>
<tr>
<td>Loose droppings</td>
<td>3.7</td>
</tr>
<tr>
<td>Pasty vents</td>
<td>3.0</td>
</tr>
<tr>
<td>Increased water consumption</td>
<td>2.9</td>
</tr>
<tr>
<td>Fluid cecal droppings</td>
<td>3.8</td>
</tr>
<tr>
<td>Feed passage</td>
<td>2.6</td>
</tr>
</tbody>
</table>
### Necropsy Lesions (Rank: 1 = Never, 5 = Always)

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thin, transparent intestinal wall</td>
<td>3.5</td>
</tr>
<tr>
<td>Thickened intestinal wall</td>
<td>1.8</td>
</tr>
<tr>
<td>Fluid intestinal contents</td>
<td>3.6</td>
</tr>
<tr>
<td>Mucoid intestinal contents</td>
<td>2.7</td>
</tr>
<tr>
<td>Distended, fluid-filled ceca</td>
<td>3.8</td>
</tr>
<tr>
<td>Hyperemtic intestinal tract</td>
<td>2.7</td>
</tr>
</tbody>
</table>

### Causes (Rank: 1 = Never, 5 = Always)

<table>
<thead>
<tr>
<th>Cause</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poult enteritis of unknown etiologies</td>
<td>3.5</td>
</tr>
<tr>
<td>Turkey Coronavirus</td>
<td>1.5</td>
</tr>
<tr>
<td>Coccidiosis</td>
<td>2.5</td>
</tr>
<tr>
<td>Other Protozoa</td>
<td>2.4</td>
</tr>
<tr>
<td>Ascaridia dissimilis</td>
<td>1.8</td>
</tr>
<tr>
<td>Necrotic Enteritis</td>
<td>1.7</td>
</tr>
<tr>
<td>Blackhead</td>
<td>1.7</td>
</tr>
<tr>
<td>Bacterial enteritis</td>
<td>2.9</td>
</tr>
</tbody>
</table>

### Incidence (%) of your flocks affected by enteritis

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Incidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 weeks</td>
<td>35.1</td>
</tr>
<tr>
<td>4-8 weeks</td>
<td>20.6</td>
</tr>
<tr>
<td>8-12 weeks</td>
<td>12.0</td>
</tr>
<tr>
<td>12-16 weeks</td>
<td>5.0</td>
</tr>
<tr>
<td>16-20 weeks</td>
<td>2.5</td>
</tr>
</tbody>
</table>

### Seasonal (Prioritize: 1 = Common, 4 = Least)

<table>
<thead>
<tr>
<th>Season</th>
<th>Prioritize</th>
</tr>
</thead>
<tbody>
<tr>
<td>December - February</td>
<td>2.0</td>
</tr>
<tr>
<td>March - May</td>
<td>2.6</td>
</tr>
<tr>
<td>June - August</td>
<td>2.8</td>
</tr>
<tr>
<td>September - November</td>
<td>2.3</td>
</tr>
</tbody>
</table>

### Outcomes (Rank: 1 = Never, 5 = Always)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor litter conditions</td>
<td>3.4</td>
</tr>
<tr>
<td>Leg problems</td>
<td>2.8</td>
</tr>
<tr>
<td>Lower daily gain</td>
<td>3.5</td>
</tr>
<tr>
<td>Higher feed conversion</td>
<td>3.5</td>
</tr>
<tr>
<td>Higher mortality</td>
<td>2.9</td>
</tr>
<tr>
<td>Poor flock uniformity</td>
<td>3.8</td>
</tr>
<tr>
<td>Diagnosis (Rank: 1 = Never, 5 = Always)</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Clinical signs</td>
<td>4.3</td>
</tr>
<tr>
<td>Intestinal scrapings</td>
<td>3.1</td>
</tr>
<tr>
<td>Histopathology</td>
<td>2.3</td>
</tr>
<tr>
<td>Virus isolation</td>
<td>2.0</td>
</tr>
<tr>
<td>PCR</td>
<td>1.8</td>
</tr>
<tr>
<td>Gross necropsy</td>
<td>4.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prevention/Control (Rank: 1 = Never, 5 = Always)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cleanout and Disinfection of Brooder House</td>
<td>4.7</td>
</tr>
<tr>
<td>Off-site Brooding</td>
<td>3.0</td>
</tr>
<tr>
<td>Single-Age Production (Brood-Growout on same site)</td>
<td>3.5</td>
</tr>
<tr>
<td>Probiotic/DFM/Prebiotic via feed</td>
<td>3.1</td>
</tr>
<tr>
<td>Probiotic/DFM/Prebiotic via water</td>
<td>2.7</td>
</tr>
<tr>
<td>Coccidial Vaccine</td>
<td>1.5</td>
</tr>
<tr>
<td>Antibiotics/Antimicrobials via water</td>
<td>3.9</td>
</tr>
<tr>
<td>Copper sulfate</td>
<td>3.0</td>
</tr>
<tr>
<td>Fenbendazole via feed</td>
<td>2.8</td>
</tr>
<tr>
<td>Anthelmintic via water</td>
<td>2.3</td>
</tr>
</tbody>
</table>
In the early 1960’s the US poultry industry was feeling the ill effects of two serious disease threats for which there were no immediate solutions, infectious bursal disease and Marek’s disease. The US Poultry and Egg Association (then called the Southeastern Poultry and Egg Association) responded by founding a research program specifically to provide funds to seek solutions for these diseases. The program was very small but made an immediate and significant impact. As the poultry industry grew, the research program grew. In the early years the program focused on providing funds for poultry disease research but over time the priorities of the program broadened to include more areas involved in poultry production and processing. Since its inception it has provided over 24 million dollars for research.

Today the program provides research funding in 19 areas: animal welfare, breeder management, broiler management, commercial egg production, diseases, employee safety and health, environmental management, feed mill operations, food safety, further processing, genetics, hatchery management, human nutrition, live haul, market turkey management, nutrition, poultry housing, pullet management, and processing. Within each of these categories are established priority topics for funding which can be viewed at www.uspoultry.org. This research priority list is established by an industry committee called the Foundation Research Advisory Committee (FRAC). In addition the FRAC recommends to the USPOULTRY Board which research proposals should receive funding. The FRAC receives pre-proposals from researchers twice per year, May 1 and November 1. The FRAC then decides which pre-proposals to invite for full research proposals. After receiving the invited full research proposals the FRAC meets to discuss and decide which proposals should be recommended for funding.

The general philosophy of the research program is to preferentially fund projects which have a significant chance of producing valuable information which can be immediately used to address an important issue within the US poultry industry. Sometimes a single research grant can lead to a significant advancement. More often, USPOULTRY funds a series of projects at several universities whose cumulative contributions make an important impact on a critical need for the poultry industry. For example, since 2000 USPOULTRY has invested $692,000 in 20 research projects at seven different universities on composting and litter management, $429,000 in 11 projects at six universities on phytase use and phosphorous metabolism, and $632,000 in 16 projects at eight universities on salmonella control. This mechanism for funding multiple research projects which address various aspects of an issue...
has been very productive and profitable for the poultry industry. Today, the most important issues facing the poultry industry are being addressed by the university researchers through the USPOULTRY research program. The largest category of pre-proposals received by USPOULTRY in 2012 was food safety, disease was second, and environmental management was a close third. This change from a program once totally focused on poultry disease research to a program today which addresses a wide range of topics is a reflection of the changing needs of the poultry industry.

The funding for the research program comes from two sources, directly from proceeds from the International Poultry Expo (IPE) through USPOULTRY and from the USPOULTRY Harold E. Ford Foundation. Because of the impact of the recent economic recession, the annual funding from both sources has declined from a previous norm of over $1 million to about $700,000 today. USPOULTRY and the USPOULTRY Foundation are dedicated to restoring the funding to at least its previous levels and have put measures in place to accomplish this goal. The future of the USPOULTRY research program is bright. It will continue to provide the funding needed by the poultry industry to find solutions for those issues critical to its advancement, profitability and goal of producing safe, wholesome, affordable products to the consumer.
In 2010, the National Animal Health Monitoring System (NAHMS) conducted its 4th national poultry study (Poultry 2010). One component of the Poultry 2010 focused on urban chickens because several urban areas have recently started to allow residents to have chickens on their properties. The goal of this study was to gain some insights about a population of chicken owners that we know very little about.

The study had two components. First, a mail/phone survey of household in Los Angeles County was conducted to estimate the prevalence of households with chickens and to describe the attitudes of residents about having chickens in their neighborhoods. Secondly, a survey was administered to customers purchasing chicken feed at feed stores in Los Angeles, Denver, and Miami to gather information about biosecurity and management practices. In New York City the survey was administered to members of a web-based chicken club via the club website.

In 2012 NAHMS repeated the prevalence study in Denver, New York City, and Miami. This was a mail/phone survey as was done in Los Angeles. The objective of this study was to estimate the prevalence of households with chickens and to describe the attitudes of residents about having chickens in their neighborhoods. Data collection was completed in September 2012.

The percent of urban residences with chickens present ranged from 0.6% in New York City to 1.3% in Miami. For those respondents who did not currently have chickens, the percent who planned to own chickens within the next five years ranged from 2% in New York City to over 7% in Denver. Approximately 1/3 of respondents in Miami were in favor of allowing chickens in their communities and close to 2/3 of respondents in Denver were in favor. Although over ¼ of the respondents believed chickens in urban areas would lead to more human illness, over 2/3 of respondents believed that eggs from home-raised chickens are better for you than eggs purchased at a grocery store.

In summer of 2013 NAHMS will conduct a study of table egg layers focusing on Salmonella enteritidis (SE). The last NAHMS study of the table egg industry was in 1999. The objectives of the Layers 2013 study are to update previously collected information on layer farm management practices relevant to SE, estimate the prevalence of SE on layer farms, and investigate risk factors for SE. The sample will include table egg layer farms with 3,000 or more laying hens that have registered with the Food and Drug Administration (FDA). Producer participation is voluntary and confidential. The study will consist of a single visit by a Veterinary Medical Officer to administer a questionnaire. We are considering the possibility of adding an optional biologic sampling component addressing Salmonella heidelberg and/or antibiotic sensitivity patterns.
The value of the US Poultry Industry is approximately $35 billion dollars in revenue for FY2012. The success of this industry is largely due to the ability to control diseases such as *salmonella*, mycoplasma and avian influenza through the USDA-APHIS-National Poultry Improvement Plan’s (NPIP) specific disease control programs.


**Pullorum-Typhoid Status:** In FY2012 (July 2011-June 2012) there were zero isolations of *Salmonella pullorum* in the US. There were no isolation/outbreaks of *Salmonella pullorum* (standard strain) reported during FY2011. There have been no isolations of *Salmonella gallinarum* since 1987 in any type poultry. US Pullorum-Typhoid Clean participating hatcheries include: 253 egg and meat-type chicken hatcheries, 35 turkey hatcheries, and 772 waterfowl, exhibition poultry and game bird hatcheries. NPIP US Pullorum-Typhoid Clean Participating Breeding Flocks and Number of Birds are listed below:

- Egg-Type Chickens: 253 Flocks with 4,589,297 birds
- Meat-Type Chickens: 5,176 Flocks with 96,372,550 birds
- Turkeys: 597 Flocks with 4,951,611 birds
- Waterfowl, Exhibition Poultry, and Game Birds: 5,016 Flocks with 1,724,248 birds

**Avian Influenza Status:** In FY2012 (July 1, 2011-June 30, 2012), there was an H5N2 isolated in commercial turkeys in South Dakota.
Table 1: NPIP US Avian Influenza Clean and US H5/H7 Clean Participating Breeding Flocks; and US H5/H7 Avian Influenza Monitored Participating Commercial Flocks:

<table>
<thead>
<tr>
<th>Subpart</th>
<th>Flocks</th>
<th>Birds</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg-Type Chicken Breeders</td>
<td>590</td>
<td>4,759,359</td>
<td>53,878</td>
</tr>
<tr>
<td>Table-Egg Layers</td>
<td>2,615</td>
<td>171,073,920</td>
<td>52,849</td>
</tr>
<tr>
<td>Meat-Type Chicken Breeders</td>
<td>6,273</td>
<td>88,629,609</td>
<td>381,641</td>
</tr>
<tr>
<td>Meat-Type Chickens Commercial</td>
<td>74,654</td>
<td>6,844,281,421</td>
<td>2,039,524</td>
</tr>
<tr>
<td>Turkey Breeders</td>
<td>881</td>
<td>7,499,757</td>
<td>34,783</td>
</tr>
<tr>
<td>Meat-Type Turkeys</td>
<td>14,939</td>
<td>124,316,258</td>
<td>160,850</td>
</tr>
<tr>
<td>Waterfowl, Upland Gamebirds,</td>
<td>4,093</td>
<td>20,817,585</td>
<td>70,439</td>
</tr>
<tr>
<td>Exhibition Poultry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>103,045</td>
<td>7,261,377,909</td>
<td>2,793,964</td>
</tr>
</tbody>
</table>

Authorized Laboratories Activities: The University of Georgia Poultry Diagnostic and Research Center provides a quality assurance panel of convalescent contact, infected chicken sera against *Mycoplasma gallisepticum* (MG) and *Mycoplasma synoviae* (MS) to authorized laboratories as a check test tool. The National Veterinary Services Laboratories (NVSL) issues a group D Salmonella check test, Salmonella serotype proficiency check test and an Avian Influenza check test for the Agar Gel Immunodiffusion test annually for authorized laboratories of the NPIP. A commercial check test for Mycoplasma polymerase chain reaction (PCR) was also offered to the authorized laboratories this year. Laboratory training provided to the authorized labs included two Salmonella Isolation and Identification Workshops in Arkansas and Georgia, one Mycoplasma Diagnostic Workshop and one Avian Influenza Diagnostic Workshop during FY2012.
Live Bird Marketing System (LBMS). As part of the ongoing LBMS surveillance for presence of avian influenza virus (AIV) and avian paramyxovirus type-1 (APMV-1), the National Veterinary Services Laboratories (NVSL) tested 2,456 specimens in 416 submissions from 16 states (Alabama, California, Connecticut, Delaware, Florida, Massachusetts, Missouri, Mississippi, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, and Washington) by virus isolation in embryonating chicken eggs and, when appropriate, by real-time reverse transcriptase polymerase chain reaction (rRT-PCR). The surveillance is a collaborative effort between individual States and the United States Department of Agriculture (USDA). Presumptive positive specimens from rRT-PCR testing at State laboratories and specimens requiring virus isolation (environmental and non-duck cloacal swabs) were submitted to the NVSL for testing. All remaining LBMS surveillance specimens were tested at the State level.

In fiscal year (FY) 2012, AIV or APMV was isolated from 14.2% (59 of 416) of submissions and 4.9% (121 of 2,456) of specimens tested. AIV subtype H2N3 (PA n=8), H3N6 (OH n=1, PA n=1), H4N6 (WA n=1), H5N2 (NY n=1), H8N4 (CA n=1) H9N2 (CA n=1) and H11N2 (CA n=1) were the subtypes of AI found in the LBMS this year. In addition H5 viral RNA was detected in a chicken from a second LBM in Kings County, NY, no virus was isolated. The remaining 106 viruses isolated were identified as APMV; 94 were APMV-1 from nine states (Alabama, Florida, Massachusetts, Mississippi, North Carolina, New Jersey, New York, Pennsylvania, and Rhode Island), three were APMV-4 from Pennsylvania, and nine were identified as pigeon paramyxovirus type-1 (PPMV-1) from five states (Connecticut, Massachusetts, Nebraska, North Carolina and New Jersey). Pathogenicity of representative APMV-1 isolates obtained from birds was determined by the intracerebral pathogenicity index (ICPI, n=24) test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site (n=49). All but 12 isolates were characterized as low virulent (lentogenic pathotype) strains; nine isolates were characterized as pigeon paramyxovirus type-1 (PPMV-1), a pigeon-adapted variant of Newcastle disease virus, and the remaining three were characterized as APMV-4 viruses.

Low Pathogenicity Avian Influenza (LPAI) in Commercial Poultry, Backyard Birds and Exhibition Birds. Surveillance for AIV in commercial poultry is conducted under provisions of the National H5 and H7 Low Pathogenicity Avian Influenza Control Program implemented in September, 2006. Although most of the testing is performed locally, the NVSL provides reagents for the agar gel immunodiffusion (AGID) test and controls for the rRT-PCR test in addition to confirmation and identification testing of positive
specimens. During FY12 no H5 or H7 notifiable AI was detected in commercial poultry. 1) There was one detection of LPAI H5N2 in backyard poultry in Monmouth County, New Jersey. A goose specimen collected as a result of routine backyard flock surveillance tested positive for H5 viral RNA. A LPAI H5N2 virus was isolated from duck specimens collected subsequently. The rural backyard flock premise was adjacent to a LBM, however the premises were separate. Birds from the BY premise did not enter the LBM premise and vice versa. No AI was detected in the LBM as a result of increased surveillance. 2) LPAI H4N8 was isolated from commercial broilers in Camp County, Texas. A spike in mortality and respiratory clinical signs were seen in four of six houses of broilers. An in-depth diagnostic investigation was conducted for the detection of a secondary pathogen, but none was found. The birds in all six houses were depopulated. 3) LPAI H8N4 was isolated from commercial turkeys in Minnesota and Wisconsin. No clinical disease or respiratory distress has been reported for any of the flocks from which virus was isolated or antibody has been detected (Table 1). 4) An LPAI H3N2 virus was isolated from a commercial turkey flock in Minnesota. Virus hemagglutinin and neuraminidase subtypes were identified using commercial swine influenza H3N2 rRT-PCR reagents. 5) H5 viral RNA was detected in swab specimens collected from multiple species in a North Carolina waterfowl zoo breeding facility. Specimen collection was for pre-movement testing. An LPAI H5N2 virus was isolated from two different swab specimens. Due to the nature of the facility no birds were depopulated, and no birds were moved to another facility. 6) Antibody to H5N2 AI was detected in pre-slaughter surveillance specimens collected from commercial turkeys in Charles Mix County, South Dakota. The flock was placed under quarantine, and swabs were collected for detection of virus. Swab specimens were negative for AI, and no respiratory signs were observed in the flock.

The NVSL received 300 submissions from commercial and backyard poultry for AI antibody confirmation and subtyping in FY12. NVSL detected influenza H1, H3, N1, and/or N2 antibodies in 184 commercial turkey submissions from 15 states (California, Colorado, Florida, Iowa, Illinois, Michigan, Minnesota, Missouri, North Carolina, New Hampshire, Ohio, Oklahoma, Pennsylvania, South Dakota, and Texas) in FY12. Detection data of additional LPAI AIV or AIV-specific antibodies in poultry/birds are shown in Table 1.

**AI Diagnostic Reagents Supplied by the NVSL.** During FY2012, a total of 13,284 units of AGID reagents (antigen and enhancement serum) were shipped to 65 state, university, and private laboratories in 34 states. The quantity is sufficient for approximately 1,528,080 AGID tests. An additional 550 units (66,000 tests) were shipped to eight foreign laboratories. Proficiency panels (121) for the AGID were shipped to 77 laboratories in 36 states to support the surveillance of AI by AGID. Positive amplification (PAC) as well as positive extraction (PEC) control for the AI matrix (M), H5 and H7 rRT-PCR were distributed to National Animal Health Laboratories for support of AI rRT-PCR testing for the support of NPIP and LBM surveillance. A total
of 76 vials of PAC were shipped in FY12, 35 vials of M PAC to 21 states, 20 vials H5 PAC to 12 states and 21 vials H7 PAC to 12 states, in addition 376 vials of PEC were shipped to 38 states.

**rRT-PCR Proficiency Test Panels.** The NAHLN laboratories conducting surveillance testing for AI and/or ND are required to have one or more diagnosticians pass an annual proficiency test (PT) to perform official rRT-PCR testing. In FY2012, Al (matrix/H5/H7) PTs were distributed to 258 diagnosticians in 55 laboratories and to 244 diagnosticians in 55 laboratories for APMV-1 (Newcastle disease) rRT-PCR. A total of 243 diagnosticians have been approved to conduct rRT-PCR testing for Al and 231 for APMV-1 in 55 and 52 laboratories, respectively. The Al rRT-PCR proficiency panel included specimens for the detection of swine influenza, specifically pH1N1. In addition to NAHLN laboratories AI and ND rRT-PCR proficiency panels were distributed to Canada and Mexico as part of the North American Animal Health Laboratory Network (NAAHLN) harmonization, and an Al panel was shipped to Panama.

**AIV Surveillance in Wild Waterfowl.** Since the curtailment of the National Wild Bird Surveillance Program in March of 2011, NVSL has supported the surveillance of AI in wild waterfowl by subtyping (determination of hemagglutinin and neuraminidase subtype) all viruses and pathotyping (chicken inoculation and amino acid sequencing) H5 and H7 viruses submitted by university and independent researchers as well as the United States Geological Survey (USGS). Virus isolation (VI) and rRT-PCR testing is conducted on mortality event specimens. In 2012, the 458 wild bird specimens received were collected from 20 different states for confirmation, subtyping and characterization and, from mortality events, VI and rRT-PCR. No HPNAI H5N1 was detected; however, LPAI H5N1 virus was detected in specimens submitted from three states (Ohio, Minnesota, and California). A total of 82 H5 viruses (various N subtypes) and 115 H7 viruses (various N subtypes) were pathotyped and subtyped. Predominant H5 and H7 subtypes were H5N2 and H7N3. All H5 and H7 AIVs were characterized as LPAI viruses of North American lineage. Other AIV subtypes identified included H1 (29), H2 (15), H3 (55), H4 (65), H6 (27), H8 (2), H10 (9), H11 (15), H12 (5), and H13 (3).

**NEWCASTLE DISEASE**

**Isolations of Virulent Newcastle Disease Virus (vNDV).** In FY2012, no vNDV was isolated from domestic poultry. Pigeon paramyxovirus type-1 (PPMV-1) was isolated from wild Rock Doves in Pennsylvania, pigeons in Pennsylvania and wild Eurasian Collared Doves in Texas. Virulent NDV was isolated from wild cormorant specimens from Minnesota (seven submissions). In addition vND was isolated from APMV-1 (LaSota) vaccine confiscated by the AZ Division of Customs and Boarder Protection. All vND and PPMV-1 isolates were characterized by the intracerebral pathogenicity index (ICPI) and/or amino acid sequence analysis of the fusion protein cleavage site. In addition, all PPMV-1 isolates were identified by the HI test with monoclonal antibodies specific for PPMV-1.
Isolations of Low Virulent Newcastle Disease Virus (LoNDV). During FY2012, LoNDV was isolated and/or characterized from 128 APMV-1 viruses or specimens received for characterization or isolation at the NVSL. The specimens and viruses were received from LBM and NPIP surveillance and diagnostic submissions. The specimens originated from 16 states (Alabama, Delaware, Florida, Iowa, Indiana, Massachusetts, Minnesota, Missouri, Mississippi, North Carolina, New Jersey, New York, Ohio, Pennsylvania, Rhode Island and Wisconsin). All of the isolates were characterized as LoNDV by the ICPI and/or by deduced amino acid motif at the fusion protein cleavage site.

NDV Diagnostic Reagents Supplied by the NVSL. During FY2012, a total of 98 vials of LaSota APMV-1 inactivated antigen (2.0 ml per vial) and ten vials of antiserum (2.0 ml per vial) for the hemagglutination-inhibition test were shipped to seven and five state, university, and private laboratories, respectively. An additional 65 vials of LaSota APMV-1 inactivated antigen and 34 vials of antiserum were shipped to eight and five foreign laboratories, respectively. Positive amplification (PAC) as well as positive extraction (PEC) control for the APMV-1 rRT-PCR assay was distributed to National Animal Health Network Laboratories for support of APMV-1 rRT-PCR testing. A total of 44 vials (21 states) of PAC, and 165 vials (27 states) of PEC were shipped.

Table 1. Subtypes of non H5 or H7 low pathogenicity avian influenza virus (AIV) or specific antibodies detected in poultry/birds, FY 2012.

<table>
<thead>
<tr>
<th>State</th>
<th>Species</th>
<th>Subtype of AIV* (number)</th>
<th>Antibody Subtypes (number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>Quail</td>
<td>H8N4* (1)</td>
<td></td>
</tr>
<tr>
<td>California</td>
<td>Chicken</td>
<td>H9N2* (1)</td>
<td></td>
</tr>
<tr>
<td>California</td>
<td>Chicken</td>
<td>H11N2* (1)</td>
<td></td>
</tr>
<tr>
<td>Michigan</td>
<td>Turkey</td>
<td>H3N2* (1)</td>
<td></td>
</tr>
<tr>
<td>Michigan</td>
<td>Turkey</td>
<td>H10N7 (1 sera)</td>
<td>H8N4 (40 subm)</td>
</tr>
<tr>
<td>Minnesota</td>
<td>Turkey</td>
<td>H8N4* (3)</td>
<td>H8N4 (40 subm)</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>Chickens</td>
<td>H2N8 (1 sera)</td>
<td></td>
</tr>
<tr>
<td>New Mexico</td>
<td>Goose</td>
<td>N3, 6, 8 and 9</td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>Chicken</td>
<td>H6N8 (1 sera)</td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>Ducks</td>
<td>H3N6* (1)</td>
<td></td>
</tr>
<tr>
<td>Oklahoma</td>
<td>Goose, swan,</td>
<td></td>
<td>H1N1, H1N2, H11N2</td>
</tr>
<tr>
<td></td>
<td>duck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Ducks</td>
<td>H2N3* (8)</td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Quail</td>
<td>H3N6* (1)</td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Duck</td>
<td>H11N9* (1)</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>Chicken</td>
<td>H4N8*</td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td>Duck</td>
<td>H4N6* (1)</td>
<td></td>
</tr>
</tbody>
</table>

*Low pathogenicity AIV by the chicken pathogenicity test.
Salmonella serotyping

The Diagnostic Bacteriology Laboratory within the National Veterinary Services Laboratories (NVSL) routinely serotypes Salmonella isolates submitted by private, state, and federal laboratories as well as veterinarians, researchers and other animal health officials. This report summarizes Salmonella serotyping submissions to NVSL from January 1 through December 31, 2011 originating from poultry. The Salmonella isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (herd and flock monitoring programs, environmental sources, food). Serotyping data from isolates submitted for research purposes are not included in the summary. Salmonella serotyping at the NVSL is an ISO 17025 accredited test. Sera used for typing Salmonella isolates consists of polyvalent sera against the O serogroups and single factor sera against the individual O and H antigens. Approximately 50% of the sera used at the NVSL is produced in house as previously described (Ewing), and the rest is purchased from commercial vendors. All sera are subjected to quality control testing prior to use. Salmonella antigenic formulae are determined essentially as previously described (Ewing) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I. Those serotypes previously reported as “Arizona” are now listed with “III” (both monophasic and diphasic) followed by the antigenic formula. Those serotypes belonging to subspecies II or IV that had been previously named are now listed with their antigenic formula preceded by II or IV.

From January 1 to December 31, 2011 there were 3,940 isolates from chicken sources and 1,372 isolates from turkey sources submitted to NVSL for Salmonella serotyping. The most common isolates from chickens and turkeys are listed in Tables 1 and 2 respectively.

The NVSL provided a Salmonella Group D proficiency test in order for laboratories to assess their ability to isolate Salmonella from environmental samples and determine the serogroup (specifically group D) of any Salmonella isolated. The samples consisted of drag swabs spiked with Salmonella and/or common contaminants. The 2012 test included Salmonella serotypes Enteritidis, Berta, Heidelberg, 9,12: non-motile, Montevideo, Senftenburg, Escherichia coli, Citrobacter freundii, Pseudomonas aeruginosa, and Proteus mirabilis. The test consisted of seven samples which were shipped to laboratories overnight on ice packs. Laboratories were instructed to use whatever protocol they choose and to
report the results within three weeks. The NVSL randomly retained 7% of the test kits and tested them blindly for QA purposes. For the first time, a significant number of labs chose to use a screening test specific for Group D *Salmonella*. As a result, the grading method was changed to grade only based on the correct identification of the samples as Group D positive or negative. The results of the proficiency test are shown in Table 3.

The NVSL provided a *Salmonella* serotyping proficiency test in order for laboratories to assess their ability to serogroup or serotype *Salmonella* isolates. The samples consisted of 10 pure *Salmonella* cultures which included *Salmonella* serotypes Heidelberg, 4,[5],12:i:-, Ouakam, Schwarzengrund, Oranienburg, Senftenberg, Dublin, Enteritidis, Newport, and Infantis. Participants were given the option to perform serogrouping, partial serotyping, or full serotyping of the isolates and were graded based on the appropriate identification to the level of typing they performed. The NVSL randomly retained 18% of the test kits and tested them blindly for QA purposes. The results of the proficiency test are shown in Table 4.

### Table 1: Most common serotypes in 2011: Chicken

<table>
<thead>
<tr>
<th>Clinical Serotype</th>
<th>No. Isolates</th>
<th>Non-Clinical Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteritidis</td>
<td>127</td>
<td>Enteritidis</td>
<td>649</td>
</tr>
<tr>
<td>Kentucky</td>
<td>40</td>
<td>Kentucky</td>
<td>586</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>13</td>
<td>Senftenberg</td>
<td>316</td>
</tr>
<tr>
<td>Rough O: g,m:-</td>
<td>10</td>
<td>Mbandaka</td>
<td>236</td>
</tr>
<tr>
<td>Infantis</td>
<td>8</td>
<td>Heidelberg</td>
<td>233</td>
</tr>
<tr>
<td>All others</td>
<td>46</td>
<td>Tennessee</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Typhimurium</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Schwarzengrund</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Newport</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Braenderup</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All others</td>
<td>1,268</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>244</strong></td>
<td><strong>Total</strong></td>
<td><strong>3,696</strong></td>
</tr>
</tbody>
</table>

### Table 2: Most common serotypes in 2010: Turkeys

<table>
<thead>
<tr>
<th>Clinical Serotype</th>
<th>No. Isolates</th>
<th>Non-Clinical Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senftenberg</td>
<td>37</td>
<td>Hadar</td>
<td>142</td>
</tr>
<tr>
<td>Albany</td>
<td>34</td>
<td>Heidelberg</td>
<td>123</td>
</tr>
<tr>
<td>Ouakam</td>
<td>30</td>
<td>Saintpaul</td>
<td>102</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>23</td>
<td>Senftenberg</td>
<td>89</td>
</tr>
<tr>
<td>Montevideo</td>
<td>13</td>
<td>Muenster</td>
<td>80</td>
</tr>
<tr>
<td>All others</td>
<td>89</td>
<td>Orion</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Berta</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kentucky</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Albany</td>
<td>43</td>
</tr>
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</table>
TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

<table>
<thead>
<tr>
<th></th>
<th>Ouakam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>38</td>
<td>226</td>
</tr>
<tr>
<td>All others</td>
<td>330</td>
<td>1,106</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Summary of NVSL *Salmonella* Group D proficiency test

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>40</td>
<td>55</td>
<td>70</td>
<td>73</td>
</tr>
<tr>
<td>Mean Score</td>
<td>93%</td>
<td>92%</td>
<td>97%</td>
<td>92%</td>
</tr>
<tr>
<td>Score Range</td>
<td>100-44%</td>
<td>100-44%</td>
<td>100-85%</td>
<td>100%-29%</td>
</tr>
<tr>
<td>Below Passing</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>N/A*</td>
</tr>
</tbody>
</table>

Because of the change in grading method, a pass/fail designation was not assigned. Seven participants scored less than 80%.

Table 4: Summary of NVSL *Salmonella* Serotyping proficiency test

<table>
<thead>
<tr>
<th></th>
<th>Serogrouping 2012</th>
<th>Serotyping 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>Mean Score</td>
<td>98%</td>
<td>92%</td>
</tr>
<tr>
<td>Score Range</td>
<td>100%-90%</td>
<td>100%-70%</td>
</tr>
</tbody>
</table>

*Salmonella Enteritidis*

The number of *Salmonella* Enteritidis (SE) isolates submitted from chickens in 2011 is shown in Table 5. The most common SE phage types are shown in Table 6.

In July 2010, the NVSL implemented a rapid SE Rule Out test in order to help customers comply with the FDA Egg Rule. The test indicates if a submitted isolate is SE or not, and the results are typically reported within two business days. In 2011, 258 isolates were submitted for SE rule out testing; 176 were SE positive.

Table 5: Number of chickens *Salmonella* Enteritidis isolates per calendar year at the NVSL

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. chicken isolates</td>
<td>4,971</td>
<td>6,164</td>
<td>4,761</td>
<td>4,987</td>
<td>3,940</td>
</tr>
<tr>
<td>No. chicken SE isolates</td>
<td>580</td>
<td>876</td>
<td>993</td>
<td>1500</td>
<td>776</td>
</tr>
<tr>
<td>SE percent of all isolates</td>
<td>11.7%</td>
<td>14.2%</td>
<td>20.9%</td>
<td>30.1%</td>
<td>19.7%</td>
</tr>
</tbody>
</table>

Table 6: Most common *Salmonella* Enteritidis phage types from chicken sources per calendar year
Salmonella Pullorum and Gallinarum

The NVSL provided 2050 ml of S. Pullorum tube antigen, 1950 ml of S. Pullorum stained microtiter antigen, and 346 ml of antisera to testing laboratories between October 1, 2011 and September 30, 2012. The NVSL conducted 152 S. Pullorum microtiter tests in 2011. The NVSL identified two isolates of S. Pullorum in 2011, both from backyard flocks. The NVSL identified one isolate submitted from outside the United States as S. Gallinarum in 2011.

Pasteurella and Mycoplasma

NVSL received 181 isolates for somatic typing in FY2012, an increase from 2011 (Table 6). NVSL also supplied 85 ml of P. multocida typing sera, an increase from 40 ml in 2010.

The amount of Mycoplasma reagents are shown in Tables 7 and 8.

**Table 6: Pasteurella multocida somatic typing. Table shows number of isolates per fiscal year for each type.**

<table>
<thead>
<tr>
<th>Type</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 3</td>
<td>54</td>
<td>38</td>
<td>25</td>
<td>38</td>
</tr>
<tr>
<td>Type 3,4</td>
<td>33</td>
<td>27</td>
<td>12</td>
<td>33</td>
</tr>
<tr>
<td>Type 1</td>
<td>14</td>
<td>25</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>All other</td>
<td>62</td>
<td>70</td>
<td>52</td>
<td>100</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>163</td>
<td>160</td>
<td>106</td>
<td>181</td>
</tr>
</tbody>
</table>

**Table 7: Mycoplasma antisera (ml) provided by NVSL per fiscal year**

<table>
<thead>
<tr>
<th>Antisera</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. gallisepticum</td>
<td>340</td>
<td>266</td>
<td>256</td>
<td>306</td>
<td>274</td>
</tr>
<tr>
<td>M. meleagridis</td>
<td>120</td>
<td>54</td>
<td>32</td>
<td>54</td>
<td>40</td>
</tr>
</tbody>
</table>
Table 8: *Mycoplasma* antigen (ml) provided by NVSL per fiscal year

<table>
<thead>
<tr>
<th>Antigen</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>M. gallisepticum</em></td>
<td>390</td>
<td>190</td>
<td>150</td>
<td>195</td>
<td>175</td>
</tr>
<tr>
<td><em>M. meleagris</em></td>
<td>150</td>
<td>75</td>
<td>75</td>
<td>95</td>
<td>80</td>
</tr>
<tr>
<td><em>M. synoviae</em></td>
<td>510</td>
<td>200</td>
<td>215</td>
<td>220</td>
<td>245</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,050</td>
<td>465</td>
<td>440</td>
<td>510</td>
<td>500</td>
</tr>
</tbody>
</table>


Highly Pathogenic Avian Influenza H7N3 in Jalisco, Mexico

Hugo Fragoso
Servicio Nacional de Sanidad Inocuidad y Calidad Agroalimentaria

Summary

An outbreak of Highly Pathogenic Avian Influenza (H7N3) began in the Jalisco state of Mexico on June 18, 2012. The last detected case of the outbreak was reported on August 20, 2012 (61 days ago). Mexico was fifth in worldwide table egg production prior to the outbreak, producing 2.3 million metric tons of table eggs. Table egg production is 29.52% of the total Mexican livestock production commodities. All poultry farming together comprise 63.48% of Mexican livestock population. This outbreak occurred in the state of Jalisco where 51% of the national egg production is produced.

June 18, 2012 the first notification was reported of high mortality in laying chickens in Tepatitlan, Jalisco. The official confirmation of avian influenza H7 was on June 20. The emergency plan was activated and response corps was mobilized on June 21. The World Organization for Animal Health (OIE) was notified on June 22 and backyard flock sampling was initiated. Confirmation of Highly Pathogenic Avian Influenza - H7N3 (HPAI H7N3) was obtained on June 23-24 and the OIE was notified. On July 2, 2012 DINESA (Operative National Animal Health Emergency) was declared and mandatory control guidelines were published.

Control measures enacted during July 3-18 included: vaccine potency testing, quarantine zone establishment (approximately 19,593 square kilometers), new rules for the movement of poultry and poultry products from Jalisco. Check points for product movement verification were carried out by Federal Police and the Mexican Army. July 26, 2012 the first batch of AI vaccine was delivered to producers. By October 17, 657 farms have been sampled with 44 positive premises, three cases of wild birds were positive on virus isolation – blackbirds (zanates) and a swallow, 87 people have been working in the field to assist with containment, a total of 92,804 samples have been processed, 128.58 million vaccine doses were applied, and 11 million birds have been depopulated. All but one of the poultry isolations have been in table egg chickens. HPAI affected farms were located near lakes and water reservoirs where migratory birds are common.

Following USDA-APHIS-NVSL adopted protocols the virus was identified as A/Chicken/British Columbia/CN-00006/2004(H7N3). Intravenous Pathogenicity Index (IVPI) Testing, using a harmonized United States of America/Canada/Mexico protocol, calculated to 2.90, classifying the virus as Highly Pathogenic. The isolate was also confirmed by PCR assay and sequencing testing. An insertion of basic amino acids was detected at the cleavage site that also classified the isolate as Highly Pathogenic.

Ongoing national surveillance is occurring on farms and in backyards flocks throughout Mexico. The Quarantine Zone is still in place. There is continued control of poultry and poultry product mobilization. Biosecurity on
farms is heightened. Notification of suspected cases – high mortality, egg production drops, and clinical signs – is required. Positive flocks are being depopulated, cleaned and disinfected. There is a wild bird surveillance program in place. Vaccination for avian influenza is occurring in the Buffer Zone with an officially produced low path Al virus vaccine. Communication strategies include posters, commercials, press releases, radio spots, and social media network postings. Repopulation of 90 million hens is expected to be completed by the end of November 2012.

The 2012 HPAI H7N3 outbreak is expected to cost $638 million US dollars. The National Table Egg Flock was reduced by 15.5%. Total egg production loss was 10% when compared to the previous year. Consumers are expected to pay $10 million US dollars more for eggs in Mexico over the next 5 months. Imported eggs have cost $16.6 million US dollars.
New USDA Licensed Avian Influenza Vaccine (rHVT-AI) for Protection against H5 Avian Influenza

Darrell R. Kapczynski
USDA-ARS, Southeast Poultry Research Laboratory

Recently, a new avian influenza (AI) vaccine was licensed by USDA for use in the United States for protection of commercial poultry. The vaccine is a recombinant herpes virus of turkeys expressing the hemagglutinin gene of an H5 subtype avian influenza virus belonging to the 2.2 clade of the H5N1 highly pathogenic avian influenza viruses of Southeast Asian lineage. Vaccine efficacy studies have demonstrated protection of chickens and turkeys against homologous and heterologous clade challenges, and reduction in viral shedding and thus transmission potential. The parameters of when and under what conditions this vaccine might be employed are the subject of discussion among state veterinarians. The impact of its use on global trade restrictions for states employing the vaccine is also under consideration. In theory, application of this vaccine does allow for differentiation of infected from vaccinated animals, the so called DIVA strategy. Both molecular and antibody tests should have the capability to distinguish infected from vaccinated birds. In particular, the USDA approved M gene real time RT-PCR test for AI and commercially available AI ELISA kits utilizing the nucleoprotein (NP) as antigen, can differentiate infected from vaccinated animals in flocks vaccinated with the rHVT-AI vaccine. However, testing of samples from rHVT-AI-vaccinated and H5 HPAI-infected animals should be tested to confirm this.
Secure Egg Supply Plan: Summary of Products and Permitting Requirements

Jonathan Zack
National Center Animal Health Emergency Management (NCAHEM)
USDA-APHIS-VS

Introduction: The SES Plan promotes food security and animal health through continuity of market planning for a highly pathogenic avian influenza (HPAI) outbreak. This plan makes specific science- and risk- based recommendations that emergency decision makers (such as Incident Commanders) can use to rapidly decide whether to issue or deny permits for the movement of egg industry products during an HPAI outbreak. Full copies of the SES Summary Plan and complete SES Plan are available at www.secureeggsupply.com.

Public-Private-Academic Partnership: The Egg Sector Working Group—a multidisciplinary team—prepared the SES Plan. This team includes the following:

- University of Minnesota, Center for Animal Health and Food Safety
- Iowa State University, Center for Food Security and Public Health
- United Egg Producers
- Egg sector veterinarians and officials
- State officials
- United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (USDA APHIS VS).

How the SES Plan Works: The SES Plan is based on current research and practice in fields including virology, flock husbandry, epidemiology, and risk-assessment. The SES Plan uses science- and risk-based preparedness and response components (see Figure 1) to provide guidance on permitting the movement of egg industry products from a Control Area during an HPAI outbreak. Simultaneously, these recommendations effectively manage the risk of HPAI transmission to naïve premises. Through the integrated implementation of the components listed in Figure 1, this plan provides a high degree of confidence that egg industry products moved into market channels do not contain HPAI virus.

Recommendations: The surveillance recommendations for real-time reverse transcriptase polymerase chain reaction (RRT-PCR) testing for poultry within an HPAI Control Area are based on guidance prepared by the APHIS Centers for Epidemiology and Animal Health (CEAH), National Surveillance Unit. Guidance on observational surveillance, including the mortality threshold and clinical signs, is based on information provided by the Egg Sector Working Group and proactive risk-assessment team at CEAH.

Mortality and Production Parameters: Flocks are to be monitored daily for obvious signs and symptoms of disease. An increase in mortality is
daily mortality greater than three times the past 7-day average and greater than 0.03 percent. Flocks that do not display such signs and have no apparent increase in mortality will be monitored by RRT-PCR testing or another suitable procedure, as determined by Incident Command.

**Testing Criteria:** RRT-PCR testing of one 5-bird pool sample from dead or euthanized sick birds per 50 dead on each house on the premises. Movement of products may require negative RRT-PCR tests, as indicated in the product specific summaries. When a hold is required for movement, at least one of the two required RRT-PCR tests must be taken on the second day of holding or later.

**Sampling:** A State or Federal regulatory official or an individual authorized by Incident Command takes five oropharyngeal swabs from five dead chickens per house and the swabs (5) are pooled in a tube containing brain-heart infusion (BHI) broth. Sampling and disposal should be completed in a biosecure manner. The samples are submitted to an authorized State veterinary diagnostic laboratory. Veterinary diagnostic laboratory personnel perform RRT-PCR testing on samples immediately upon receipt and transmit the results to the Incident Command on the same day. The Incident Command reports the tests results to the farm manager. If the test is not negative or if daily mortality spikes over three times the past 7-day average, additional diagnostic testing will be conducted.

**Important Note on Diagnostic Testing:** The RRT-PCR test is not a pathotyping assay, and cannot separate HPAI and low pathogenicity avian influenza strains. However, RRT-PCR testing can be used as a means to know that targeted avian influenza strains (both low and high pathogenicity) are present if there is a positive RRT-PCR. All mention of RRT-PCR testing in the SES Plan is in reference to surveillance for HPAI in an outbreak situation, after HPAI has been characterized by virus isolation and/or other pathotyping assays. If positive RRT-PCR tests are obtained with no confirmation of illness or mortality, further pathotyping will be conducted to determine the presence of HPAI.
Proactive Risk Assessments to Maximize Market Continuity:  
2012 Turkey and Broiler Work Group Report

Timothy P. Snider¹, Minden Buswell¹, David Halvorson¹, Timothy Goldsmith¹,  
Sasidhar Malladi², and Todd Weaver³

¹University of Minnesota, Center for Animal Health and Food Safety, St. Paul, Minnesota;  ²University of Minnesota, Center for Animal Health and Food Safety, Fort Collins, Colorado;  ³Centers for Epidemiology and Animal Health, Fort Collins, Colorado;

Continuity of Business (COB) planning is an integral component of USDA NAHEMS Foreign Animal Disease Preparedness (FAD Prep) plans. COB planning promotes food availability (food security) and animal health during a foreign animal disease (FAD) emergency response. In the event of an FAD outbreak, initial regulatory actions will be implemented to detect, control, and contain the outbreak. Minimizing the spread of highly pathogenic avian influenza (HPAI) through 'stop movement' orders would be a likely component of any effective response. However, unnecessary stoppage in the movements of animals and/or animal related products may result in unintended consequences for industry, especially for certain products produced with limited holding capacity and just-in-time delivery systems.

Effective COB plans facilitate the managed movement of poultry industry products within, into, and out of a control area from monitored premises that do not have known epidemiological links to infected or high risk premises. For these movements to occur, APHIS response plans require the completion of a risk assessment, or a similar scientifically based evaluation. Approval to move a product from within a control zone is made by the Incident Command and must be documented in the form of product specific movement permits. Completing these assessments during an event can be challenging. In order to help facilitate the timely completion of risk assessments and movement permitting decisions, proactive risk assessments are being completed before an actual HPAI emergency through a joint government, industry and academia partnership. The objectives of these assessments are to assess the risk to animal health associated with the movement of products out of a control zone, during an HPAI outbreak, and to ensure that the risk of HPAI disease transmission through the movement of products is acceptable (e.g., negligible or low risk etc.) through the development of a mutually agreed upon set of science based and risk based mitigations.

Outbreak specific measures were developed with input from risk managers in industry and government including veterinarians and other subject matter experts. Outbreak specific control measures evaluated through risk assessment will be operationalized in HPAI FAD Prep plans (e.g. Secure Egg Supply (SES) and other commodity specific plans) in the event of an FAD emergency. Participation in these plans is voluntary. Veterinary residents at the University of Minnesota's Center for Animal
Health and Food Safety play a key leadership role, and facilitate the collaborative process that brings risk managers and stakeholders from all poultry production sectors (i.e. layer, broiler, and turkey sectors) as well as state and federal regulatory veterinarians together to facilitate the development of proactive risk assessments.

**2012 Activities - Broiler Sector Working Group (Conference Calls every 2-3 weeks)**
- **Broiler Hatching Egg RA Review Process**
  - Writing completed (Dec 2011) and Permit Guidance Discussions (Jan 2012)
  - RA Review Process – Internal and technical writer review (Jan 2012) followed by review by Centers for Epidemiology and Animal Health (CEAH), National Surveillance Unit (NSU), National Animal Health Monitoring System (NAHMS), and Chief Epidemiologist
  - Review changes accepted by working group (Aug 2012). Next Step: National Center for Animal Health Emergency Management (NCAHEM) review
- **Broiler Day Old Chick RA**
  - Started January 2012 are currently more than 60% complete
  - Preliminary Discussions (Jan-Mar) necessity for the RA and determining Scope and Risk Pathways
  - Evaluation of Risk Pathways for a Hatchery in a Control Area (Mar – Oct)
    - Current and Outbreak Specific biosecurity measures; Area Spread; Fly transmission; Aerosol transmission
- **Secure Broiler Supply** – Initial framework discussions (Aug 2012)

**2012 Activities - Turkey Sector Working Group (Conference Calls every 2-3 weeks)**
- **Information gathering/consultation phase (Nov 2011 to Present)**
  - Production flow, Egg Handling, Transport, Breeder Flock Characteristics
  - Vehicle and Driver biosecurity
  - Current and Outbreak Specific measures → Biosecurity and Surveillance (hen and tom flocks)
  - Disease Transmission models →Primary(hen flock) and Secondary hen flock (via semen) infection models
- **Working Group Supplemental Information**
  - Industry hosted facility visits (turkey and broiler)
  - Industry provided Hen and Tom Breeding Flock Mortality Data and Egg Production Rate Drop Data
  - Egg washing and sanitizing survey (online) and Hatchery transmission of influenza survey (in person)
TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

- Turkey Day Old Poult Risk Assessment
  - Discussions re necessity for RA, Scope, Risk Pathways and Information gathering (Fall 2012)
Southeast Poultry Research Laboratory (SEPRL) Update on Exotic and Emerging Poultry Diseases

David E. Swayne, Mary Pantin-Jackwood, David L. Suarez, Laszlo Zsak, Erica Spackman, Darrell Kapczynski, Patti Miller, Stephen Spatz, Qingzhing Yu, and Claudio Afonso
Southeast Poultry Research Laboratory

In June 2012, an outbreak of highly pathogenic avian influenza (HPAI) occurred in the state of Jalisco, Mexico. In response to the outbreak, SEPRL in collaboration with SENESICA in Mexico conducted vaccination studies. Using five different low pathogenic H7 avian influenza viruses from North America as potential vaccine seed viruses in inactivated, oil emulsified vaccines, chickens were vaccinated and challenged with H7N3 HPAI virus from Mexico. All five vaccines provided protection for mortality and reduced the challenge virus replication and shedding from the oropharynx.

Swine influenza in the United States has become a complex disease with multiple variants with different gene combinations co-circulating. Historically the influenza viruses that infect swine eventually end up infecting poultry, particularly turkeys where it is an important problem for turkey breeders with impacts on egg production. The biggest issue with swine influenza is the variant H3N2 viruses that have human H3 and N2 genes and different internal gene combinations. These viruses are commonly found in swine and have become a public health concern with numerous human cases identified, often associated with pig exhibitions at state fairs. SEPRL has been evaluating the most common variants in turkeys and quail to provide data on the risk of introduction in poultry and its potential impact for veterinary of public health. Preliminary data shows the viruses can infect turkeys, but no evidence of clinical disease was observed.

Phylogenetic analyses provide a way to associate genetic, geographic, temporal and host epidemiological data of microbial agents. Newcastle disease virus (NDV) isolates are grouped phylogenetically using two different systems that do not completely correlate with each other and neither system has objective criteria to easily decide when a new genotype is warranted. Newest classification system builds upon one of these older systems, the genotype system originally designed by Lomnicizi using partial fusion (F) gene sequences, and provided objective criteria to classify new genotypes. Using complete F gene sequences of 704 sequences available in GenBank, a phylogenetic comparison with bootstrap values greater than 60% were obtained. Evolutionary distances were inferred and genotypes were greater than 10% different than each other and sub-genotypes differed by 3-10%. From this information criteria for future genotypes were assigned. First, at least four isolates without a direct epidemiological link (not from the same outbreak) are needed to assign a new genotype. Second, bootstrap values have to be greater than 60% to be considered valid. Third, different genotypes have an average distance per site greater than ten percent and
sub-genotypes should have an average distance between 3-10%. Lastly, the mean evolutionary distance between genotypes will be set at a cutoff of 10%.

When this analysis was complete 15 genotypes were found, ten of which existed previously in the Lomnicizki analysis. Genotypes I, II, III, IV, V, VI, VII, VIII, IX and XI remained the same, except sub-genotype numbers declined from ten to five for genotype VII, and eight to four for genotype VI. Genotype V was not previously divided into sub-genotypes and now has two sub-genotypes and genotype I remains the same with two sub-genotypes. A genotype previously labeled Ila has been renamed genotype X. Additional genotypes XII through XV were assigned and characterized. Phylogenetic data is useful in evaluating how isolates are linked epidemiologically and predicting efficacy of molecular assays, which need to be evaluated with circulating isolates to ensure they are detected.

The virulent NDV (vNDV) responsible for the 2008 outbreaks in Peru and Dominican Republic (DR) have been characterized. The Peru vNDV isolate groups with other vNDV isolated from healthy geese in live bird markets in China in 2011 and fits the criteria to be in the newly created genotype XII. The Peru virus has an intracerebral pathogenicity index (ICPI) value of 1.78, a fusion cleavage site of 113R-Q-K-R-F117 typical of vNDV, and a mean death time of 4.7 days. The virus is most distance from vaccine genotypes I and II and most similar to genotypes VI and VII. A traditional inactivated LaSota vaccine protected SPF white leghorns 100% from death and disease after challenge with the Peru strain in an experimental setting.

The vNDV responsible for the DR outbreak was also found to be significantly different than other genotypes. This virus grouped with two vNDV from DR (2008 and 1986) and another from 1947 vNDV from Mexico into a new genotype XVI. These viruses are most closely related to genotypes IV and VIII. These DR vNDV strains appear to have been maintained in some form in the DR since the mid-1980s. The DR vNDV has an ICPI of 1.88 and a F cleavage site of 113R-Q-K-R-F117.

A risk assessment of recombinant NDV strains has been initiated with three main goals. The first goal is to assess the possibility of a recombinant NDV acting as a vector and containing the hemagglutinin (HA) gene of avian influenza virus would be able to swap HA genes if the virus was present in a host also infected by a wild type AIV. For this aim the recombinant NDV (rNDV) contained a virulent HA gene of H5 Mongolia AIV and was infected into a 14 day-old SPF embryonating chicken egg (ECE) along with the H5 Mongolia strain that contained an attenuated HA gene. If the H5 Mongolia AIV is recovered, it would only be from recombination of the two genes. Two other AIV, H6 and H9, are also used as they are commonly found circulating in wild birds. The 14 day-old ECE are used because these older eggs have a more robust interferon response that makes it difficult for less virulent viruses to grow and acts as a tool to select more virulent viruses. Each of the three combinations, rNDV-HA with H5, or H6 or H9, was placed into 300 ECE. Allantoic fluids from embryo mortality between 24-72 hours are now being inoculated onto MDCK cells without the addition of trypsin, which allows high
path AIV, but not NDV to grow. Plaque purification and sequencing will be done of any recovered AIV.

The second goal was to evaluate how stable rNDV are in ECE. Recombinant NDV are used in Mexico and China and usually have the fusion cleavage site attenuated to a NDV of low virulence (loNDV) before being used as a vaccine. Two recombinant viruses (rLaSota, and rZJ1-attenuated) and two wild type NDV (LaSota and Australia/1998) were each placed into 900 14 day-old SPF ECE. Allantoic fluid from embryo mortality between 24-72 hours was harvested and RNA isolated for the fusion cleavage site to be sequenced to see if any increase in multiple basic amino acids occurred. After one passage, all 102 still contain the typical fusion cleavage site observed in other loNDV, 113R-Q-G-R-L117. While not described in the scope of this project, additional passes of this allantoic fluid will be analyzed.

The last aim of this project was to observe how easily rNDV infected and transmitted to non-target species, pigeons, starlings and house sparrows. Five birds are inoculated with rLaSota, rLaSota-HA, rZJ1, and a wild type pigeon NDV (PPMV-1) and two days after infection, four naïve birds are placed into the isolator. Birds are swabbed every two days to evaluate viral shed. The pigeon experiment has been completed and the pigeons are able to be infected and transmit the viruses to naïve birds. None of the pigeons showed clinical signs of disease. Half of the sparrow experiment has been completed but swab data has not yet been analyzed. While these experiments are not comprehensive, they are an initial laboratory evaluation of vaccine use in the field to provide some evidence of the stability of these rNDV used as vaccines.

**Avian Herpesviruses** (Marek’s Disease and Infectious Laryngotracheitis): The Marek’s disease vaccine platform involved in the generation of cell free Marek’s disease virus. To accomplish this, three Herpesvirus of turkeys (HVT) recombinants were generated in order to create an HVT helper virus. The first recombinant contained a single deletion in the packaging site. The second recombinant contained deletions in both packaging sites. The third recombinant containing double deletions in the packaging sites also contained a packaging site flanked by lox P sequences. The viability of this third recombinant was assessed on CEFs expressing the Cre recombinase and its complete genomic sequence was determined.

In the second quarter of 2012 a Marek’s disease amplicon containing an origin of replication, the green fluorescent protein gene and a packaging site was generated. In transfection/infection experiments it was demonstrated that this amplicon can be encapsulated into the virion of gallid herpesvirus type 2. This is accomplished by first transfected the amplicon into CEFs and then infecting them with GaHV-2. After four days the infected cells were passaged onto zeocin-resistant CEF in the presence of Zeocin. Green fluorescence was observed four days later. In June 2012 the nucleotide sequences of four avian herpesvirus strains from Merial were determined using next-generation sequencing technology. The bioinformatics analysis of these strains will be completed in the fourth quarter of 2012.
The genomic ILTV program for 2012 involved comparative analysis of virulent and vaccine strains of gallid herpesvirus type 1. In the autumn of 2011, in collaboration with the University of Georgia the nucleotide sequences of six vaccine strains [derivative of chicken embryo origin (CEO) and tissue culture origin (TCO)] was determined using hybrid next generation sequencing technology. The sequences of these strains have been instrumental in the identification of genes associated with virulence and will provide the blueprints for the generation of new vaccine containing deletion in these genes. Comparative sequence analysis between the vaccine strains and virulent strains indicated surprising conservation at the amino acid lengths of the majority of open reading frames. However, numerous single nucleotide polymorphisms were identified and it is largely suspected that virulent isolates were the result of reversion of the vaccines to generate virulent progeny. Furthermore we have identified a gene within the TCO genome that contains a premature stop codon which results in a truncation protein for the ORF-C gene.

Enteric Diseases of Poultry: A metagenomic analysis of the turkey gut RNA virus community has identified novel enteric RNA viruses that may play roles in the poultry enteric diseases or in performance problems noted in the field. As part of the molecular characterization of these novel enteric viruses, an RT-PCR based diagnostic assay was developed targeting a novel turkey-origin picobirnavirus (PBV) initially identified in a pooled intestinal sample from turkey poults in North Carolina. Little detailed molecular information exists regarding the family Picobirnaviridae, and the picobirnaviruses are almost completely un-described in avian species. This diagnostic assay targets the turkey picobirnavirus RNA-dependent RNA polymerase (RdRp) gene and produces an 1135 base pair amplicon. This RT-PCR test was validated using in vitro transcribed RNA and was tested using archived enteric samples collected from turkey flocks in the southeastern United States. Further, a phylogenetic analysis suggests the turkey PBV is unique since it does not group closely with the recognized PBV genogroups circulating in mammalian hosts.

Using metagenomic approaches we identified a novel parvovirus from enteric content of chickens and turkeys that were affected by enteric diseases. Comparative sequence analysis showed that the chicken parvovirus (ChPV) and turkey parvovirus (TuPV) represented a new member in the Parvovirus family. We described some of the pathogenic characteristics of ChPV in young broilers. Following experimental infection, two-day-old broiler chickens showed characteristic signs of enteric disease. Runting-stunting syndrome (RSS) was observed in four of five experimental groups with significant growth retardation between 7 and 28 days postinoculation (DPI). Viral growth in small intestine and shedding was detected at early times postinoculation, which was followed by viremia and generalization of infection. Chicken parvovirus could be detected in most of the major tissues for three to five weeks PI. Immunohistochemistry staining revealed parvovirus positive cells in the duodenum of inoculated birds at
seven and 14 DPI. Our data indicate that ChPV alone induces RSS in broilers and an important determinant in the complex etiology of enteric diseases of poultry.

**Avian Metapneumovirus:** Avian metapneumovirus (aMPV) and Newcastle disease virus (NDV) are threatening avian pathogens that cause sporadic but serious respiratory diseases in poultry worldwide. Although, vaccination, combined with strict biosecurity practices, has been the recommendation for controlling these diseases in the field, new outbreaks are inevitable with current vaccines. In the present study, reverse genetics technology was used to construct NDV LaSota vaccine strain-based recombinant viruses that express the glycoprotein (G) of aMPV, subtype A or B, as bivalent, next-generation vaccines. These recombinant viruses, rLS/aMPV-A G and rLS/aMPV-B G, showed slight attenuation *in vivo*, yet maintained similar growth dynamics, cytopathic effects, and virus titers *in vitro* when compared to the parental LaSota virus. The expression of the aMPV G protein in recombinant virus-infected cells was detected by immunofluorescence. Vaccination of turkeys with rLS/aMPV-A G or rLS/aMPV-B G conferred complete protection against velogenic NDV, CA02 strain, challenge and partial protection against homologous pathogenic aMPV challenge. These results suggest that the LaSota recombinant virus may be a safe and effective vaccine vector and expression of the G protein alone is not sufficient to provide full protection against aMPV-A or -B infections. Expression of other aMPV-A or -B virus immunogenic protein(s) or in conjunction with the G protein may be necessary to induce stronger and more protective immunity against aMPV diseases.
TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

Research Update: Avian Disease and Oncology Laboratory Avian Tumor Viruses

Aly Fadly, Hans Cheng, John Dunn, Mohammad Heidari, Henry Hunt, Lucy Lee, Robert Silva and Huanmin Zhang
USDA-ARS Avian Disease and Oncology Laboratory (ADOL)

Genomics and Immunogenetics

Use of genomics to identify QTL, genes, and proteins associated with resistance to Marek’s disease. Marek’s disease (MD), a lymphoproliferative disease caused by the highly oncogenic herpesvirus Marek’s disease virus (MDV), continues to be a major disease concern to the poultry industry. The fear of MD is further enhanced by unpredictable vaccine breaks that result in devastating losses. The field of genomics offers one of the more exciting avenues for enhancing control of MD. By identifying genes that confer genetic resistance, it should become possible to select for birds with superior disease resistance. Genetic resistance to MD is a complex trait controlled by many genes. Identification of these genes is a major challenge despite the existence of the chicken genome sequence and ever increasing number of tools, especially next generation sequencing. Thus, we have been implementing and integrating genomic approaches that identify QTL, genes, and proteins that are associated with resistance to MD. The rationale for using more than one approach is that the strengths of each system can be combined to yield results of higher confidence. Another justification is that given the large volume of data produced by genomics, each method provides an additional screen to limit the number of targets to verify and characterize in future experiments. Some highlights of this year’s findings include: 1) analysis of RNA seq datasets indicates both the Toll-like receptor and JAK/STAT pathways are conserved responses to MDV infection in commercial broilers and experimental layers, and genes at the start of each pathway can be selected to modulate the response; 2) Meq binds AP-1 sites to regulate expression of genes that influence immunological responses including MAPK signaling, which is also needed to maintain growth in low serum; and 3) a complete list of polymorphisms and genes in the MDV genome associated with in vitro attenuation has been compiled, and testing of recombinant MDVs indicates that a SNP in UL5 (helicase/primase) has significant impact on viral virulence.

Host Genetics and Vaccinal Protective Efficacy against MD. Vaccinal protective efficacy against vv+MDV challenge was studied in MD resistant and susceptible chickens. Chickens from a MD resistant line (63) and a susceptible line (72) were either vaccinated or vaccinated followed by vv+MDV challenge. Chickens that vaccinated followed by vv+MDV challenge resulted in differential MD incidence and protective index (PI). Both HVT and Rispens conveyed comparable protection against the vv+MDV
REPORT OF THE COMMITTEE

challenge with PI 91.2 and 86.7 percent in line 6, respectively. In comparison, CVI988/Rispens conveyed 80 percent protection while HVT achieved significantly lower protection (25%) in line 7. This result confirms our previous report that host genetics plays a vital role in modulating vaccinal protective efficacy. Furthermore, next generation RNA sequencing data suggest vaccine, MDV, and vaccine plus MDV differentially up- or down-regulated global gene expression in both MD resistant and susceptible chickens. RNA samples were collected from both MD resistant and susceptible lines either vaccinated, MDV challenged, and both. RNA libraries were constructed following standard procedures for next generation RNA sequencing with Illumina’s HiSeq platform. The RNA reads data suggested that the global gene expression differed between the MD resistant and susceptible chickens and differentially up- or down-regulated by each vaccine, MDV, or the combination of both vaccine and MDV. This finding suggests host genetics effect on vaccinal protective efficacy may be partially explained by differential globe gene expression upon vaccination and MDV challenge of chickens with different genetic backgrounds.

Marek’s Disease Virus Evolves to Higher Virulence in Birds with Limited Genetic Variation. MD is still a major concern as MDV continues to evolve to higher virulence. Most studies addressing the evolution of MDV virulence have concentrated on the virus while largely ignoring the hosts’ influence. The host system called the major histocompatibility complex (MHC) represents a highly polymorphic system designed to defend the species from extinction by the fast paced evolution of a parasite. In natural chicken populations, there are hundreds of different MHC haplotypes that oscillate in response to pathogen evolution, but commercial poultry breeding has limited the number of MHC haplotypes to six or less. Our current work has shown that MDV can evolve to higher virulence in birds with a single MHC haplotype. We are evaluating the effects of resistant and susceptible MHC haplotypes on MDV evolution. Our results suggest that MDV evolves to higher virulence in the susceptible MHC haplotype. The virus passed in the resistant MHC haplotype does not overcome the resistance but is more virulent in the susceptible haplotype than the parental virus. Thus, the virus can evolve to more virulence in resistant MHC haplotypes but this increased virulence is only observed in the more susceptible MHC haplotypes. This may help explain sporadic outbreaks of MDV in flocks segregating for resistant and susceptible MHC haplotypes.

Immunopathogenesis, Diagnosis and Control of Marek’s Disease
Pathotyping of new field strains of MDV. Pathotyping of new field strains of MDV requires both a long period of time and a large number of birds. Confirming a positive correlation of virus replication and pathotype may lead to faster and cheaper alternative pathotyping methods or as a screening assay for choosing isolates to be pathotyped. Past studies have found differences in replication rates between selected vMDV and vv+MDV, but this correlation has not been evaluated using a broad selection of virus strains. Our first trial evaluated replication rates of five virus strains from each virulent
pathotype (v, vv and vv+) using maternal antibody positive chickens which found very little difference in lymphoid atrophy between groups and mild differences between replication rates by pathotype. The current trial evaluated differences using maternal antibody negative chickens. We found a significant increase in viral load in brain, bursa and lung tissue at days nine and 11 post challenge for vvMDV and vv+MDV strains compared to vMDV strains. No significant difference was seen between vvMDV and vv+MDV strains. Similar results were seen comparing lymphoid atrophy between pathotype groups. Using these results, it may be possible to determine a replication rate threshold as a preliminary screen to separate vMDV from vv/vv+MDV strains.

Role of macrophages in MDV infection. We investigated the specific role of macrophages (MQ) in the control or exacerbation of MD by depletion of these phagocytic cells using a chemical called clodronate (Cl2MBP) 48 hours prior to exposure to shedder birds. Our preliminary studies indicate that combination of intra-tracheal and intra-venous treatment of chickens with clodronate reduces the number of macrophages in the spleen and lungs significantly and this reduction in phagocytic cell population will likely influence the number of virus particles being transmitted from the lungs to the lymphoid organs. Macrophages in addition to the speculated role of virus dissemination play an essential role in viral replication and infection by production of nitric oxide and interferon gamma. This information is important in understanding the immunological responses to MD and development of immunomodulatory measures to prevent MDV infection and spread.

Diagnosis. Polymerase chain reaction (PCR) was used in diagnosis of MD and reticuloendotheliosis (RE) in formalin-fixed, paraffin-embedded (FFPE) tumorous tissues that have been stored for periods varied from 5-244 months. In another experiment, PCR was also used in diagnosis of MD in tumorous tissues that have been only preserved in formalin for periods that varied from 7-49 days. MD and RE were detected in FFPE tissues tested even in those stored for up to 20+ years; MD was also detected in tissues preserved in formalin for up to seven weeks. Results indicated that PCR is a useful tool that can be used in diagnosis of MD and RE in affected tissue stored as FFPE tissue blocks or in those only preserved in formalin. The data indicated that PCR is a good alternative to any biological, molecular, or immunohistochemical assay to confirm the diagnosis of MD and RE, as it does not require shipping of frozen tissue to the diagnostic laboratory.

Vaccines. Recently, we reported that inserting long terminal repeat (LTR) from REV into the genome of MDV lowered the pathogenicity of MDV. Results from a pilot study to determine the protective ability of various passage levels of MDV with LTR insert showed that passage level 75 when used as a vaccine reduced MD lesions by 75% following challenge with strain 648A, a very virulent plus (vv+) strain of MDV. Further protection studies are being planned to evaluate MDV with LTR insert as a vaccine against MD.
Avian Leukosis

Role of MD vaccines in enhancement of spontaneous lymphoid leukemia-like tumors in Chickens of ADOL line ALV6. Preliminary data indicate that ADOL line ALV6 chickens vaccinated in ovo or at hatch with the SB-1 strain of MDV, a serotype 2 MD vaccine virus developed more spontaneous tumors than chickens that did not receive the vaccine. This information should be helpful to poultry breeders and growers who are interested in reducing or eliminating the incidence of spontaneous avian leukemia virus-like tumors in their flocks.
US Surveillance for Avian Influenza in Wild Birds 2006-2011

Thomas DeLiberto, Sarah Bevins, Seth Swafford, Kerri Pedersen, Mark Lutman, John Baroch, Brandon Schmit, Dennis Kohler, Tom Gidlewski, and Dale Nolte
USDA-APHIS Wildlife Services (WS)

The USA successfully implemented a nationally coordinated highly pathogenic avian influenza virus (HPAIV) early detection system in wild birds that was also effective in providing valuable ecological data on low pathogenic AIVs. This strategy capitalized on existing infrastructure and expertise at state and federal agriculture, as well as at natural resources agencies. This program, combined with the Canadian and Mexican surveillance programs, represented the largest, coordinated disease surveillance program ever implemented. During 2006-2011, over 500,000 samples were collected from over 250 species of wild birds throughout North America and results were shared among all three countries.

The integrated, targeted approach used several parallel surveillance activities that provided statistically-based evidence on the absence of HPAIV from the wild bird metacommunity. Standardized data collection protocols were developed to ensure the consistency and quality of samples collected. The National Animal Health Laboratory Network (NAHLN) facilities were used to implement rapid screening for H5 and H7 viruses, which were molecularly characterized and tested for pathogenicity by the National Veterinary Services Laboratories (NVSL). Partner agencies provided collection data to a common database, which was used to provide status updates to the public and decision makers on the progress of the system in achieving annual sampling targets.

The majority of AIVs were detected in dabbling ducks. While the USDA effort used a targeted approach resulting in a majority of the samples coming from dabbling ducks, AIV prevalence in this functional group was disproportionately high (88%). The majority of H5 (91.5%) and H7 (89.7%) AIVs detected also were in dabbling ducks. These results reinforce the important role of dabbling ducks as a natural reservoir of AIVs, especially for viruses that have the potential to evolve into notifiable AIVs.

While annual prevalence of AIVs in wild birds throughout this effort varied within ranges reported in previous studies, it also revealed an increasing trend in prevalence across the USA over the five-year study (Fig. 1). A similar trend was observed for prevalence of H5 viruses, suggesting that the increase in matrix positive wild birds could at least be partially attributed to an increase in H5 occurrence; however, since H5 viruses only accounted for 9.3% of matrix positive birds, other subtypes likely played a role as well. Data from the United State Geological Survey Breeding Bird Survey revealed that their populations did not significantly increase in North America from 2000-2011. Therefore, the increase in prevalence was not likely due to an increase in the most prolific dabbling duck species. Analyses
also indicated that differences in annual sample size, sampling efficiency, or age class of birds did not result in the observed trend. The increasing prevalence may represent part of a multi-year cycle of AIVs in their natural reservoirs, or may be a response to changing environmental factors across the continent.

Figure 1. Prevalence of AIV in US wild birds from 1 April 2007-31 March 2011.
The World Organization for Animal Health (OIE) Updates – Poultry

Michael J. David
International Animal Health Standards, National Center for Import and Export, USDA-APHIS-VS

Every year, the World Organization for Animal Health (OIE) updates existing terrestrial animal code chapters or drafts new ones. At its May 2012 General Session, the World Assembly of Delegates adopted new text to several existing chapters. In addition, in September of 2012 the OIE’s Terrestrial Animal Health Standards (Code) Commission met to propose further modifications to several chapters for consideration at the May 2013 General Session. Of interest to the poultry industry, the following chapters were updated in 2012 or are being proposed for further modification in 2013:

**Criteria for the Inclusion of Diseases and Infections on the OIE List.** The OIE revised its criteria for listing diseases. The existing list of avian diseases may change once the OIE runs the currently listed diseases through the new algorithm. Therefore, some of the currently listed diseases may fall off the notifiable list, and similarly, some currently unlisted diseases may now get on the list.

**Biosecurity Procedures in Poultry Production.** Last year, a new chapter addressing basic biosecurity and hygiene procedures during poultry production was adopted. This year, this chapter has undergone some minor revisions to improve its clarity and understanding.

**Harmonization of National Antimicrobial Resistance Surveillance and Monitoring Programs.** The issue of antimicrobial resistance (AMR) is also being addressed by the OIE. A specific chapter on AMR will be submitted for adoption later this fall. However, related or complementary chapters such as this one were updated to reflect current thinking. This particular chapter is generic enough to accommodate for local situations.

**Animal Welfare.** There were no updates or new chapters presented this year directly related to poultry welfare. However, for the first time in OIE’s history, a welfare chapter on the housing and production of a livestock species (in this case, beef cattle) was adopted by the World Assembly. We therefore, expect that a welfare chapter on Broiler Chicken Production Systems will be presented for adoption during the next General Session in May 2013.
REPORT OF THE COMMITTEE

Backyard and Small Commercial Flocks Disease Report

Jarra Jagne¹, Anne Lichtenwalner²
¹Cornell University, ²University of Maine

Introduction: Backyard chickens have always been kept by farmers and people living in rural areas but in recent years, an urban chicken movement has spread all over the United States. Many cities have laws prohibiting the production of livestock in residential areas and backyard farming started as an “underground” activity. Nowadays, in cities such as Madison, Wisconsin, Ft. Collins, Colorado and Ann Arbor, Michigan, residents have campaigned to change the laws to allow them to keep a small number of laying hens. Smaller cities and towns have increasingly joined these early pioneers to also make their laws favorable for backyard chicken enthusiasts. In cities such as Seattle, Portland, Los Angeles and San Francisco raising hens has always been legal so the trend has expanded quite considerably in those locations.

In 2010, the USDA through the National Animal Health Monitoring System (NAHMS) conducted a study on the health and management of backyard poultry flocks in four US cities as part of a comprehensive study on urban backyard poultry flocks. The study was a good start but there is still much that is unknown about urban and suburban backyard flocks in terms of their numbers, locations and disease status. These flocks represent a unique challenge for poultry disease diagnosticians and the poultry industry in terms of disease control and management. Veterinarians working in the field and in diagnostic laboratories are increasingly dealing with cases from small backyard and commercial flocks (500 or less). The purpose of this informal survey is to put together disease information from such flocks from August 2011 to August 2012. The information presented below came from a total of 12 state/university diagnostic labs covering a wide geographic region. Comprehensive information from the state of California covered more than the year 2011-2012 and will be summarized separately.

Survey Description: Survey respondents were asked to provide the number of diseases observed/diagnosed in backyard chickens, turkeys, game birds, ducks and other species. Several of the respondents also commented on the multifactorial diseases contributing to mortality of backyard poultry as well as the reluctance of owners to pay for diagnostic services. In some of those cases, diagnoses were sometimes achieved by clients sending photos of gross lesions by email. With two labs participating, Pennsylvania had the largest number of diseases recorded (189). New Jersey (146), Colorado (71), Missouri (47), South Carolina (39) and New York (38) rounded out the top six. The other states that participated include Arkansas (30), Delaware (27), Texas (24), Michigan (10), North Carolina (7) and Maine (6). Some states such as Colorado also sent in parallel information on cases diagnosed visually without any diagnostic testing (total cases - 434) and 69% of those were infestations with external parasites in
chickens and turkeys. Respiratory diseases were 16% of the total followed by avian tumors at 9%.

Survey Results:
Chickens as we expected, are by far the most common poultry species kept by backyard enthusiasts and they accounted for over 62% of all the 623 laboratory-diagnosed diseases followed by game birds at 15% as seen in the table below.

<table>
<thead>
<tr>
<th>DISEASES OBSERVED</th>
<th>POULTRY SPECIES AFFECTED</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chicken</td>
<td>Turkey</td>
</tr>
<tr>
<td>Salmonella sp.</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>E.coli infections</td>
<td>39</td>
<td>5</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>Viral</td>
<td>35</td>
<td>6</td>
</tr>
<tr>
<td>Mycoplasmas</td>
<td>49</td>
<td>5</td>
</tr>
<tr>
<td>Avian Tumors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marek’s disease virus</td>
<td>39</td>
<td>0</td>
</tr>
<tr>
<td>Lymphoid leukosis virus</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Parasites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal parasites</td>
<td>104</td>
<td>21</td>
</tr>
<tr>
<td>External (lice and mites)</td>
<td>44</td>
<td>2</td>
</tr>
<tr>
<td>Nutritional diseases</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Fungal diseases</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>392</td>
<td>59</td>
</tr>
</tbody>
</table>

The survey shows the wide range of diseases and conditions that are documented in backyard chickens. Intestinal parasites top the list for all the species. Coccidiosis and endoparasites such as roundworms, tapeworms and cecal worms are commonly seen in backyard flocks. Inadequate housing and other management conditions such as free ranging encourage the accumulation and spread of infected feces in many flocks. Adding external parasites, parasitism was identified in 39% of all cases. Respiratory diseases caused by bacteria, viruses and mycoplamas were the second most common group of diseases. Vaccination for common respiratory viruses is not
practiced by many small flock owners due to lack of knowledge about vaccines or the fact that vaccines are packaged in doses of 500 or 1,000 for larger commercial flocks.

Many of the laboratories reported greater than normal positive diagnoses for Marek’s disease that were marked by presence of both visceral and nerve lesions. Small flock owners obtain their flocks from a variety of sources including small commercial hatcheries, feed stores, livestock auctions, swap meets, from friends and neighbors and home incubation of fertile eggs. Only hatcheries practice Marek’s vaccination and even that may not be a guarantee because the practice can be dependent on the hatchery size. Many backyard breeds are also fancy or heritage types that are usually bred by fanciers who do not practice vaccination. *E. coli* infections, seen mostly in chickens also show a significant prevalence. These were identified as salpingitis and egg yolk peritonitis for the most part. Small flock owners tend to keep their chickens for much longer up to 3-4 years on average when we see an increase in pathological changes in the reproductive organs. In addition to nutritional and fungal diseases, other conditions noted as “other” in survey forms were necrotic enteritis, fowl pox, ovarian adenocarcinoma, botulism and West Nile virus.

The state of California shared a very comprehensive look at backyard poultry submissions through their Laboratory Information System (LIS) that spanned ten years from 2001-2011 (3,178 diagnoses). Diseases were grouped under viral, bacterial, parasitic, management and noninfectious causes, neoplastic diseases, metabolic diseases, mycotic diseases, nutritional deficiencies and diseases caused by toxicities. Viral, bacterial and parasitic diseases were the top three diagnoses with Marek’s causing 67% of viral diseases, *E. coli* infections were the highest for bacterial diseases and coccidiosis was responsible for 35% of parasitic diseases. Management and non-infectious related diagnoses (yolk peritonitis, visceral gout, cloacal prolapse etc.) were at 11% of the total diagnoses.

**Conclusion:** Even with the small sample of laboratories that responded to the survey it was evident that parasitism, respiratory diseases of various etiologies, Marek’s disease and mycoplasma infections are significant problems in backyard poultry. The surge in the number of people keeping backyard poultry is said to be due to several factors; Grassroots campaigns to buy locally produced food, the belief that home raised livestock lowers energy use and carbon emissions associated with transporting food, alternative to large commercial farms (issues of pollution, noise etc.) and the perception that backyard poultry have fewer disease problems. Backyard poultry owners need to be educated how to better care for and manage their flocks. They should be knowledgeable about diseases, vaccinations and the risk of zoonotic diseases and food safety issues associated with *Salmonella*, *Listeria* and *Campylobacter*. The poultry industry and poultry veterinarians also have a role to play in providing correct information to small poultry farmers who it seems are going to be a part of poultry production for years to come.
Veterinary Accreditation Limitations for Exporting Poultry and Poultry Products
Elena Behnke¹, Alberto Torres-Rodriguez²
¹Centurion Poultry, Inc.
²Cobb-Vantress, Inc.

Background/History: When a poultry company exports eggs or chicks out of the country, an accredited veterinarian must issue a health certificate, ascertaining the health status of the flock(s) of origin. Because these flocks can originate from multiple states, the company generally has three choices when handling export documentation: 1) The company can hire multiple veterinarians, all of which are licensed and accredited in the states of importance where breeder flocks are located; 2) The company can have one vet that is licensed and accredited in multiple states; or 3) The company can work with accredited consultant veterinarians in the state(s) from which the flock(s) originate. While both larger and smaller companies utilize option 3 at times, larger companies are usually able to support more veterinarians, while smaller companies must rely on one veterinarian becoming licensed and accredited in multiple states.

Although obtaining veterinary accreditation is more streamlined through the new National Veterinary Accreditation Program, the prerequisite to obtaining accreditation is to become licensed in the state in which the accredited duties are being performed. Obtaining and maintaining multi-state licensing can be quite expensive and time-consuming for one veterinarian.

Argument: The problem of multi-state licensing was discussed with several individuals and groups. Dr. Fidel Hegngi of USDA-APHIS-VS, after discussions with his colleague at the National Veterinary Accreditation Program (NVAP), suggested patterning the poultry industry after the military as a possible solution. Requirements for Military Accreditation are: 1) Be licensed in any one state (Army Veterinary Corps requirement); 2) Complete Initial Accreditation Training (IAT); 3) Attend Core Orientation; 4) Complete VS Form 1-36A; 5) Complete state specific training, if required in state of deployment; and 6) Accreditation approved, National Accreditation Number issued. By the Department of Defense (DOD) agreement with all states, DOD Veterinary Surgical Association (VSA) veterinarians are “legally able to practice” in any State in which they are located, as long as they hold one unrestricted State license from any State. Accredited duties for military vets are the same as for private practitioners in that the activities are noted in 9 CFR B, C, and D. Therefore, if military veterinarians are granted exemption from obtaining licenses in multiple states but are allowed to perform accredited duties in any state as long as they hold one valid state license, poultry industry veterinarians should theoretically be able to obtain similar exemption.

Discussion: The DOD agreement with states for military veterinarians has created an avenue through which poultry veterinarians could obtain single state licensure with the option to perform multi-state accreditation.
duties when relevant for flocks under their supervision. With a strong explanation of the poultry industry's needs, perhaps this request for exemption similar to that granted for military veterinarians can be made on behalf of poultry industry veterinarians and presented to the National Assembly.
The USAHA Committee on Salmonella met on October 23, 2012 and heard presentations from the below speakers. Details of the program can be found in the Committee’s full report.

Dr. Stacey Bosch of CDC spoke on *Salmonella* in Unpasteurized Dairy Products and also an Update on the Outbreaks of Human *Salmonella* infections linked to live Poultry from Mail Order Hatcheries.

Dr. Kristina Lantz gave the National Veterinary Service Laboratories (NVSL) *Salmonella* Summary.

Dr. Xin Li of FDA/CVM spoke on *Salmonella* in Animal Feed.

Dr. Pat McDonough of Cornell University spoke on Companion Animal and Big Cat Salmonellosis issues with diet and associated problems.

Dr. Daniel Engeljohn of FSIS spoke on FSIS Perspectives on *Salmonella*.

Dr. Jerry Rameriz of FDA spoke on FDA’s view of *Salmonella heidelberg* in commercial layers.
REPORT OF THE COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE

Chair: Harry Snelson, NC
Vice Chair: Lisa Becton, IA

Bobby Acord, NC; Gary Anderson, KS; Paul Anderson, MN; William Ballantyne, CAN; Karen Beck, NC; C. Black, GA; Becky Brewer-Walker, AR; Corrie Brown, GA; Tom Burkgren, IA; Jim Collins, MN; Joseph Corn, GA; Thomas DeLiberto, CO; Effingham Embree, Jr., IL; Mark Engle, TN; J. Flanagan, FL; James Foppoli, HI; Tony Forshey, OH; Nancy Frank, MI; Cyril Gay, MD; Michael Gilsdorf, MD; Thomas Hagerty, MN; Rod Hall, OK; James Mark Hammer, NC; William Hartmann, MN; Greg Hawkins, TX; Michael Herrin, James Leafstedt, SD; Donald Lein, NY; Karen Lichtenegger, CAN; Tsang Long Lin, IN; Bret Marsh, IN; David Marshall, NC; Chuck Massengill, MO; James McKean, IA; Gene Nemechek, NC; Sandra Norman, IN; Gary Osweiler, IA; Kris Petrini, MN; Barbara Porter-Spalding, NC; Tom Ray, NC; Mo Salman, CO; David Schmitt, IA; Richard Sibbel, IA; Dennis Slate, NH; Paul Sundberg, IA; Brad Thacker, MD; Beth Thompson, MN; Susan Trock, GA; Patrick Webb, IA; Margaret Wild, CO; Larry Williams, NE; Ellen Wilson, CA; George Winegar, MI; Nora Wineland, MO; Paul Yeske, MN.

The Committee met on Monday October 22, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 1:00 to 6 p.m. There were 23 members and 40 guests present.

Dr. Snelson opened the meeting with housekeeping items and reviewed the mission statement of the Committee. He asked for resolutions to be presented if there are any. Other Committee rules were covered prior to the meeting proceeding.

Presentations and Reports

Subcommittee on Feral Swine Brucellosis and Pseudorabies

Joe Corn
University of Georgia, College of Veterinary Medicine

Dr. Corn provided an update of what is going on with feral swine. Discussed the feral swine mapping system and how data is gathered to populate that map. Information is available on the National Feral Swine (NFS) mapping webpage. It is updated on a monthly basis. Now there are 36 states reporting feral swine as Nebraska has eliminated their feral swine population so have been removed from the list. The draft concept paper on pseudorabies virus (PRV) and swine brucellosis (SB) is underway. Dr. Ray presented on feral swine control issues in North Carolina (NC). The State was funded to study the impact of importation of feral swine into NC and what the end outcome is for the state. The economic impact of this importation and also the potential for an introduction of an FAD were
included in the study and provided in detail. Early results are available but not yet published. A presentation of monitoring of feral swine diseases was also given. This covered additional diseases like classical swine fever (CSF) and swine influenza virus (SIV).

**Swine Health Programs Update**

Troy Bigelow  
USDA-APHIS-VS

Dr. Bigelow provided a review of Swine Health programs activities throughout the past year. This will cover many diseases both regulatory and non-regulatory. There are some changes occurring in the industry and with swine health programs and those will be presented later in the year. Surveillance is moving from disease-centric to commodity-based. The goal is to increase flexibility and move towards more of a risk-based approach vs. just random sampling.

PRV will be targeted surveillance to high risk premises. Will utilize NAHLN labs and use convenience serology that is already submitted to the NAHLN labs. Validation of antibody testing for oral fluid diagnostic testing will also become a priority to match industry needs. High risk sites are still going to be targeted for the focus for PRV. Random surveillance will continue to focus on sow/boars. To date, there have been about 521,000 samples collected so far to equate to about 5% sampling level. This does exceed the PIE “Previously Free” status requirements. PRV NAHLN lab sample collection numbers were presented for year to date. NAHLN stream was implemented in FY20120 with 15 labs. There are plans to expand for SB surveillance. Testing for feral swine testing is not currently part of the surveillance plan. Testing of feral swine is doe in collaboration/cooperation with USDA Wildlife Services. All states remain free of PRV. Three herds were identified in 2011 and were transitional herds and indemnified when diagnosed. SB update is provided and will utilize many of the same sample streams as PRV. Look to see the implementation of the update of the plan in FY2013. The focus to increase surveillance is because of the increased risk of feral swine to commercial populations. There is a concept paper describing what is to come for the changes in the surveillance plan. The draft paper is in the review process. Will be coming out in the Federal Register and will explain where the program will go and the reasoning behind those changes. The updated plan will combine PRV and SB programs into one and it will hope to be in the FR by FY2013.

CSF surveillance is underway with the same sampling that is used for PRV and SB. Look at high risk (waste-feeders) and feral swine sampling. All samples have been negative for CSF to date. Will also be streamlining the Swine Health Protection Act; did over 36,000 feeders and found 125 non-licensed feeders. The information provided here can be found at the USDA website.

Trichinae program is also ongoing. The program guidelines are in the CFR and can be found at the website.
Focus for USDA is cost-effective measures, utilizing different sampling streams and to update surveillance activities.

**Seneca Valley Virus Update**

David Marshall  
North Carolina State Veterinarian

Dr. Marshall gave a presentation on three vesicular disease incidents in commercial swine. They received a call from a swine practitioner about vesicular lesions on the snouts of sows. There were no lesions on the new gilts. The case was treated as an FAD. There was no fever or inappetance of affected sows. They saw signs as the introduction of new gilts. There was not oral or foot lesions no fever. No lesions were ever seen in progeny of the affected sows. Second case showed both sows and gilts affected with some off feed but no feet or oral lesions. Some weaned pigs were sent to Iowa from one of the affected farms. No further problems developed in Iowa or on the sow herd. The third case occurred in the finisher farm. There were 25% in the barn affected. There was no movement on or off the farm that might cause the infection (within the last 90 days). Primary lesions were vesicular lesions on the snouts. A wide variety of samples were taken and submitted to NAHLN lab in Raleigh. FMD samples were initially tested at Raleigh and were negative. Samples were all negative for FAD by a FAD Panel at FADDL. All three cases were positive and detected by different tests for Seneca Valley Virus (SVV) via PCR and VI. Timely reporting from FADDL is critical but for response, do not over-react. The affected company did run a trial of their emergency response plan at the same time and there was no impact on the producer for the quarantine. The quarantine was stopped within 36-48 hours.

There is concern about the need for new research for SVV and the idiopathic vesicular disease complex (IVD) in swine. There are issues associated with this disease and complex and could significantly disrupt operations and packing for swine. So outreach and education is needed to look at this disease and how it is moving within the system.

NVSL has been seeing some of these viruses since 1988 but periodically. It will be interesting to look further into the epidemiology of the isolates and see what changes if any are occurring. In had seen a case of a febrile pig at the Indiana State Fair and was also diagnosed with SVV.

**Secure Pork Supply Update**

Jim Roth  
Director of the Center for Food Security and Public Health, College of Veterinary Medicine, Iowa State University

Dr. Roth gave a presentation updating about activities for Secure Pork Supply (SPS). He reviewed the potential impact in the event of an FAD outbreak. The true effect will be hard to predict as no country with similar industry structure has been affected. See the FADPrep document for what USDA response will be. Part of those USDA activities includes a continuity of
TRANSMISSIBLE DISEASES OF SWINE

business plans. There is a Secure Egg Supply plan and it is instituted. There is also a Secure Turkey Supply and also a Secure Milk Supply plan is underway. Secure Pork will cover foot-and-mouth disease (FMD), African swine fever (ASF), CSF and swine vesicular diseases. The diseases are not zoonotic and spread primarily through direct contact and oral exposure. Pigs are relatively resistant to aerosol exposures but not immune. We will need to work with other affected species (cattle) to make sure to address the ancillary effects of swine infection.

The SPS is a voluntary program pre-break. The plan focuses heavily on biosecurity and surveillance. The plans must be based on current capabilities and with science as it evolves. Final decisions will be made by responsible officials during an outbreak. There is a need for outreach and training prior to an outbreak as well as after an outbreak.

For biosecurity, there are two levels: 1 and 2. There are also other very active working groups to include surveillance, compartmentalization, data collection/management/sharing, risk assessments, communications and a plan for FAD response if it occurs tomorrow (before all these things are in place). Compartmentalization is a complex issue and the hope is to be able to address the needs to be approved for this and to implement that in production.

Initial steps include the development of a planning committee comprised of key stakeholders from all phases of the industry and academia.

Vaccine plays a role in some of the diseases of focus but amounts may not be helpful in the event of a large outbreak. FMD is in limited supply; CSF is not in the US so availability is limited. There are no vaccines for ASF or vesicular diseases. Therefore, dependence upon vaccines should be limited until supplied can be guaranteed.

FMD is present worldwide. Only 66 of the 178 OIE members are free of FMD. Dr. Roth presented differences in the response to FMD outbreak in UK and Uruguay. Both countries are considered free and Uruguay sustained a lot less cost to industry than UK. US scenario would fall somewhere in between the two countries, so there response must be relevant to the state of the industry. Challenges include the mobility of animals and products and herd size is significant. Therefore, the strategy for response has to change with the magnitude and scope of the initial outbreak.

There is a categorization of the phases and types of FMD response. This is a draft that can be commented on by mid-January, 2013. It can be found at the CFSPH website www.cfsph.iastate.edu. See the document for the description of the different phases of response. There are six types of outbreaks and those definitions of types can be found within the draft document. Also included in the document is the availability and proposed use of vaccines for each scenario. Dr. Roth provided an example of an FAD in Iowa (courtesy of John Zack).

So how do we handle movements of animals during an initial outbreak? Swine movements play a critical role in the management and response. Have to be able to stop and start movement in a timely manner that can
control disease and also not cause welfare issues on-farm. It is very hard to
determine that an animal is free of FMD but can establish that there is a lack
of infection. This disease is not a zoonotic disease and does not affect
humans at all and it is not a food safety issue. However, meat scraps fed
back to pigs ARE infective. Potential exists to keep plants open to continue
processing of animals in transit and during an outbreak. Processing presents
a mechanism that can preserve protein for consumption and also effectively
remove infected animals from the system. Biosecurity protocols play a huge
role in the plant and in services provided by plants (transportation of live
animals).

Issues to address: Will consumers accept the products? Will packers
continue to process animals? Will cold storage be able to hold product in an
outbreak?

CSF Surveillance in Puerto Rico
Fred Soltero
Area Veterinarian in Charge, APHIS-Veterinary Services (VS), Puerto Rico
and US Virgin Islands

Dr. Soltero gave a presentation on the CSF surveillance in Puerto Rico.
He provided a background of CSF within the United States and surrounding
neighboring countries. As CSF is in many countries around the US, this is
why USDA has a stepped-up surveillance strategy in PR. USDA is the sole
participant in the surveillance plan. There are five areas of the surveillance
program. Garbage feeder premises have a higher level of surveillance due to
higher risk of disease. Five samples per premises are needed to determine if
CSF is present. There were 219 premises targeted for 2011. There is also an
"illegal boat landing program" that targets these boats and aims to prevent
exposure to swine near ports of entry. Dogs and other vectors can carry
products away before detection and sampling. Additional and increased
sampling occurs after the boats have landed and sites identified (see every
seven and 28 days). It is a very effective program and an effective one. Other
surveillance sampling streams include feral swine on Mona Island to look for
FAD’s. This island is first potential place for introduction of diseases since it
is halfway between PR and DR. There is also cooperative work with NC
Veterinary Diagnostic Laboratory to work on samples and have access to
swine practitioners along with sample testing. First cases of PRRS,
Trichinella, Techenvirus, and Circovirus were found through this program.
Many commercial endemic diseases have been confirmed in PR swine. VS
are involved in school lunch garbage feeding auctions. This helps to monitor
garbage disposal and also helps to reduce the load on landfills. USDA
provides list of licensed garbage feeders that are eligible to feed garbage.
This mechanism is the only way that USDA can let unlicensed feeders know
that they cannot buy at the auction. Any other authority is through the local
States. CSF surveillance still needs to be assigned to the program in the
Caribbean so it can respond in case an introduction occurs.
Dr. Tarasiuk gave a presentation on the status of African swine fever (ASF) in Russia. ASF is a devastating disease and re-emerging disease. The clinical signs vary in severity by strain. There is no vaccine for ASF currently so control of the disease is a huge challenge. He presented information on historical spread of the virus into Ukraine has been identified. Garbage has been highly implicated in the spread of the virus into wild and domestic pig populations. There are sporadic outbreaks in the north near Finland and around Moscow. The virus has a wide distribution across the country of Russia. The Krasnodar region is under quarantine due to such high circulation of the virus in domestic and feral swine. Certain areas the virus circulates continuously. A significant threat exists for spread into Europe. All European countries have a contingency plan in place for increased surveillance and monitoring. Major source of the virus is garbage (55%) of the pigs affected, but there are also 28% of outbreaks that the source is unknown. Wild boars are only about 6% of the source of outbreaks and direct contact with other pigs is about 2% of the source. Mortality is about 90-100% and pigs have high fevers and cyanosis of ears and hemorrhages in skin. Biosecurity is lax on many sites, especially transportation, and is leading to continued breaks in many different areas even on more commercially structured farms. Other clinical signs during an acute outbreak include bloody diarrhea. Other observations can include petechial hemorrhages in organ surfaces and mucosal layers. Acute form of the disease showed a lot less or smaller hemorrhages vs. chronic disease. Lymph nodes are significantly affected: enlarged, hemorrhagic and have a marbled appearance.

The economic impact has been significant. There have been over 30 outbreaks and >600k pigs have been destroyed. Total lost to the industry is estimated to be at $1 billion dollars US ($30 billion rubles).

Diagnosis occurs in two central labs in Pokrov and Vladimir and additional testing at Interprovincial Regional Labs. Major testing is PCR and ELISA (indirect). There are educational materials for all holdings and pig farms to make them aware of what is going on and course of the disease and the transmission.

What is the response by the government? Quarantine is implemented. The vet authority carries out a census of pigs in the area and then posts veterinary police on the edge of the districts and closes minor roads. Stamping out is the main means of control currently. Quarantine can be lifted 6 months after the last case of animal death but pig breeding in the area is not allowed earlier than 1 year after the quarantine is lifted. After stamping out, then burn carcasses with flammable materials. Ashes mixed with lime for final burial. The Site should be disinfected with 3% NaOH and 2% formaldehyde.

Challenging factors for ASF control is that the pigs have a high viremia that lasts a long time (if the pigs survive) upwards of 70 days. There can be
carrier animals and no regular surveillance of disease. The compensation for 
pigs is limited and there is an uncontrolled distribution of pork products. 
Producers have the potential to make up to $100 profit per pig so if 
compensation is not guaranteed, then producers may not be as willing to 
cooperate in control efforts. Products themselves can remain infective for 3-6 
months uncooked pork products (chilled meat 15 weeks; 3-6 months in hams 
and sausages). Poorly coordinated veterinary services presents a challenge 
for control of ASF.

In order to have better control of ASF there needs to be close 
coordination with the leading veterinary authority as well as with local 
veterinarians. There needs to be a clear chain of command to implement 
control practices.

USDA ASF Response Plan
John Zack
USDA-APHIS-VS

Dr. Zack gave a presentation on African swine fever (ASF) and started 
with an overview of ASF and what groups it affects. ASF is a very persistent 
environmental pathogen and remain infective. There was a review of clinical 
signs and symptoms. A big concern is that this disease can look like other 
diseases that are routinely seen in pork production.

From a reporting and diagnosis standpoint, cases are confirmed at 
FADDL. Case definitions have been updated for ASF. ASF is a notifiable and 
reportable disease. A positive case has had virus isolated and also been 
positive through initial screening by PCR and ELISA. Currently have a 
passive surveillance but need to look at a more active surveillance plan. 
There is also no current vaccine available for ASF and potential for 
development is underway but a long-term effort. Recent discussion with 
NVSL and program staff, current diagnostic tests can tell you if it is ASF or 
not. The ASF real-time PCR has been reviewed and the group proposed that 
is be used in the NAHLN labs for early detection of ASF. Plans are underway 
to do training on this PCR for NAHLN labs to start to do this test.

The goal of response is to detect and detain quickly. There needs to be a 
stoppage of the production, transmission and spread of the virus once 
identified. The primary control method would still be stamping out. The 
disease response strategy is at https://fadprep.lmi.org . The international 
guidelines to show proof of freedom from ASF are significant and not easy to 
attain.
Latest ASF Research
Luis Rodriguez
USDA ARS

Dr. Rodriguez gave a presentation updating activities ongoing at Plum Island for ASF. Other experts include Manuel Borca and Jonathon Arzt. He provided a quick overview of the virus and disease it can cause.

In previous ARS focus, many different accomplishments were made for ASF including techniques for genetically engineering virulent ASF isolates; genetically engineering live-attenuated ASF viruses which protect swine from ASF; development of an rt-PCR for ASF. Characterization of the virus-host relationship in the pig was a major focus of previous ARS research. With the re-emergence of ASF as a major disease, ARS stated to re-focus on research for this disease. The research program is titled as the countermeasures to control FAD’s: CSF and ASF. There was a gap analysis and found many different gaps in knowledge: pathogenesis; virus ecology; epidemiology; and immunology. The goal of the research is to develop intervention by identifying virus-host determinants of virulence and transmission and by developing technologies to enable the development of ASF vaccines that are efficacious against the most prevalent ASF strains. Research needs include a consistent challenge model, comparative studies of early pathogenesis, identification of the immune mechanisms mediating protection and development of ASF experimental vaccine through functional genomics. A challenge model was developed through the oronasal inoculation. Immunohistochemistry shows extensive cellular infection after inoculation on the palatine tonsil. The epithelial cells are NOT infected in ASF as compared with FMDv. Infection seems to begin in macrophage origin cells.

Functional genomics is another area of focus in order to help develop potential vaccines. Different genes are associated with different functions. Genes have been identified that affect host virulence. Genetic manipulation of the virus (remove the genes for virulence) can provide mutants that might be eligible as a suitable vaccine candidate. There are ways to induce protection for ASF but still limited use and in initial evaluation. There is work with the Georgia strain of ASF to look at for potential vaccine candidates.

What is next? There is still a body of research that needs to be done in order to understand early pathogenesis events using a natural route of infection. Need to determine protection induced by experimental live attenuated vaccine and what is the mechanism of that protection; Identify the immune mechanisms mediating protection induced by experimental live attenuated vaccine strains; assess immune response and protection from ASF challenge.
PIN Tag Pilot Project
Ellen Kasari
USDA APHIS, National Surveillance Unit (NSU)

Dr. Kasari gave a presentation on updating what is going on for the PIN tag project. The project started in May of 2012 and goes through October 18, 2012. The purpose was to see if there is a cost effective mechanism by targeting surveillance and still get the same information for surveillance and see if we could utilize the premise identification to track animals through the various slaughter chains. There were 6 states in the initial pilot and those states represented in the pilot accounted for 59% of the breeding population.

The goal of the project was to test the components of a risk-based surveillance program using Premises identification (PIN) tags. Tags were only traced and no back-tags were tracked during the course of the pilot study. The risk evaluated was the risk of exposure to feral swine. Information from the tags needed to be readily accessible for county and zip code. There were five main objectives that included the validation of existing premises and to make sure that information from animals was collected and could be traced back to a specific county. Having the updated feral swine information helps in the assessment of risk to commercial swine, so having an updated database of information is crucial. Communications of set-up and ongoing process was held. There was monthly reporting to the participating states to let them know what was occurring in their respective states for sow slaughter. Both the USDA Traceability database was utilized as well as individual State information in order to get the end zip code and county information. The focus of sample collection was geared towards those counties who had more feral swine.

Outcomes: For the barcode tags, there was 95% accuracy in scanning the tags. For the tags with state ID, those tags needed to have hand entry to identify information. N-PIN tags were easily to retrieve information, state tags were a bit harder to access information needed (45.5% of tags could be readily assigned a location). The sampling could target locations where breeding swine and feral swine were located but still not get a large sampling of sites. Charts were presented for the outcome of the trial. The trial did help to ferret out changes needed in slaughter collection and laboratory processes. The pilot did show value in potentially being able to update breeding herds by providing who was sampled each month and state information could then be updated. Still need readily accessible information; need a critical mass of samples from PIN tagged sows in risk counties; there is a lack of standardization of PIN tags for automated reading; IT solutions are needed for lab decisions and then lab resources are needed due to higher volume of samples coming in. There are issues, but they can be worked out with cooperation and collaboration between states and industry.
PIN Tag- Industry Update
Patrick Webb
NPB Director of Swine Health Programs

Dr. Webb provided a similar presentation that was given in the Committee on Animal Health Surveillance and Information Systems meeting. He covered the industry perspective on the pilot PIN tag project why it is a high priority for pork producers. The industry supports the use of premise identification for program disease and FAD surveillance and response. A review of the sow PIN tag was given. So far, there is >1.7 million tags that the industry has purchased. Challenges to the industry: the program is voluntary; the tag is an added cost for producers; the color has recently been expanded to include those other than pink (white, orange, yellow - available in Nov 2012). There are resolutions from both NPPC and NPB Boards in support of the use of the PIN tags. Two sow packers will also be requiring the tags by 2014 (Johnsonville) and 2015 (Sarah Lee). Producers are trying to offset cost of the tag by using them originally as a gilt identifier instead of adding one more tag later in life. For premise identification, 104% of USDA estimated swine premises have a nationally standardized PIN (70,218 premises registered). PIN’s are required for PQA site assessments and majority of market hog packers require site assessments in order to market pigs for slaughter. Push is now to utilize the PIN for other production and diagnostic purposes. Next steps can be to look at a pilot for market hog surveillance. Ultimately, the targeted surveillance can help the industry in the event of an FAD and potentially get production back to normal as quick as possible after an outbreak. We need to build the capacity now vs. during the middle of an outbreak.

Variant H3N2 Influenza Outbreak in the US, 2012
Sue Trock
Influenza Division, National Center for Immunization and Respiratory Diseases (NCIRD), Centers for Disease Control and Prevention

Dr. Trock gave a presentation of influenza activities that have occurred earlier in the year (2012). A brief history of influenza infection in people related to swine was reviewed. For 2005 - 2011, 35 index cases identified for variant influenzas. There were 12 human cases in Aug-Dec, 2011 with the H3N2v. For 2012, there is a lot of activity for H3N2v. Three-hundred and six cases from July – October, 2012. Multiple states were involved with the majority of cases in Indiana. The last case was in September of 2012. Looking at human antibodies, children < 10 years old have little immunity. Exposures 98% had direct contact at the fairs with the pigs or attended a far with many exhibiting swine. Exposure was 2-7 days prior to onset of clinical symptoms. Data is presented in a recent MMWR article.

Recommendations for fairs can be found online at the CDC website and include minimize eating/drinking at barns, hand washing stations, supervise small children, wash hands and close when you get home, not bring stroller to barns. CDC made the recommendation that folks that are high risk groups
should not attend the fairs. Many visitors going to the fair could have some exposure, but very limited for those with casual exposure in the barns, really needed to have close or intimate and long-term contact with swine in the barns. There was limited human to human transmission and limited community transmission. Managing influenza was a collaborative effort between many organizations.

Influenza Outbreak at the Indiana State Fair
Bret Marsh
Indiana State Veterinarian, Indiana Board of Animal Health (BOAH)

Dr. Marsh reviewed the events leading up to and including the Indiana State Fair. LaPorte County was the first county that called BOAH in July about a pig that might be too hot to go to slaughter (may be condemned at slaughter for an elevated body temperature). There were 15% of pigs with temps over 105 degrees F. Then a call came in from a reporter about children being sick (July 13, 2012). The only clinical symptoms of the pigs was that they were fevered and off feed. An initial screen was taken from 12 pigs at random and they were all positive for influenza. Many different alerts were sent out to folks with upcoming fairs to help with the management of influenza. Calls were also held with the Swine Health Advisory Committee to see if anything was going on for commercial operations. Many additional counties had both swine and exhibitors getting ill. The next big concern is the 4-H show at the beginning of the State Fair. Check-in starts on July 31, 2012. Multiple meetings were held with collaborating and cooperating organizations to help manage this outbreak. For the Indiana State Fair, the decision was made to temp pigs prior to entry to the fair. This went out in an email prior to folks coming to the fair so they knew ahead of time. Protocols were in place prior to unloading time. Fair exhibitors temperature-checked their own pigs in order to manage biosecurity issues. They utilized digital thermometers for screening and went back to verify with a glass thermometer if a pig had high temperature. The goal was to be reasonable in screening animals coming in. From an animal welfare standpoint, the pigs were all in very good condition since folks were alerted ahead of time for what was going to happen. Once in the barn, the veterinary staff monitored pigs daily and any pigs with influenza-like illness (ILI) were sent home. Most common clinical sign was off feed, no coughing or sneezing. Signage was placed for biosecurity and hand washing stations were available. They encouraged exhibitors to depart after the show was over and not eating in the barns. Indiana did try to use the Influenza A test kits from Pfizer, but found out that it was not necessarily effective for individual pigs, more based for herd level testing. BOAH did also send companion samples to Purdue NAHLN lab for concurrent testing. On day seven, BOAH sent home six pigs for fever. Then the barrow show was cancelled the next day. The building was cleaned and disinfected and then held the open show later. Indiana ended up with 138 total cases from this summer. There were two cases from 2011, so the virus was present in the state. There were 721 farms of origin from 72 counties that were at the State
Fair. As a result of the experience, there will be the establishment of a Show Pig Advisory Committee. There were recommendations that were made with BOAH and to help manage shows and still keep these events healthy for pigs and people. Four main recommendations include: vaccination of swine prior to exhibitions; RFID prior to placement; temperature < 105 degrees F; 72-hour rule on swine shows.

**SIV Surveillance Update**  
Troy Bigelow  
USDA-APHIS-VS

Dr. Bigelow gave a presentation on the updates on the ongoing swine influenza surveillance plan. He covered the objectives of the influenza plan which can be found on the USDA-APHIS-VS website for influenza. Swine influenza is not considered a regulatory disease and response is from the State veterinarian level. The surveillance is a voluntary and anonymous but is not able to give prevalence of disease but only on what is going on with samples that are submitted. The data presented is helping to generate questions regarding influenza patterns of activity. The information does show what type of isolates are circulating in the industry and information can be shared with stakeholders and other related organizations.

**Committee Business**  
Dr. Snelson reviewed the National List of Reportable Animal Diseases (NLRAD) finalization resolution. Dr. Becton confirmed that the plan for the NLRAD is ongoing as planned. He also reviewed the NAHLN Funding resolution as this was for infrastructure for NAHLN operations. Lastly, he reviewed the Comprehensive and Integrated Swine Surveillance (CISS) resolution. Change the resolution to request an annual progress report instead of having a date included. Mark Engle requested to accept this motion, Jim Niewold seconded. Motion passed by a voice vote.

A new resolution was presented by Dr. Marshall on increased focus on the Seneca Valley virus (SVV) and idiopathic vesicular disease complex (IVD) in swine. The Committee discussed the language of the resolution and Dr. Snelson will include the resolution in the notes. Jim McKean made a motion to accept and Gene Nemechek seconded. Motion passed by a voice vote. Mark Engle made a motion to adjourn and the meeting was adjourned.
REPORT OF THE COMMITTEE ON TUBERCULOSIS

Chair: William Hartmann, MN
Vice Chair: Dustin Oedekoven, SD

John Adams, VA; Bruce Akey, NY; Joan Arnoldi, WI; James Averill, MI; Lowell Barnes, IN; Bill Barton, ID; Warren Bluntzer, TX; Steven Bolin, MI; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Gary Brickler, CA; Charlie Broaddus, VA; Charles Brown, II, WI; Mike Chaddock, DC; John Clifford, DC; Michael Coe, UT; Jim Collins, MN; Kathleen Connell, WA; Thomas Conner, OH; Walter Cook, WY; Donald Davis, TX; Thomas DeLiberto, CO; Scott Dewald, OK; Jere Dick, MD; Leah Dorman, OH; Brandon Doss, AR; Phil Durst, MI; Michael Dutcher, WI; Reta Dyess, TX; Anita Edmondson, CA; Robert Ehlenfeldt, WI; Leonard Eldridge, WA; Dee Ellis, TX; Steven England, NM; Donald Evans, KS; John Fischer, GA; Dave Fly, NM; James Foppoli, HI; W. Kent Fowler, CA; Clifford Frank, KS; Nancy Frank, MI; Mallory Gaines, DC; Tam Garland, TX; Robert Gerlach, AK; Michael Gilsdorf, MD; Velmar Green, MI; Thomas Hagerty, MN; Rod Hall, OK; Steven Halstead, MI; Burke Healey, CO; Carl Heckendorf, CO; Bob Hillman, ID; Donald Hoenig, ME; Thomas Holt, FL; Dennis Hughes, NE; John Huntley, WA; Billy Johnson, AR; Jon Johnson, TX; Shylo Johnson, CO; Jamie Jonker, VA; Karen Jordan, NC; Susan Keller, ND; Bruce King, UT; Paul Kohrs, WA; Maria Koller-Jones, CAN; John Lawrence, ME; Maxwell Lea, Jr., LA; Rick Linscott, ME; Konstantin Lyashchenko, NY; Daniel Manzanares, NM; Bret Marsh, IN; Chuck Massengill, MO; Paul McGraw, WI; Robert Meyer, WY; Susan Mikota, TN; Michele Miller, FL; Ernie Morales, TX; Henry Moreau, LA; Sherrie Nash, MT; Cheryl Nelson, KY; Jeffrey Nelson, IA; Kenneth Olson, IL; Mitchell Palmer, IA; Elizabeth Parker, ITA; Boyd Parr, SC; Janet Payeur, IA; Kris Petrini, MN; Alex Raeber, CHE; John Ragsdale, NM; Jeanne Rankin, MT; Suelie Robbe-Austerman, IA; Nancy Robinson, MO; Keith Roehr, CO; Mo Salman, CO; Larry Samples, PA; Bill Sauble, NM; Shawn Schafer, ND; Irene Schiller, CHE; David Schmitt, IA; Dennis Schmitt, MO; Stephen Schmitt, MI; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Kathryn Simmons, DC; Daryl Simon, MN; R. Flint Taylor, NM; Tyler Thacker, IA; David Thain, NV; Charles Thoen, IA; Beth Thompson, MN; Kenneth Throlson, ND; Michael VanderKlok, MI; Arnaldo Vaquer, VA; Kurt VerCauteren, CO; Jesse Vollmer, ND; Ray Waters, IA; Scott Wells, MN; Diana Whipple, IA; Richard Willer, HI; Brad Williams, TX; Kyle Wilson, TN; Ross Wilson, TX; George Winegar, MI; Josh Winegarner, TX; David Winters, TX; Jill Bryar Wood, TX; Ching Ching Wu, IN; Stephanie Yendell, MN; Glen Zebarth, MN.

The Committee met on October 23, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 1:00 to 5:25 p.m. Dr. William Hartmann, Chair, welcomed members and guests to the Committee on Tuberculosis. Dr. Hartmann introduced Vice-Chair, Dr. Dustin Oedekoven. There were 54 members and 63 guests present.
Dr. Mitch Palmer, Chair of the Tuberculosis (TB) Scientific Advisory Subcommittee presented the Report of the Scientific Advisory Subcommittee. A motion to accept the report of Scientific Advisory Subcommittee was made, and seconded. The motion was passed. The full text of the report is included in this report.

Dr. Dee Ellis, Texas Animal Health Commission, gave the Report of the Bi-national TB and Brucellosis Committee. The full text of the Bi-national report is included in this report.

Dr. Alecia Naugle, National Tuberculosis Program Manager, USDA-APHIS-VS, gave the National Tuberculosis Program Update. The full text of the update is included in this report.

Dr. Jose Alfredo Gutierrez Reyes, Director of Animal Health Programs, SAGARPA/SENASICA presented "Bovine Tuberculosis in Mexico: Control and Eradication, Achievements and Challenges" to the Committee.

Dr. Noel Harrington, Canadian Food Inspection Agency was introduced and gave the Canadian Tuberculosis Program Report.


Dr. Doug Cory, Professional Rodeo Cowboys Association (PRCA), United States Team Roping Championships (USTRA) spoke to the Committee about the Use of Mexican Cattle for Recreational Purposes in the US.

Ernie Morales, Morales Feedlots, Inc. presented on the US Feeder Perspective on the Importation of Mexican Origin Feeder Cattle.

Dr. Dee Ellis, Texas Animal Health Commission, spoke about the Border State Veterinarian Issues and Concerns.

Dr. Suelee Robbe-Austerman, National Veterinary Services Laboratory (NVSL), presented Molecular Epidemiology of Bovine Tuberculosis. A summary of the presentation is included in this report.

Dr. Alecia Naugle, National Tuberculosis Program Manager, USDA, APHIS, VS, spoke on the Granuloma Submission Rates in Fed Cattle in the US. Additionally, Dr. Joyce Bowling-Heyward, Director of Import/Export Animals for USDA, APHIS spoke briefly on testing and effects on importation of cattle.
A discussion period was held with the panel of speakers, including Suelee Robbe, Dee Ellis, William Wallace, Jose Alfredo Gutierrez Reyes, Doug Cory, Alecia Naugle and Ernie Morales.

**Committee Business**

At the conclusion of formal presentations, William Hartmann determined there was a quorum. Two resolutions were approved and forwarded to the Committee on Nominations and Resolutions. Topics included support for research on mycobacterial diseases in animals and tuberculosis testing of expert cattle and the requirement for a negative culture of *M. bovis* from histopathologically negative tissues.
Four presentations were made at the 2012 Tuberculosis (TB) Scientific Advisory Subcommittee (SAS) meeting.

Jeff Nelson
UDSA-APHIS-VS, NVSL, Ames, IA

In 2011, the United States Department of Agriculture conducted a project in which elk (*Cervus elaphus* spp.), white-tailed deer (WTD) (*Odocoileus virginianus*), and reindeer (*Rangifer tarandus*) were evaluated by the single cervical tuberculin test (SCT), comparative cervical tuberculin test (CCT), and serologic tests. The rapid antibody detection tests evaluated were the CervidTB Stat-Pak, and the Dual Path Platform (DPP) VetTB. Blood was collected from presumably uninfected animals prior to tuberculin injection for the SCT. A total of 1,783 animals were enrolled in the project. Of these, 1,752 (98.3%) were classified as presumably uninfected, based on originating from a captive cervid herd with no history of exposure to TB. Stat-Pak specificity estimates were 92.4% in reindeer, 96.7% in WTD, and 98.3% in elk and were not significantly different from SCT specificity estimates. Using the DPP in series on Stat-Pak antibody-positive samples improved specificity in the three species. Thirty-one animals were classified as confirmed infected, based on necropsy and laboratory results, and 27/31 were antibody positive on Stat-Pak for an estimated sensitivity of 87.1%. The study findings indicate that rapid serologic tests used in series are comparable to the SCT and CCT and may have a greater ability to detect TB-infected cervids.

NVSL TB Serum Bank Update - 2012
Jeff Nelson
APHIS-VS-NVSL, Ames, Iowa

The NVSL TB Serum Bank provides well-characterized serum samples with skin test results for samples from uninfected animals and skin test, histopathology, and TB culture results from infected animals. The serum bank continues to be available to researchers and diagnostic companies as they develop and evaluate serologic tests for bovine TB using the criteria recommended by the US Animal Health Association. In FY 2012 the serum bank was able to add 104 serum samples from white-tailed deer and 2,390 serum samples from cattle. The serum bank currently contains about 3,688 serum samples from cervid species of which 92 are from TB infected animals, as well as, 5,229 serum samples from cattle of which 476 are from
TB infected animals. The serum bank will continue to accept blood and tissue samples from potentially infected cattle and white-tailed deer.

**Comparison of CSL and Lelystad Tuberculin in the Bovigam® Under Field Trial Conditions**

Bjoern Schroeder  
Prionics USA

A total of 984 animals were investigated with BOVIGAM® using CSL and Lelystad tuberculin in parallel. Animals that were confirmed Tb positives (N=193), animals derived from confirmed positive herds but were only assessed as exposed (N= 709) and animals derived from a Tb negative region in USA and confirmed Tb negative animals (N=82) were investigated.

The results demonstrate that significantly more animals were detected in the infected group using Lelystad PPD in comparison to CSL purified protein derivatives (PPD). Forty four animals were detected exclusively with Lelystad PPD whereas only three were detected exclusively with CSL PPD. Similar results were obtained in the exposed group in which 43 animals were only detected with Lelystad PPD whereas only seven animals were exclusively detected with CSL PPD. In Tb negative herds, equivalency between the two PPDs could be demonstrated. In total, 82 animals have been tested in USA and UK with the two PPD sources used in parallel. One animal was exclusively detected with either Lelystad PPD or CSL PPD. Three animals were found positive with both PPDs. The proportion of agreement between tests is given with 98%.

The field trial results show that the sensitivity of Lelystad PPD is higher in comparison to CSL PPD without negatively affecting specificity. Lelystad tuberculin is a useful tool to improve Tb diagnostic. Consequently, we request approval of Lelystad PPD to be used with BOVIGAM® for the detection of tuberculosis in cattle.

**Whole Genome Sequencing- Improving Epidemiology**  
Tyler Thacker  
USDA-ARS, NADC, Ames, Iowa

Next Generation Sequencing technologies enable the rapid sequencing of the genome of *Mycobacterium bovis*. In collaboration between National Animal Disease Center (NADC) and National Veterinary Services Laboratory (NVSL), over 80 strains of *M. bovis* have been sequenced. Small nucleotide polymorphisms (SNPs) were identified in each strain and aligned. Phylogenetic relationships were determined using MrBayes. The utility of whole genome sequencing to aid epidemiological investigations was discussed.

**IDEXX *Mycobacterium bovis* Antibody ELISA Update**  
John C. Lawrence  
IDEXX Livestock and Poultry Diagnostics, Westbrook, Maine

- OIE General Session Approval May 2012
  - Fitness for Purpose - Supplemental test, local surveys at herd level
• Data reviewed by TB expert committee and Biological Standards commission

2012 CVB Data Submissions/Approvals
• USA Field Trials (three kit lots at three sites)
• Pre-licensing serials (three kit lots)

USDA CVB Product License September 28, 2012
• Supplemental test to be used in conjunction with other methods for diagnosing bovine TB
• Sale and use is restricted to laboratories approved by state and federal animal health officials

Active use in various regions as well as continued evaluations by country reference laboratories

Subcommittee Business:
At the 2011 USAHA tuberculosis (TB) committee meeting an ad hoc subcommittee was formed to revise the document known as the “Criteria for evaluating experimental tuberculosis test performance for official test status to be approved.” Minor revisions were made, primarily to add flexibility to the recommendations in situations where the number of TB infected animals of a given species is low and conducting trials with the statistical power previously required is not possible. The revised document was reviewed by the TB Scientific Advisory Subcommittee (SAS). The final draft was distributed to members of the TB committee for review. It is the recommendation of the TB SAS that the revised “Criteria for evaluating experimental tuberculosis test performance for official test status” be approved.
REPORT OF THE COMMITTEE

REPORT OF BI-NATIONAL COMMITTEE ON BOVINE TUBERCULOSIS AND BRUCELLOSIS

Dee Ellis
Texas Animal Health Commission

Dr. Dee Ellis, Border state veterinarian representative on the Bi-National Tick, Tuberculosis (TB), and Brucellosis committee gave a short overview of the recent meeting held in Los Cabos, Baja Sur, Mexico in June of 2012. An explanation of the structure, membership and intent of the group was given first. Ellis then shared the primary talking points that the industry group of Mexican and US industry representatives agreed on, which include the USAHA member and the border state animal health representatives. The consensus points of agreement which were presented to the SAGARPA and USDA representatives present related to TB were:

1. Mexico has made advances in decreasing TB prevalence
2. Need to manage risk of transmitting TB from Mexico feeders to US cattle
3. Continue to utilize pasture grazing as part of feeder management systems
4. Request Chihuahua discuss the management/testing process for exhibition/event cattle prior to export at USAHA TB Committee
5. Request USDA only downgrade a Mexican state after a review has been made
6. Request USDA utilize zones more often so entire state statuses are not as likely to be affected
7. Urge USDA to consider two Modified Accredited Advanced (MAA) zones for Sonora – related to brucellosis status differences to simplify internal movements.
National Tuberculosis Program Update, Report

Alecia Naugle
US Department of Agriculture
Animal and Plant Health Inspection Service (APHIS)
Veterinary Services (VS)

Fiscal Year (FY) 2012 – Preliminary Report

Development of Proposed Brucellosis/TB Regulations

APHIS continued to develop new regulations and supporting standards for the brucellosis and tuberculosis (TB) programs in FY2012. Under the proposed approach, The Code of Federal Regulations will provide the legal authority for the programs while the details of the programs will be described in a program standards document.

APHIS conducted several webinars that provided additional information about the proposed regulation in FY2012. APHIS proposed to use a national calculator to determine the fair market value for animals that are destroyed because of TB or brucellosis in the Draft Regulatory Framework published in May 2011. In response to requests from commenters, APHIS hosted two webinars in November 2011 that provided more information about the calculator and options for indemnity payments. In August 2012, APHIS presented an overview of the Proposed Rule and Program Standards for Brucellosis and Bovine Tuberculosis. The webinar presentation described the fundamental concepts underlying the proposed regulations, the content of both the Proposed Rule and the Program Standards, and significant differences from the draft regulatory framework and the rationale for these differences. Recordings of both webinars are available at:


APHIS is hopeful that Proposed Rule and Program Standards will be published in the Federal Register in early FY2013. Both documents are currently under Agency review. Upon publication, APHIS plans to provide an extended comment period of 90 days through the www.regulations.gov website in light of the scope of these regulations.

Bovine State Status

As of September 30, 2012, 48 States, two Territories, and one zone were TB accredited-free (AF), including Puerto Rico and the US Virgin Islands. California was modified accredited advanced (MAA). Michigan continued to have accredited free (AF), MAA, and modified accredited (MA) status.

Captive Cervid State Status

All States and territories have MA status.

TB Program Reviews
APHIS conducted an on-site TB program review in Michigan in July 2012. This review was conducted to evaluate the status of the TB eradication program and compliance with the memorandum of understanding that is required for split-State status.

**TB-Affected Herds Identified in FY 2012**

Six TB-affected cattle herds, three beef and three dairy, were detected during FY 2012. These herds were located in California (two dairy), Michigan (one beef and one dairy), South Dakota (one beef), and Texas (one beef). Four (67 percent) of these TB-affected herds (two dairy and two beef herds) were detected as a result of slaughter surveillance and subsequent epidemiologic investigations.

Two cattle herds (California dairy, Texas beef) were depopulated with Federal indemnity. The remaining herds are under test-and-remove management plans, except that State indemnity funds were used to partially depopulate one beef herd in Michigan. Two cattle herds detected prior to FY 2012, one dairy herd each in California and Michigan, are continuing under test-and-remove management plans. Two captive cervid herds in Michigan remain under quarantine.

**National TB Surveillance**

**Granuloma Submissions:** From October 1, 2011, through June 30, 2012, 8,093 granulomas were identified during postmortem slaughter inspection and submitted for diagnostic testing. These lesions originated from 149 US establishments that slaughtered 21.7 million cattle, including 5.2 million adult cattle. The minimum standard for slaughter surveillance is one granuloma submitted per 2,000 adult cattle slaughtered annually. This standard is applied to each slaughter establishment. Of the 40 highest volume adult cattle slaughter establishments, 37 (92.5 percent) met or exceeded the submission standard, and three (7.5 percent) establishments did not. These 40 highest volume establishments slaughter approximately 95 percent of all adult cattle slaughtered in the United States.

Of the 8,093 granulomas submitted by slaughter establishments, 14 (0.17 percent) had histology consistent with mycobacteriosis. Of these 14 cases, TB was confirmed in 12 (85.7 percent) cattle. TB is confirmed by a combination of polymerase chain reaction testing of formalin-fixed tissue and culture of fresh tissue.

**Slaughter Cases:** Of the 12 TB cases detected in cattle at slaughter, three cases occurred in adult cattle over two years of age, and nine cases occurred in feeder cattle. The three adult cattle cases included two adult beef cows that led to detection of affected herds in South Dakota and Texas. The third adult TB case is currently under investigation in Oklahoma and Texas. One adult Holstein cow detected in late FY 2011 led to detection of a California dairy in FY 2012. The fed cattle cases were all beef-type cattle and were from slaughter establishments in Texas (eight cases) and Nebraska (one case). Six cases were in Mexican-origin cattle and an
additional case was believed to have occurred in a Mexican-origin animal but the definitive State-of-origin could not be determined. The remaining two cases are under investigation.

**Mexican-Origin Slaughter Cases:** A total of six TB-infected animals identified through slaughter surveillance were determined to be of Mexican-origin. The official Mexican ear tags collected at slaughter indicated origin from the States of Chihuahua (one case), Nuevo Leon (three cases), and Zacatecas (two cases). An additional case is believed to have originated from Mexico based on the epidemiological investigations, but the definitive Mexican State-of-origin could not be determined.

**Live Animal Testing:** Tuberculin skin testing in live animals is another component of national TB surveillance in cattle and bison. As of August 31, 2012, 903,289 caudal fold tuberculin tests of cattle and bison were reported, with 9,919 responders (1.1 percent, 50 States and two Territories reporting). Tuberculin testing is the primary means of surveillance for TB in captive cervids as there are no standards for granuloma submissions for establishments that slaughter cervids. As of August 31, 2012, 19,721 single cervical tuberculin skin tests were conducted in captive cervid species with 368 suspects (1.7 percent) reported to APHIS.

The gamma interferon test has been available as an official supplemental test in the TB program since 2005. Laboratories in five States (California, Colorado, Michigan, Nevada, and Texas) and the NVSL are approved to conduct gamma interferon testing. A total of 8,827 tests were conducted in cattle in during FY 2012.

**Collaborations with Mexico**

APHIS continues to work with Mexico to ensure equivalency between the two countries’ requirements for controlling TB. In FY2012, APHIS completed a review of the Mexican National TB Program. Although Mexico has made improvements and maintained program advancements in some areas, APHIS identified several areas of critical concern during the review including the low efficiency of epidemiologic investigations and low caudal fold response rates for TB skin testing. APHIS and Secretaría Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA) continue to collaborate to address these concerns and are jointly developing a strategic plan designed to minimize the risk of TB while providing a framework to facilitate trade in the future. In addition to the national review, APHIS also conducted a TB program review in the Mexican State of Guerrero in September 2012. The purpose of this review was to evaluate an additional 15 municipalities for AP status. If the review results are favorable, all 25 municipalities in the coast of Guerrero will have AP status. The review report is pending.

**TB Serum Bank**

APHIS continues to obtain well-characterized serum samples including skin test results for both uninfected and infected animals. Histopathology and TB culture results are also obtained for samples from TB-infected animals. A total of 104 samples from white tailed deer and 2,390 samples from cattle
were added to the serum bank in FY 2012. The serum bank contains 5,229 serum samples from cattle, of which 476 are from TB-infected animals, and 3,688 samples from cervids, of which 92 are TB-infected. Serum bank samples continue to be available to researchers and diagnostic companies for serologic test development. States are encouraged to submit blood and tissue samples from potentially infected cattle and captive cervids, as well as blood samples from presumably uninfected cattle and white-tailed deer from AF States during FY 2013.

**Update on Program Approval of Serological Tests**

**ChemBio CervidTB Stat-Pak® and Dual Path Platform (DPP®):** The Center for Veterinary Biologics (CVB) previously licensed the CervidTB Stat-Pak for use in elk, red deer, and white-tailed deer. In October 2012, the CVB licensed the DPP as a secondary test for bovine TB.APHIS plans to approve both tests for use in series in elk, red deer, white tailed deer, fallow deer, and reindeer. APHIS will conduct outreach with State and Federal Animal Health Officials, accredited veterinarians, cervid producers, and cervid industry organizations to provide additional information and instructions on the use and interpretation of the tests. The National Veterinary Services Laboratories (NVSL) will conduct all Stat-Pak testing during the initial phase of program use.

**IDEXX ® M. bovis Antibody Test Kit:** The Center for Veterinary Biologics licensed the IDEXX ® M. bovis Antibody Test Kit for use in cattle in September 2012. The TB Program is evaluating this test to determine how it can be used in the TB Program. If the test is approved, the TB program will likely initially restrict the use of this test to specific situations (for example, in affected herds) and pilot projects that allow us to further evaluate the suitability of this test. We will also limit testing to the NVSL. As we become more familiar with its performance in our hands, VS may eventually approve additional uses for the test and additional laboratories to conduct the test. VS will continue to update State and Federal animal health officials and our stakeholders as new information becomes available concerning the approval and implementation of the IDEXX M. bovis Ab Test as an official TB test.

**Selected State Updates**

**California Update:** Two newly-detected TB-affected dairy herds were identified in California during FY 2012. The first herd was detected through slaughter surveillance, and was depopulated with Federal indemnity funds due to a moderately high within herd apparent prevalence. The second herd was detected through TB testing conducted because it was a fence line contact of the first herd. This herd is under a test-and-remove management plan. One additional dairy detected in 2011 is continuing under a test-and-remove herd plan. This herd was scheduled for quarantine release in 2012, but an infected animal was detected during the final herd test so the quarantine remains in effect.

**Michigan Update:** Two newly-detected TB-affected herds, one beef and one dairy herd were identified through ongoing surveillance testing in FY 2012. Both herds are currently under test-and-remove herd management.
plans. One dairy is continuing under a test-and-remove herd plan from 2004; the herd was scheduled for quarantine release in 2009 but an infected animal was detected during the final herd test so the quarantine remains in effect. One affected beef herd detected in FY 2010 completed a test-and-remove herd management plan and was released from quarantine in October 2011. Two affected captive cervid herds that were detected in FY 2009 remain under quarantine in the MA zone. All of these herds described in this summary are located in the MA zone in Michigan.

South Dakota Update: A TB-affected cow-calf operation that raised club calves was detected through slaughter surveillance. The herd was managed under a test-and-remove herd plan. Wildlife surveillance was conducted in the area surrounding the herd premises, and TB was not detected in the animals that were tested. The herd was released from quarantine in September 2012.

Texas Update: A TB-affected cow-calf herd in west Texas was detected through slaughter surveillance. The herd was maintained on two separate, epidemiologically distinct premises. Infected animals only occurred at one of the premises; and the remainder of the cattle on the affected premises were depopulated with Federal funds. Wildlife surveillance was conducted in feral swine and white tailed deer in the area surrounding the herd premises, and TB was not detected in the wildlife that was tested. Slaughter surveillance in a Texas establishment identified a TB-infected adult cow; however, the individual animal identification was not collected at the time of slaughter. The investigation for this case is ongoing, and testing of herds that contributed to the slaughter lot is underway in Oklahoma and Texas.
Canada’s official animal health service resides as part of the Canadian Food Inspection Agency (CFIA). The Agency is mandated to safeguard the food of Canadians and the health of the animals and plants on which safe food depends. The goal of that CFIA’s National Bovine Tuberculosis Eradication Program is the detection and eradication of bovine tuberculosis (TB) from Canada thereby ensuring the health of Canada’s people, livestock, and wildlife.

The current National Bovine Tuberculosis Eradication Program consists of five major elements: disease reporting, disease detection (surveillance), stamping-out responses to disease outbreaks, movement controls, and wildlife reservoir management. The collective result of these elements is reflected in Canada’s area disease status classification.

Detection of TB in Canada occurs through both passive and active surveillance. Passive surveillance consists of routine post-mortem inspection by private practitioners and diagnostic laboratories, as well as the tuberculin testing of individual animals for reasons such as export, entry into artificial insemination centres, or changes of ownership. The foundation of active surveillance is the routine post-mortem inspection of animals at slaughter for the presence of suspect tuberculosis lesions which are submitted to the CFIA’s Mycobacterial Disease Centre of Expertise for laboratory examination. The program’s performance standard requires submission of a minimum of one granulomatous lesion for every 2,000 adult cattle slaughtered.

Slaughter surveillance is augmented through periodic on-farm testing of livestock herds. This testing is targeted at: a) those livestock sectors with insufficient slaughter volumes to support slaughter surveillance as the sole mode of active surveillance; and b) those geographic areas where the risk of bovine TB being present in, or introduced into, the area’s livestock warrants a higher level of surveillance. Additional opportunities for surveillance occur through testing for export, entry into artificial insemination centres, and as part of disease investigations.

In Canada, the caudal fold tuberculin (CFT) test is the screening test for cattle/bison and the mid-cervical tuberculin (MCT) test is the screening test for cervids. Comparative cervical tuberculin (CCT) test is the ancillary test for cattle/bison/cervids. The performance standard for tuberculin testing requires a minimum false positive reactor rate of 1% for caudal fold testing. The CFIA is working to develop a more efficient approach to track individual reactor rates as well as improved training for new and existing staff on tuberculin test methods.

The CFIA is contributing to an industry (Canadian Cattlemen’s Association) project entitled The Evaluation of new Diagnostic Blood Tests for Bovine Tuberculosis in Cattle. Using serum samples provided by the
TUBERCULOSIS

USDA TB Serum Bank, the project will evaluate and compare the performance of several commercial and non-commercial serological tests. The goal is to identify one or more tests that are suitable candidates for potential adoption as an official bovine TB test in Canada.

Since 2009, a single TB-affected herd has been identified in Canada. A Canadian origin beef cow exported from British Columbia (BC) to the US for immediate slaughter was found to have TB lesions on post-mortem inspection. Laboratory testing by the USDA found the lesions to PCR positive and *M. bovis* was subsequently isolated by mycobacterial culture. The CFIA’s subsequent actions included whole herd depopulation (*n* = 318) with a further six infected animals identified. The investigation of trace-in, trace-out, contact, and perimeter herds (*n* = 143) resulted in tuberculin testing an additional 4,000 animals. No additional cases of *M. bovis* infection were identified through the investigation. The source of the infection to the index premises has not been identified.

For the purpose of monitoring the performance and progress of the National Bovine TB Eradication Program, every province is considered to be a separate eradication area. Each eradication area is assigned a bovine TB status that reflects the adequacy of the disease surveillance and eradication measures implemented in the province/area (bovine TB free, bovine TB-accredited advanced, or bovine TB-accredited). Since 2006, all provinces/eradication areas have been classified as bovine TB-free.

As a result of multiple TB-affected herds in BC since 2007 and the uncertainty as to the source of the infection, the CFIA is preparing to re-designate the TB status of British Columbia from bovine TB-free to bovine TB-accredited advanced. The re-designation will result in the requirement for movement permits for all cattle and farmed bison being moved from BC to other provinces/eradication areas of Canada with higher TB status. Restoration of bovine TB-free status in B.C. will require that there are no further cases of bovine TB during a period of 3 consecutive years.

Canada has two known wildlife reservoirs of bovine TB. The first, Wood Buffalo National Park (WBNP), is located at the northern boundary of Alberta and is home to approximately 6,000 free-ranging bison with a prevalence of TB estimated at 50%. A bison management and containment plan is in place, which includes a no-bison buffer zone, the killing of stray bison, and other measures to prevent the spread of infection to healthy wild free ranging bison. Livestock herds are not located in the vicinity of the park and no livestock cases of bovine TB have been detected that are attributable to bison of WBNP.

The second reservoir, Riding Mountain National Park located in south-western Manitoba has a very low prevalence of disease the wild cervid population. In response to several TB infected cattle herds in the area surrounding the park, the Riding Mountain TB Eradication Area was established around the park in 2003. Surveillance plans have been developed each year for livestock and wildlife collaboratively amongst the CFIA, Parks Canada and provincial authorities. These have been risk based

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and prescribe the frequency of testing based on proximity to identified cases of TB in wildlife or cattle herds. In addition, risk mitigation measures have been employed including barrier fencing, bans of baiting around the park, education, and wildlife population reduction. After more than three years of surveillance testing without additional cases of bovine TB identified in livestock, the CFIA designated the RMEA as TB-free in 2006. Currently, the CFIA is applying a scenario tree surveillance model that incorporates multiple sources of information to guide surveillance in the RMEA. By targeting those herds at highest risk, the sensitivity of the surveillance program has increased, leading to greater confidence of disease freedom in the domestic livestock population.
Molecular Tools Used in Identifying Bovine Tuberculosis

Sue Lee Robbe
NVSL, USDA-APHIS-VS

For the last 10 years, NVSL has been genotyping isolates for the TB program, and this talk summarizes these data. NVSL currently uses spoligotyping and MIRU-VNTR-24 to genotype isolates. NVSL has 1678 isolates currently in the database. Just over 800 isolates were recovered from cattle born in the USA. Another 642 are Mexican origin animals with 465 isolates from cattle killed in Mexico, and 177 were from cattle slaughtered in the USA. Cattle of unknown origin make up 112 of the isolates. Spoligotyping isolates from animals slaughtered or who died within the USA separates out the isolates into 45 different spoligotype patterns. However, 76% of the isolates fall into only five spoligotype patterns, SB0673, SB0145, SB0271, SB0265, and SB2011.

NVSL has detected seven spoligotypes that have been identified in livestock born within the USA and as yet, these spoligotype patterns have not been identified by NVSL in Mexico origin cattle. Three of the seven, SB0292, SB0815 and an unnamed genotype 640013777601600 are variants of the endemic Michigan strain and have only been identified in Michigan. Two of the seven spoligotypes, SB1069, and SB0265 have been recovered primarily in farmed cervids at irregular intervals since the early 1990’s. The last two spoligotypes are closely related to isolates previously recovered from primarily Mexican origin cattle and a few sporadic cases from USA origin cattle; they are SB0271- associated with the outbreak in Minnesota cattle and wild white-tailed deer, and SB2011-associated with an outbreak in a Colorado dairy.

There are five strains currently endemic within the USA; three of them have a wildlife component; SB0145 and variants in Michigan, SB0271 in Minnesota, and SB0145 in Molokai, Hawaii. The two other strains that do not have a wildlife component were mentioned earlier, SB1069 and SB0265, and occur primarily in farmed cervids. There is no molecular evidence that bTB is circulating within the national cattle herd. It appears that cases of bTB within the US National cattle herd are the result of new infections. Based on genotyping, bTB infections within the US National cattle herd are associated with either: wildlife, cattle of Mexican origin or farmed cervids. It appears that the adult slaughter surveillance program has been effective at identifying new infections within the US National cattle herd prior to these new infections spreading beyond the index herd and the traces from that herd. The molecular epidemiological information from genotyping can not only be used to help answer local questions in the field, but also to help guide and focus our national TB state federal cooperative program.
REPORT OF THE COMMITTEE ON WILDLIFE DISEASES

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Vice Chair: Colin Gillin, OR

Gary Anderson, KS; Neil Anderson, MT; Joan Arnoldi, WI; Scott Bender, AZ; Warren Bluntzer, TX; Kristina Brunjes, KY; Beth Carlson, ND; Walter Cook, WY; Joseph Corn, GA; Lynn Creekmore, CO; Donald Davis, TX; Thomas DeLiberto, CO; Mark Drew, ID; James Evermann, WA; Richard French, NH; Francis Galey, WY; Robert Gerlach, AK; Paul Gibbs, FL; Linda Glaser, MN; Dean Goeldner, MD; Greg Hawkins, TX; Robert Hilsenroth, FL; Donald Hoenig, ME; David Hunter, MT; Mandy Kauffman, WY; Kevin Keel, GA; Susan Keller, ND; Patrice Klein, MD; Terry Kreeger, WY; Jim Logan, WY; Francine Lord, CAN; Margie Lyness, GA; David Marshall, NC; Chuck Massengill, MO; Leslie McFarlane, UT; Daniel Mead, GA; Robert Meyer, WY; Michele Miller, FL; Mitchell Palmer, IA; Jewell Plumley, WV; Jennifer Ramsey, MT; Justin Roach, OK; Thomas Roffe, MT; Mark Ruder, KS; Emi Saito, CO; Shawn Schafer, ND; David Schmitt, IA; Dennis Schmitt, MO; Stephen Schmitt, MI; Charly Seale, TX; Laurie Seale, WI; Daryl Simon, MN; Jonathan Sleeman, WI; David Stallknecht, GA; Cleve Tedford, TN; Robert Temple, OH; Charles Thoen, IA; Lee Ann Thomas, MD; Brad Thurston, IN; Kurt VerCauteren, CO; Diana Whipple, IA; Margaret Wild, CO; Richard Willer, HI; Ellen Wilson, CA; George Winegar, MI; David Winters, TX; Richard Winters, Jr., TX; Cindy Wolf, MN; Peregrine Wolff, NV; Marty Zaluski, MT; Glen Zebarth, MN.

The Committee on Wildlife Diseases met on October 21, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 12:30 to 6:00 p.m. There were 32 members and 44 guests present. The Chair and Vice Chair welcomed those in attendance, reviewed the agenda, and introduced the first speaker.

Zinc Phosphide Toxicosis in Wild Geese in Oregon: A Partial Solution to an Agriculture-Wildlife Conflict

Dr. Rob Bildfell of the Oregon State University Veterinary Diagnostic Laboratory provided a report on zinc phosphide toxicosis in wild geese. Large scale mortality events have been recorded in populations of geese migrating through the Willamette Valley of Oregon since at least the late 1990s. Investigations eventually revealed the cause to be ingestion of zinc phosphide, a rodenticide used to control the vole population on grass seed fields. Typical clinical and post mortem findings were reviewed, as were the diagnostic tests necessary to confirm this unusual toxicosis. These episodes generated considerable publicity, and regulatory agencies have worked hard to control the problem. This included tightening of restrictions for the application of these rodenticides, improved product labeling, prosecution of offenders, and an outreach education program designed to increase awareness in the agricultural community. These measures appear to have
been largely effective as Oregon Department of Fish and Wildlife officials did
not confirm any zinc phosphide-related mortality events between July 2008
and July 2012. This is an example of how interagency cooperation can
decrease negative effects of agricultural practices on populations of wild
birds.

Identification of Lymphoproliferative Disease Virus in Wild Turkeys
(*Meleagris gallopavo*) in the Southeastern United States

Dr. Justin Brown of the Southeastern Cooperative Wildlife Disease Study
(SCWDS) reported to the committee on the detection of lymphoproliferative
disease virus (LPDV) in Eastern wild turkeys (*Meleagris gallopavo*) in the
United States. Viral-associated lymphoid neoplasia in domestic poultry is
caused by infection with a herpes virus or three species of retroviruses.
Previously, retroviral neoplasms reported in wild upland game birds in the
United States have typically been associated with reticuloendotheliosis virus
(REV) infection. Since 2009, LPDV, a virus previously thought to be exotic to
the United States, has been identified in 26 Eastern wild turkeys from 14
states (Colorado, Kansas, Missouri, Arkansas, Louisiana, Georgia, North
Carolina, West Virginia, Maryland, Ohio, Pennsylvania, New Jersey, New
York, and Maine). All infected turkeys were found dead or had some overt
sign of disease. Proviral DNA of LPDV was detected in samples of spleen,
skin, bone marrow, and/or liver from each turkey using PCR targeting a
portion of the *gag* gene, and the results were confirmed through sequencing
of the PCR products. Based on gross and microscopic lesions,
lymphoproliferative disease associated with LPDV infection was determined
to be the primary cause of mortality in only a minority (7/26; 27%) of the
turkeys with pleomorphic lymphoid cells identified in visceral organs and
tissues, including liver, spleen, lungs, kidneys, skin, heart, skeletal muscle,
pancreas, proventriculus, intestines, brain, and adrenal gland. Other primary
causes of morbidity and/or mortality were identified in the remaining LPDV
infected turkeys, including avian pox, systemic bacterial infection, toxicosis,
and trauma. The cases reported herein are novel as they represent the first
reports of LPDV infection in wild turkeys and the first identification of LPDV in
North America. Research efforts are currently underway to investigate the
epidemiology, natural history, and significance of this virus, including: 1)
surveillance for LPDV in asymptomatic hunter-killed wild turkeys; 2) genetic
characterization of North American LPDV strains; 3) experimental challenge
studies in domestic turkeys; and 4) evaluation of LPDV replication in various
cell culture systems.

2012 Virulent Newcastle Disease Events in Minnesota

Dr. Michelle Carstensen of the Minnesota Department of Natural
Resources (MNDNR) reported on a recent Newcastle Disease outbreak in
Minnesota. Virulent Newcastle disease was first detected in double crested
cormorants in 1990. Since that time, outbreaks have been occurring
throughout North America. Minnesota has 39 cormorant rookeries, with a
long history of use. Minnesota’s cormorant population was involved in the large outbreak of virulent Newcastle disease that occurred in 1992, where an estimated 35,000 cormorants died. Since that time, smaller outbreaks have occurred in Minnesota, most recently in 2008, 2010, and now in 2012. The first report of cormorants with neurological signs was received in July of 2012, prompting the investigation of cormorant rookeries throughout the state. Virulent Newcastle disease suspects were collected at 12 locations across the state and consisted primarily of cormorants, though some gulls and pelicans exhibited clinical signs consistent with the disease. The most common sign was unilateral wing paralysis. By mid-August, the National Veterinary Services Laboratory (NVSL) had confirmed virulent Newcastle in at least one location. To date, virulent infection has been confirmed in cormorants from six rookeries, with results pending from three additional locations. Numbers of known mortalities are as follows: approximately 1,000 cormorants, 400 pelicans, and less than 100 gulls (mainly ring-billed gulls). The MNDNR responds to confirmation of virulent infection by lethal removal of clinical suspects and all carcasses are incinerated on site. Only employees without contact with live birds (domestic or wild) are involved in clean-up efforts, and only carcasses destined for diagnostic testing are allowed to leave the rookeries. Additionally, because many of the positive locations occur in Minnesota’s prime poultry producing counties, islands and rookeries confirmed as virulent were closed to public access and will remain closed until ice-up. The MNDNR currently is collaborating with the National Wildlife Health Center and USDA’s Wildlife Services on a research project to better understand the dynamics of this disease.

The Role of *Mycoplasma ovipneumoniae* in the Epidemiology of Epizootic Pneumonia of Bighorn Sheep

Dr. Thomas Besser of Washington State University reported to the committee on respiratory disease research in bighorn sheep. Pneumonia of bighorn sheep (*Ovis canadensis*) is a dramatic disease of high morbidity and mortality that typically occurs in outbreaks affecting all ages of animals upon first appearance in a population, and affecting primarily lambs in subsequent years. Several microbial causes have been proposed for this disease, including lungworms, *Mannheimia haemolytica* and other *Pasteurellaceae*, and *Mycoplasma ovipneumoniae*. Based on epidemiologic causal criteria (strength of association, temporality, plausibility, and experimental evidence), we propose that healthy bighorn sheep populations are naïve to *M. ovipneumoniae*, and that introduction of this agent to susceptible bighorn sheep populations causes in epizootic infection and polymicrobial bacterial pneumonia.

Bovine Viral Diarrhea Virus in Free-ranging Ungulates in the Western United States

Dr. Peregrine L. Wolff of the Nevada Department of Wildlife reported on bovine viral diarrhea virus (BVDV) surveillance in wild ungulates in the
western US BVDV is a pestivirus of the family Flaviviridae. Infected species are primarily within the order Artiodactyla and include members from the families Antilocapridae, Bovidae and Cervidae. Antibodies to BVDV have been detected in over 40 species of captive and free-ranging ungulates worldwide. BVDV infection has been reported in free-ranging North American wildlife include white-tailed deer (Odocoileus virginianus), mule deer (Odocoileus hemionus), and bighorn sheep (Ovis canadensis), as well as a captive mountain goat (Oreamnos americanus). Experimental studies involving white-tailed deer have indicated that the epidemiology of infection is similar to that of cattle and transmission studies indicate that BVDV can be transmitted from domestic cattle to white-tailed deer. Thus BVDV may be an underreported but important disease of free-ranging ungulates at the livestock-wildlife interface.

From 2010-2012, serological surveys of sympatric bighorn sheep, mountain goats and mule deer in the northeastern region of Nevada have indicated a high seroprevalence to BVDV. Tissues from mountain goats and bighorn sheep involved in a die-off from pneumonia in 2009-2010 yielded a new strain of BVDV type 1a. Virus isolation and strain typing studies are currently underway for samples collected from mule deer, as well as bighorn sheep and mountain goats that survived the die-off. At this time it is unknown whether BVDV will have population level impacts on any of these species.

Preventing the Establishment of a Disease Reservoir in Wildlife: A Case Study of Bovine Tuberculosis in Minnesota's Wild Deer Herd

Dr. Michelle Carstensen of the Minnesota Department of Natural Resources (MNDNR) reported on a Minnesota's approach to managing a recent bovine tuberculosis (bTB) outbreak. Five key management recommendations were suggested to increase the possibility of success: 1) react fast to initial disease detection; 2) follow-through on monitoring the outbreak; 3) be aware when monitoring must switch to management; 4) reduce transmission potential (both cattle and deer); and 5) evaluate your efforts and adjust when needed. The MNDNR has conducted surveillance for this disease in deer since 2005, when bTB was first detected in cattle on a northwestern Minnesota farm. The disease has since been found in a total of 12 cattle operations and 27 free-ranging white-tailed deer (Odocoileus virginianus). Both deer and cattle have the same strain of bTB, which has been identified as one that is consistent with the disease found in cattle in the southwestern United States and Mexico. The Board of Animal Health (BAH) has been leading efforts to eradicate the disease in Minnesota's cattle. Measures have included the depopulation of all infected herds, a buy-out program that removed 6,200 cattle from the affected area, and mandatory fencing of stored feeds on remaining farms. No new infections have been detected in cattle or deer since 2009. The state regained its bTB-Free accreditation in October 2011; however, some testing requirements remain on cattle herds within the endemic area. MNDNR plans to continue to monitor infection in the local deer population through hunter-harvested
surveillance in fall 2012, and any further aggressive management actions (e.g., sharpshooting deer in key locations) will be dependent on future surveillance results.

Hemorrhagic Disease and *Culicoides* spp. Surveillance, 2012

Dr. Daniel Mead of the Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia updated the committee on hemorrhagic disease activity in the United States in 2011 and 2012, and on *Culicoides* spp. surveillance in the southeastern US. During 2011, SCWDS isolated 44 viruses from white-tailed deer (WTD) samples submitted from 14 states. Viruses isolated were EHDV-2 (42), BTV-11 (1) and BTV-17 (1). So far in 2012, we have received samples from 26 states and have isolated 154 viruses from animals suspected of having HD. EHDV-2 accounts for the majority of isolates (101) and was isolated from WTD, cattle, and alpaca. EHDV-6 was isolated from 41 (27% of total isolates) WTD and EHDV-1 was isolated from seven WTD. Of the bluetongue viruses isolated, BTV-10 was isolated from a pronghorn, BTV-11 was isolated from a WTD, and BTV-13 was isolated from WTD and a bighorn sheep. The EHDV-6 virus was first detected in the US in 2006 and up until 2012 had been isolated only from very small numbers of deer nearly every year since then. The significance of the large number of EHDV-6 isolations and the broad geographic range of their origin in 2012 is under investigation.

SCWDS has conducted *Culicoides* species surveys since 2007, as part of a Cooperative Agreement for Exotic Arthropod Surveillance with USDA-Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS). This surveillance began in response to the detection since the 1990s of a number of exotic orbiviruses including EHDV-6 and several BTV serotypes. Between July 2011 and June 2012, surveys were conducted at 43 sites in nine states, and 17,198 *Culicoides* insects representing 35 species were collected. More than 50 species of *Culicoides* have been identified since surveillance began in 2007. Surveys continue in Alabama, Florida, Georgia, Louisiana, and Mississippi.

Factors Influencing Group Size and Brucellosis Seroprevalence in Montana Elk Populations

Neil Anderson of the Montana Department of Wildlife Fisheries, and Parks reported to the committee on brucellosis research in wild elk in Montana. Increasing elk densities across the West in response to increased demand for recreational and hunting opportunities may have negative, unintended implications for disease transmission risk. Historically, free-ranging elk populations were not thought to sustain brucellosis (*Brucella abortus*), but recent studies suggest increasing elk densities and aggregation sizes may result in free-ranging elk serving as maintenance hosts for the pathogen. Developing a better understanding of the factors that influence the rate of pathogen transmission is a central issue in ungulate management across the Greater Yellowstone Ecosystem (GYE). Here, we evaluate spatial
variations in elk density and aggregation patterns across the Montana portion of the GYE to generate predictions of elk to elk disease transmission risk, and we validate these predictions using current estimates of brucellosis seroprevalence. We found snowpack, vegetative cover type, and elk densities affected elk group sizes, while percent grasslands within the winter range and elk density affected the proportion of the population aggregated in large groups (>300 elk). Increasing elk herd density not only increased predicted average group size and proportion of the population aggregated in large groups, but increasing elk density also strongly increased the size of the largest elk aggregations. We found no evidence that wolf predation risk, measured as an annual wolf to elk ratio, affected mean group size or the proportion of the population aggregated in large groups. Finally, we estimated brucellosis seroprevalence rates across the Montana portion of the GYE and the affect group size has on those rates.

Genotypic Influences of Chronic Wasting Disease “Susceptibility” of Elk on Population Modeling

Dr. Terry Kreeger of the Wyoming Department of Game and Fish reported on genetics research and population modeling of elk with respect to chronic wasting disease (CWD). A ten-year model was completed in Wyoming that superimposed life table data and known genotypes from a captive elk herd continuously exposed to CWD onto data from a free-ranging elk herd utilizing winter feed grounds, which incorporated hunting and non-hunting sources of mortality. Five different scenarios were modeled over a 100-year period. The effect of CWD on this feed ground elk population varied, depending on genotype and hunting strategies.

USDA-APHIS-Veterinary Services Chronic Wasting Disease National Program - FY2012 Update

Dr. Patrice N. Klein of USDA-APHIS-Veterinary Services (VS) updated the committee on the status of CWD in wild and captive cervids in the United States, the Federal CWD funding situation, and the Federal CWD Rule published in June 2012.

Wild cervid surveillance

In FY2011, cooperative agreements were awarded to 46 State wildlife agencies (approximately $4.2 M) and 34 Native American Tribes (approximately $340 K). The Native American Fish and Wildlife Society received approximately $175K to support CWD outreach and education activities. Cooperative agreement funds were eliminated in FY 2012 due to federal budget reductions. In FY2010, funding supported surveillance in approximately 74,900 wild cervids in 46 cooperating States. Wild cervid CWD surveillance totals are pending for FY2011 (2011 – 2012) due to seasonal surveillance activities and completion of final cooperative agreement reporting to APHIS. To date, approximately 60,890 wild cervids have been tested in fiscal year 2011.
At the end of fiscal year 2012, there were 17 ‘tier 1’ States, 20 ‘tier 2’ States and 13 ‘tier 3’ States. Texas was the most recent “Tier 1” state, with a report of CWD positive free-ranging mule deer in the northwestern region along the New Mexico border. Only 13 states remain that have not detected CWD in their free-ranging or farmed cervid populations.

**Farmed/captive cervid surveillance testing**

In FY2012, CWD surveillance testing was conducted on approximately 22,585 farmed /captive cervids by immunohistochemistry (IHC). APHIS funded this testing through December 2011. In January 2012, APHIS transitioned testing costs to cervid owners as a result of budget reductions.

**Farmed/captive cervid CWD status**

To date, 60 farmed/captive cervid herds have been identified in 13 states: Colorado, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, New York, Oklahoma, Pennsylvania, South Dakota, and Wisconsin. There are a total of 40 elk herds, 19 white-tailed deer (WTD) herds, and one red deer herd. In the past year, new CWD positive animals have been reported in one red deer herd in Minnesota (May 2012), three WTD herds in Iowa, including a hunt facility (July 2012), and a WTD herd in Pennsylvania (October 2012). At this time, 15 CWD positive herds remain under state quarantine – seven elk herds in Colorado, three elk herds in Nebraska, three WTD herds in Iowa, one WTD herd in Pennsylvania, and one red deer herd in Minnesota.

**Budget: Commodity Health Line Structure**

In FY2011, APHIS received approximately $15.8 million in appropriated funding for the CWD Program. In the FY2012 budget, livestock commodities regulated by USDA were organized into ‘Commodity Health Line’ structures or groupings. APHIS’ Equine, Cervid and Small Ruminant (ECSR) Health line supports efforts to protect the health and thereby improve the quality and productivity of the equine, cervid and small ruminant industries. In FY2012, approximately $1.925 million of ECSR funding was allocated for CWD program activities to provide Federal oversight of the national CWD herd certification program (HCP). The President’s FY2013 budget proposes further funding reductions.

**CWD Rule Update**

The CWD Interim Final Rule was published on June 8, 2012, establishing a national voluntary CWD herd certification program (HCP) and consistent minimum interstate movement requirements. The rule became effective on August 13, 2012. Enforcement of the interstate movement regulations is delayed until December 10, 2012, to give States time to apply to APHIS to become an Approved State CWD HCP.

After reviewing the public comments, APHIS will issue a final rule, and if needed, incorporate any changes made in response to comments on preemption. Comments received on other topics will be held for future rulemaking.

The goal of the CWD Program is to assist States, Tribes, and the cervid industry to prevent and control spread of CWD in farmed and wild cervid
populations through establishment of a national CWD HCP and interstate movement requirements. APHIS provides federal oversight of the voluntary national CWD HCP with program activities conducted by the Approved State CWD HCPs. APHIS will serve in an advisory capacity to Approved States for epidemiological investigations on CWD positive findings, development of herd plans, and assist (where possible) with herd inspections and inventories. APHIS will continue to fund confirmatory testing on any presumptive CWD-positive samples from farmed and wild cervids, conducted by the National Veterinary Services Laboratories (NVSL).

**Committee Business**

The Committee extensively discussed four resolutions related to chronic wasting disease (CWD) in wild and/or captive cervids with respect to the Federal budget, and the Federal CWD Interim Final Rule and the CWD Program Standards that were published in June 2012. One resolution addressing Federal funding for indemnification for captive cervids destroyed in CWD control programs was introduced and passed unanimously. It was determined that the remaining three resolutions will be revised by a small but inclusive working group and introduced at the upcoming meeting of the Committee on Captive Wildlife and Alternative Livestock.
Hosted by the American Association of Extension Veterinarians

FMD Research and Outreach in Vietnam: Challenges and Opportunities – C. Huston

Helping Beginning Ranchers Develop Sustainable and Innovative Management Practices through Workshops and Retreats – K. Rood

Assessment of patterns of Salmonella prevalence within broiler flocks – R. Wills

Integrated Program for Reducing Bovine Respiratory Disease Complex in Beef and Dairy Cattle Coordinated Agricultural Project (BRD CAP) – A. Van Eenennaam

Oklahoma Bovine Trichomoniasis Regulation Education Program – D. Sparks

Vermont's Dairy Farm Contact Recall Challenge – J. Smith

Variant H3N2 Influenza Virus, Fairs and Youth Exhibitors – S. Trock

Running Head: Bovine Emergency Response Plan - A Framework for Addressing Crashes Involving Cattle Being Transported – L. Pederson
Foot-and-Mouth Disease (FMD) is an economically important disease of livestock worldwide which can cause considerable suffering in affected animals. A high morbidity rate can be encountered in affected populations, manifested as severe and painful lesions on mucosal areas of the mouth and feet, with greater mortalities occurring in younger and neonatal animals. Furthermore, severe economic trade restrictions can be placed on countries following outbreaks or in areas of endemic infection. Vietnam is a country where FMD virus (FMDV) is endemic in the livestock population (cattle, buffalo, pigs and goats) and targeted vaccination of susceptible animals is practiced. Recent outbreaks in livestock have occurred in 2011 and 2012. It is known that animals that recover from FMD infection can develop a prolonged, persistent infection with the FMDV, potentially serving as a continued source of new infections in susceptible populations. However, little is known about the role of persistently infected animals, especially the role of buffalo, in maintenance and transmission of the FMDV virus within susceptible populations.

Twenty-three farms with persistently infected buffalo and cattle have been identified in Vietnam through repeated probangs testing. From these farms, transmission cells consisting of positive and naïve animals have been created and will be tested monthly for one year to determine if transmission occurs. The results of this study will add to the understanding of the epidemiology of FMD in a naturally occurring environment. This study also demonstrates many of the challenges and opportunities faced when studying disease surveillance and control in Vietnam. In addition to obvious language barriers, educational, economical, political and social barriers must be considered when developing research and outreach programs in a foreign country.
HELPING BEGINNING RANCHERS DEVELOP SUSTAINABLE AND INNOVATIVE MANAGEMENT PRACTICES THROUGH WORKSHOPS AND RETREATS

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Creating Profitable and Sustainable Beginning Utah Ranchers teaches best management practices in livestock production and grazing management to Utah's beginning livestock producers. The livestock industry faces an aging work force. Training beginning ranchers enables them to be both profitable and sustainable. In Utah, this includes both business and range management skills, since most livestock production occurs on public and private rangeland. Extension faculty partnered with the Utah Grazing Improvement Program and Applied Technology Colleges to conduct workshops focusing on business management, innovative range management and the use of marker-assisted selection to identify and use superior livestock genetics to be more profitable by improving product marketability. Workshops fostered beginning rancher networking and encouraged management participation by spouses and other family members involved in their operations. Workshop topics included risk management, ranch budgeting, nutritional supplementation, animal health, taxes, generational transfer, Forage Kochia, retained ownership, managing irrigated pasture, niche marketing and management intensive grazing. Knowledge increased in all areas assessed through post-event surveys. Attendees requested additional business management workshops and regional workshops focusing on management for their locales. Utah's beginning ranchers are better prepared to face the challenges of ranching through participation in the Beginning Rancher program.
ASSESSMENT OF PATTERNS OF SALMONELLA PREVALENCE IN BROILER FLOCKS

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The objective of the study was to assess patterns of Salmonella prevalence within broiler flocks as they progressed through the production continuum. Presence of Salmonella was evaluated in 64 broiler flocks from 32 farms in four states in the southeastern United States.

The prevalence of Salmonella within a flock was estimated by sampling the flock upon delivery of the chicks at the grow-out farm (a gastrointestinal tract (D1GI) sample from one chick from each of 30 transportation trays); one-week before processing (whole carcass rinse (GOWC), ceca (GOCA) and crop (GOCP) samples from each of 30 birds); upon arrival at the processing plant (PPWC, PPCA and PPCP samples from each of 30 birds); prior to the chill tank (rinses (PPPR) from 30 carcasses); and post-chill tank (rinses (PPPO) from 30 carcasses). The median flock prevalence varied across sample types and points: D1GI(0.0%), GOWC(13.3%), GOCA(3.3%), GOCP(1.7%), PPWC(53.3%), PPCA(8.3%), PPCP(10.0%), PPPR(33.3%), and PPPO(13.3%).

The direction and magnitude of changes in prevalence between various sample types and points within each flock were determined. While slightly less than half of the flocks had increased prevalence from grow-out to plant arrival for ceca samples, over 70% of the flocks had increased prevalence from grow-out to plant arrival for crop samples and whole carcass rinses. The prevalence of Salmonella decreased or stayed the same from PPPR to PPPO for the majority of the flocks (78.0%). The results of the study provide insight on where to focus interventions to facilitate the control of Salmonella in the broiler production continuum.
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INTEGRATED PROGRAM FOR REDUCING BOVINE RESPIRATORY DISEASE COMPLEX IN BEEF AND DAIRY CATTLE COORDINATED AGRICULTURAL PROJECT (BRD CAP)

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There is growing interest in the selective breeding of livestock for reduced disease susceptibility. Bovine respiratory disease (BRD) or pneumonia is the largest single natural cause of death in US beef and dairy cattle, and BRD susceptibility represents an obvious target for selective breeding programs. In 2011 Agriculture and Food Research Initiative (AFRI) funded a 5-year Coordinated Agricultural Project (CAP) entitled “Integrated Program for Reducing Bovine Respiratory Disease Complex in Beef and Dairy Cattle”. The objective of this multi-institutional CAP is to fully capitalize on recent advances in genomics to reduce the prevalence of BRD in beef and dairy cattle. The research component of this proposal will identify genetic loci and genomic rearrangements associated with BRD, and use these data to develop SNP-based selection tools to identify BRD-resistant animals. Incorporating BRD into genetic evaluations offers a sustainable approach to reduce disease incidence. There are also plans to investigate the use of genomics to develop a DNA-based diagnostic assay to quickly and effectively identify the specific BRD pathogens present in an animal. The extension component will employ Advisory panel guidance to develop a sustained effort to disseminate, demonstrate, evaluate and document the impact of a range of educational outreach materials and best management practices for beef and dairy cattle producers, and feedlot personnel. The education component will develop undergraduate courses, and offer educational and research internships to cultivate a future human resource for continued reduction in BRD prevalence. Newly-available genomics tools offer an innovative approach to reduce BRD incidence which is much-needed given increasing public concern regarding animal welfare and traditional therapeutic treatments of disease. The BRC CAP is supported by Agriculture and Food Research Initiative Competitive Grant no. 2011-68004-30367 from the USDA National Institute of Food and Agriculture (NIFA). For more information please see http://BRDComplex.org.
OKLAHOMA BOVINE TRICHOMONIASIS REGULATION EDUCATION PROGRAM

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Bovine Trichomoniasis is a venereal disease of cattle that is transmitted to cows though breeding. Effective January 1, 2011, any bull changing ownership in Oklahoma by private sale, public sale, lease, trade, or barter is required to have a negative test for Trichomoniasis within 30 days of change of ownership. The objective of the Oklahoma Cooperative Extension Service (OCES) Bovine Trichomoniasis Education Program was to overcome opposition to the regulatory requirements and gain support, through education of veterinarians, producers and industry representatives about the disease and the importance of testing for the health and profitability of the cattle industry. The program, developed as a joint effort with Oklahoma Department of Agriculture, Food and Forestry (ODAFF) veterinarians, successfully reached 252 food-animal veterinarians and between 2,500 and 2,600 producers across the state during 2011. Education encompassed presentations, films, Q & A sessions, industry meetings and printed materials including an informative brochure developed by OCES and funded by ODAFF. Impact from the program has been demonstrated by the elimination of formal complaints and legal actions by producers opposing the testing, as informed producers are much more willing to comply with the regulations. Since the inception of the required testing on January 1, 2011, 215 bulls have tested positive for the disease, resulting in the prevention of up to 215 infected herds. This represents a huge win for the Oklahoma cattle industry and individual cattle producers. The feedback provided by producers attending the education sessions has been positive and included constructive suggestions, confirming the success of the program.

This disease initially caused problems in the Western and Rocky Mountain States but has moved with the movement of breeding cattle to the east and south. Many states, including several east of the Mississippi, are now starting to experience the problem. It would be of value for extension veterinarians to learn how the state Department of Agriculture and the cooperative extension service has worked together to lessen the impact of the disease on cattle producers and the cattle industry in Oklahoma.
Successful epidemiologic investigation of farm contacts in a contagious disease outbreak requires cooperation and accuracy of memory on the part of the farmer. Given that most dairy farms do not have physical access control or a method of recording farm visitors, this project was conducted to investigate the ability and willingness of farmers to recall or record visits. Twenty-six farmers participated in the "contact recall challenge" interviews, which consisted of 1.) Asking farmers to recall from memory, or by prompting, all visitors of the last two weeks; 2.) Asking farmers to record farm visitors over the next month; then 3.) A month later asking farmers the same recall challenge with prompting. Questions about the farmer's attitude about biosecurity were also asked. Half of the farmers completed the record sheet. Most felt it was important to know who comes onto their property to protect the health of their animals, but did not feel it was important to record visitors. More investigation of the risk perceptions of farmers towards biosecurity threats and their perceptions of control over such threats is needed to direct efforts to improve farm gate biosecurity on dairy farms.
Between July 2011 and December 31, 2011, the Centers for Disease Control and Prevention (CDC) received reports of 12 human cases of variant H3N2 influenza virus. Investigations into some of these cases identified exposure to swine at agricultural fair events as an associated risk factor. This virus is a reassortant with seven of eight genes tracing lineage to the swine H3N2 influenza virus, while the eighth gene, the matrix gene, was acquired from the 2009 H1N1 pandemic virus circulating in the human population.

As of the date of this abstract submission there have been > 150 additional cases of variant H3N2 with onset of clinical signs after July 1, 2012. The vast majority of these cases occurred in children (<18 years old) who exhibited swine at agricultural fair events. In some instances clinically ill swine were also reported. Limited sampling from swine at some of these fairs identified a similar virus.

Intervention activities included education and outreach to exhibitors, fair managers, State Veterinarians, fair veterinarians, state health departments and extension agents among others. On August 9, a webinar was held to discuss the current status of the outbreaks as well as to discuss educational efforts specifically involving pilot projects through 4-H and extension representatives and coordinated by the National Institute of Food and Agriculture’s (NIFA) Division of Education and 4-H.

Three pilot projects to introduce 4-H’ers to public health and potential zoonosis are being developed in conjunction with USDA-Veterinary Services, 4-H Headquarters (USDA-NIFA), the CDC and will include several State 4-H programs. The three proposed projects are designed to train youths while providing experience integrating public health aspects into 4-H activities. The projects seek to develop: 1.) Health Educators; 2.) Health Investigators; and 3.) Health Ambassadors. Youth participants in the Health Educator project will develop an understanding of public health, how it affects their lives and the role they can play in disease prevention. The 4-H programs based at the University of Georgia and Pennsylvania State University volunteered to pilot the Health Educator project. The Health Investigator program will engage youth in the process of investigating a disease outbreak simulation, to include communication of findings and recommendations to the public. Volunteer state 4-H programs for this effort include Pennsylvania State University, University of Georgia, Oklahoma State University, University of Nebraska and Colorado State University. The Health Ambassadors pilot project will encourage youth to become leaders in preventing zoonotic disease transmission in public settings, with a focus on
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fairs and animal exhibits. Four 4-H programs will work alongside University of California Davis, which has already developed a model for this initiative, to expand this project and adapt it for their states: University of Minnesota, Iowa State University, North Carolina State University and University of Oregon.
Annually over fifty million head of domestic and imported cattle and calves are marketed and transported for breeding, feeding, and slaughter in the United States. Nearly all of these cattle are transported via semi-truck and trailer. The transport of livestock is an integral and economically significant part of the beef cattle industry. The number of livestock transported in the United States via semi-truck and trailer has significantly increased since the mid 1950's. Anti-animal agriculture activist groups widely used a ban on the transport of equine animals to slaughter to drive the abolition of equine slaughter in the United States. Within the beef cattle industry, there is concern activist groups will attempt to further regulate livestock production by writing and supporting legislation banning the transport of food animals for slaughter. As the number of livestock being transported via motor vehicle has increased, so has the number of accidents involving livestock transport.

A major percentage of the livestock transport accidents in the United States and Canada involved semi-trucks carrying cattle. Currently in the United States, standard operating procedures for addressing accidents involving the transport of livestock do not exist. The Bovine Emergency Response Plan developed a framework for local emergency responders and law enforcement to more appropriately address accidents involving cattle transport vehicles. The Plan includes standardized procedures and materials for dispatchers and first responders in the areas of call assessment, scene arrival and assessment, scene containment and security, extraction of cattle from the trailer, relocation of cattle involved in the accident, mortality
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disposal, the righting of the wrecked transport vehicle (if needed), humane euthanasia of cattle, and debriefing. A Bovine Emergency Response Plan dissemination and implementation strategy is being developed. The Bovine Emergency Response Plan development team has also identified needed educational materials and curriculum, and additional funding needs to develop these materials and programs.

Key words: Cattle transportation, emergency response, standard operating procedures, accidents, humane euthanasia.
2. **USDA-ARS Animal Health Research Review 2012: Alternatives to Antibiotics**


Novel Immunotherapeutics as Alternatives to Antimicrobial Growth Promoters for Enteric Pathogens: An update on the mode of action – H. Lillehoj

Designer Antimicrobials: Molecular shuffling to create multi-functional enzyme antimicrobials that are highly refractory to resistance – D. Donovan

Characterization of Bacteriophages Virulent for *Clostridium perfringens* and Identification of Phage Lytic Enzymes as Alternatives to Antibiotics for Potential Control of the Bacterium – B. S. Seal

Biotherapeutics as alternatives to antibiotics: Effects of adenoviral delivered cytokines on innate and adaptive immunity – C. Loving

Input from participants: Future needs and solutions for integrating the use of alternatives to antibiotics in livestock and poultry production.
Antibiotics are one of the most important medical discoveries of the 20th century and will remain an essential tool for treating animal and human diseases in the 21st century. However, antibiotic resistance among bacterial pathogens and concerns over their extensive use in animals has garnered global interest in limiting their use in animal agriculture. Yet, limiting the availability of medical interventions to prevent and control animal diseases on the farm will directly impact global food security as well as animal and human health. Insufficient attention has been given to the scientific breakthroughs and novel technologies that provide alternatives to antibiotics. The objectives of the symposium “Alternatives to Antibiotics in Animal Production” were to highlight promising research results and novel technologies that could potentially provide alternatives to conventional antibiotics and assess challenges associated with their commercialization to help provide actionable strategies to support their development. The symposium focused on the latest scientific breakthroughs and technologies that could provide new options and alternative strategies for preventing and treating diseases of animals. Some of these new technologies have direct applications as medical interventions for human health, but the focus of the symposium was animal production, animal health and food safety during food-animal production. Five subject areas were explored in detail through scientific presentations and expert panel discussions including: 1.) Alternatives to antibiotics, lessons from nature; 2.) Immune modulation approaches to enhance disease resistance and treat animal diseases; 3.) The gut microbiome and immune development, health and diseases; 4.) Alternatives to antibiotics for animal production and; 5.) Regulatory pathways to enable the licensure of alternatives to antibiotics. The following reports highlight a few examples from ARS scientists of alternative strategies for treating animal diseases that were presented at the symposium. Additional reports on alternatives to antibiotics are provided on the following website: http://www.ars.usda.gov/alternativestoantibiotics/
As the world population grows and developing countries become more affluent, the global consumption of meat will increase by more than 50% within the next ten years. Confronting the increasing demand for poultry food products are emerging field diseases, increasing regulatory ban of antibiotics growth promoters (AGPs), high-density growth conditions, and waste management. Multiple dietary immunomodulators have been suggested as alternatives to AGPs including antimicrobial peptides (AMPs), toll-like receptor (TLR) ligands and agonists, prebiotics, probiotics, hyperimmune antibodies, herbs and essential oils, bacteriophages, enzymes, anti-infectives and anti-virulence drugs. Furthermore, studies done in mice and humans have shown solid scientific evidence that many of these AGP alternatives, such as TLR ligands, probiotics, herbs, and essential oils, immunomodulate host immunity by directly interacting with conserved innate sensing molecules present on innate immune cells. In this regard, as shown in our recent studies, the dietary immunomodulation of gut immunity using natural dietary supplements such as TLR ligands, DFMs and plant-derived phytochemicals is a promising alternative strategy that can be applied to many infectious diseases where traditional prevention methods showed limitations. In order to maximize the effects of drug-alternative strategies and to develop a rational synergistic approach for disease control, the underlying immune mechanisms should be thoroughly investigated with the best available scientific tools. There is also increasing scientific evidence that implicates negative consequences of dietary antibiotics on gut microflora, local innate immunity, disease resistance, and overall animal well being. As we move into the twenty-first Century and the demands for animal food products increase to meet the nutritional needs of a growing world population, developing drug-free alternative strategies to prevent and control animal diseases is a timely global issue and a critical component of our long-term efforts to alleviate poverty and world hunger. This presentation will highlight some emerging strategies to enhance gut immunity and to decrease economic losses due to poultry diseases such as coccidiosis and necrotic enteritis. Such information will magnify our understanding of host-parasite biology, mucosal immunology, and facilitate the design of future nutritional interventions and vaccination strategies against coccidiosis and necrotic enteritis.
There is a need for new antimicrobials since broad range antibiotics are believed to select for multi-drug resistant superbugs. Bacteriophage endolysins are peptidoglycan hydrolases (PGHs) that lyse the bacterial cell wall to allow nascent phage to escape and have desirable antimicrobial qualities. Phage and host have co-evolved, such that the endolysins target highly immutable bonds within a limited target species range. PGHs cause osmolysis by degrading extracellular PG, avoiding many of the classical resistance mechanisms (e.g. efflux pumps). PGHs are modular proteins amenable to genetic modification for the generation of novel fusions with multiple lytic activities. We have generated a fusion PGH combining the staphylolytic domains of the synergistic staphylococcal phage K endolysin LysK and the PGH bacteriocin Lysostaphin. The fusion retains the three unique catalytic activities of the parental molecules with an increased specific activity compared to both parental enzymes in turbidity reduction assays. Few bacteria can evade three simultaneous lytic activities. The recombinant protein disrupts *Staphylococcus aureus* SA113 biofilms more efficiently (at lower concentrations) than either parental molecules, and is less prone to resistance development both *in vitro* and *in vivo*. Cultures of *S. aureus* strain Newman develop ~2-fold increased resistance to the fusion during ten rounds of liquid culture sublethal exposure (Minimum inhibitory concentration assay; MIC) compared to much higher parental enzyme MIC increases [LysK (~42-fold); Lysostaphin (~585-fold)]. Conventional antibiotics or the two parental enzymes in combination, tested in parallel were less effective than the triple fusion at reducing resistant strain development. In a rat model of nasal carriage, a triple acting fusion was able to reduce the *S. aureus* colonization to the same extent as mupirocin (~2 logs), whereas the parental molecules could not. Bacteria recovered from treated rats were found to retain the same sensitivity to the fusion molecule in both MIC and Plate Lysis Assays as the parental strain, prior to the experiment. The delivery of three unique PGH lytic activities in a single protein effectively treats *S. aureus* while reducing the risk of resistant strain development.
CHARACTERIZATION OF BACTERIOPHAGES VIRULENT FOR CLOSTRIDIUM PERFRINGENS AND IDENTIFICATION OF PHAGE LYTIC ENZYMES AS ALTERNATIVES TO ANTIBIOTICS FOR POTENTIAL CONTROL OF THE BACTERIUM

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Summary
Clostridium perfringens is a Gram-positive, spore-forming anaerobic bacterium that plays a significant role in human food-borne disease as well as non-food-borne human, animal, and poultry diseases. There has been a resurgent interest in the use of bacteriophages or their gene products to control bacterial agents. Consequently, poultry intestinal material, soil, sewage and poultry processing drainage water were screened for virulent bacteriophages in both the USA and Russian Federation that could lyse C. perfringens in spot assays. From the bacteriophage collections highly lytic viruses were isolated and the double-stranded deoxyribonucleic acid (DNA) genomes of the viruses were sequenced to completion. DNA sequencing of six bacteriophage genomes completed at PMSRU and four genomes in collaboration with Russian investigators resulted in identification of unique amidases as well as bacteriophage encoded proteins that potentially contain lysozyme and endopeptidase activities. Three recombinant bacteriophage lytic enzyme genes encoding putative amidases have been cloned, their proteins expressed as recombinants and isolated to homogeneity, then demonstrated to species-specifically lyse C. perfringens. No other bacteria beyond the genus were lysed by the recombinant bacteriophage proteins indicating that beneficial bacteria will not be killed by these novel antimicrobials. These bacteriophage lytic enzymes will have possibilities for use in agriculture and medical applications as potential replacements for current antibiotics that may have diminished activity.

Introduction
Clostridium perfringens is a Gram-positive, spore forming, anaerobic bacterium that is commonly present in the intestines of people and animals. C. perfringens is classified into one of five types (A, B, C, D, or E) based on the toxin production (Smedley et al., 2004; Sawires and Songer, 2006). Unfortunately, few tools and strategies are available for prevention and control of C. perfringens in poultry. Vaccination against the pathogen and the use of probiotic or prebiotic products has been suggested, but are not available for practical use in the field at the present time (Van Immerseel et al., 2004). Consequently, there is a need for developing on-farm interventions to reduce populations of this bacterial pathogen that lead to
peracute flock disease and potentially greater numbers of animal-borne C. *perfringens* entering the human food chain.

In the European Union (EU) antimicrobial growth promoters have been banned from animal feeds because of concerns over the spread of antibiotic resistances among bacteria (Bedford, 2000; Moore et al., 2006) and the EU-wide ban on the routine use of antibiotics in animal feeds became effective on January 1, 2006 (Regulation 1831/2003/EC). Removal of these antimicrobials will induce changes within the chicken gastrointestinal microbial flora, dictating the need to further understand the microbial ecology of this system (Wise and Siragusa, 2007) so that appropriate antibiotic alternatives may be developed based on this knowledge (Ricke et al., 2005). The view that there is no compelling reason to pursue development of novel therapeutic agents is unwise (Projan & Youngman, 2002), especially considering emergence of “pan-resistant” or multiple-antibiotic resistant strains of Gram-positive bacteria (French, 2010).

Bacterial viruses were first reported in 1915 by Fredrick William Twort when he described a transmissible “glassy transformation” of micrococcus cultures that resulted in lysis of the bacterium (Twort, 1915). Subsequently Felix Hubert d’Hérelle reported a microscopic organism that was capable of lysing shigella cultures on plates that resulted in clear spaces in the bacterial lawn that he termed “plaques” (d’Hérelle, 1917). Bacteriophages were and continue to be sold in the Russian Federation and Eastern Europe as treatments for bacterial infections (Sulakvelidze et al., 2001). There has been a resurgent interest in bacteriophage biology and their use or use of phage gene products as antibacterial agents (Liu et al., 2004; Fischetti, 2010). The potential use of lytic bacteriophage and/or their lytic enzymes has been of considerable interest for medicine, veterinary and bio-industries worldwide due to antibiotic resistance issues.

**Results**

Poultry intestinal material, sewage and poultry processing drainage water were screened for bacteriophages that produced clear plaques on the host bacterium *Clostridium perfringens*. The first viruses isolated from broiler chicken offal washes (O) and poultry feces (F) were virulent viruses designated ΦCP39O and ΦCP26F that produced clear plaques on host strains. Importantly, no toxin encoding genes were identified among the bacteriophages and the phage genomes probably do not integrate into the host genome (Seal et al, 2011). Comparisons of our siphoviral phage genomes to 26 other bacteriophage genomes revealed three shared clusters of orthologous groups (COGs), two of particular interest within this core genome was an endolysin (PF01520, an N-acetylmuramoyl-L-alanine amidase) potentially capable of digesting the *C. perfringens* peptidoglycan and a holin (PF04531) that disrupts the bacterial cell wall (Oakley et al., 2011). There is only one other siphoviral bacteriophage genome sequenced to date from a lysogenic phage wherein a lysin was identified and expressed for digestion of the *C. perfringens* peptidoglycan (Zimmer et al., 2002).
Two putative phage lysin genes (ply) from the clostridial phages ΦCP39O and ΦCP26F were cloned and expressed in *E. coli*, and the resultant proteins were purified to near homogeneity. Gene and protein sequencing revealed that the predicted and chemically determined amino acid sequences of the two recombinant proteins were homologous to N-acetylmuramoyl-l-alanine amidases. The proteins from those two bacteriophages were identical in the C-terminal putative cell-wall binding domain, but had only 55% identity to each other in the presumptive N-terminal catalytic domain (Fig. 1). Both recombinant lysins were capable of lysing both parental phage host strains of *C. perfringens* as well as other strains of the bacterium in spot and turbidity reduction assays. Importantly, other member species of the clostridia were resistant to the lytic activity by both assays proving the species-specificity for killing only *C. perfringens* (Simmons et al., 2010).

A virulent short-tailed bacteriophage ΦCPV1 was isolated in the Russian Federation utilizing *C. perfringens* as the host and was classified in the family Podoviridae (Volozhantsev et al., 2011). One bacteriophage genome encoded lysin was predicted to share homology with N-acetylmuramoyl-l-alanine amidases and a second structural lysin was predicted to be a lysozyme-endopeptidase. These enzymes digest peptidoglycan of the bacterial cell wall and could be considered potential therapeutics to control *C. perfringens* (Volozhantsev et al. 2011). Another bacteriophage ΦCP24R was isolated from raw sewage at a USA waste treatment plant and lytic activity was observed against a food-borne type A *C. perfringens* isolate. Three distinct genes with lytic domains were identified, including an amidase, a lysozyme and protein with a zinc carboxypeptidase domain that has not been previously reported in the viral kingdom (Morales et al., 2012).

Two more short-tailed bacteriophages, designated ΦCPV4 and ΦZP2, were isolated in the Moscow Region of the Russian Federation while another closely related virus, named ΦCP7R, was isolated in the southeastern USA. The viruses were identified as members of the order Caudovirales in the family Podoviridae with short, non-contractile tails. The predicted DNA polymerase type B protein sequences were closely related to other members of the *Podoviridae* including *Bacillus* phage Φ29. Whole-genome
comparisons supported this relationship, but also indicated that the Russian and USA viruses may be unique members of the sub-family *Picovirinae* (Volozhantsev et al., 2012). All three podoviral bacteriophage genomes encoded a predicted N-acetylmuramoyl-L-alanine amidase and a putative stage V sporulation protein. Each putative amidase contained a predicted bacterial SH3 domain at the C-terminal end of the protein, presumably involved with binding the *C. perfringens* cell wall.

Several new antimicrobial agents, putative lysins encoded by the genomes of clostridial bacteriophages have been identified in our laboratories (Fig. 2). These putative enzymes represent different biochemical bonds found in the peptidoglycan that can be targeted as an antimicrobial intervention strategy.

![Figure 2](#)

**Figure 2.** Representative bacteriophage lytic proteins encoded within the genomes of bacteriophages as the result of joint USA and Russian Federation cooperative research. The identification of these potential antimicrobials is from data as reported in Morales et al., 2012 and Volozhantsev et al., 2011, 2012.

**Discussion**

Bacteriophages have been considered as potentially important alternatives to antibiotics (Sulakvelidze et al., 2001; Lu and Koeria, 2011; Maura and Debarbieux, 2011). However, it is important to emphasize that development of bacterial resistances to their viruses such as evolution of phage receptors, super-infection exclusion, restriction enzyme-modification systems and abortive infection systems such as bacterial clustered regularly interspaced short palindromic repeat (CRISPR) sequences (Labrie et al., 2010) all point to the inevitable need for constantly searching for new
bacteriophage isolates to use therapeutically. Also, it should be noted that although bacteriophage therapy has been utilized as a treatment, it was pointed out early on by Smith (1959) that a large proportion of *C. perfringens* strains remained resistant to infection by many of the bacteriophages isolated during his investigations. This has been observed during our investigations wherein most bacteriophages virulent for *C. perfringens* have a restricted host range for a specific isolate of the bacterium. Therefore, selection of appropriate 'bacteriophage cocktails' may not necessarily be effective against many of the various bacterial isolates that exist in the environment. This was proven to be the case for *Listeria monocytogenes* where the FDA-approved phage cocktail does not kill many isolates of the bacterium obtained from ready-to-eat foods (Shen et al., 2006).

Enzymes are added to monogastric animal feed for digesting carbohydrates and for metabolizing phytate to produce free phosphorus. These are marketed commercially for poultry feed additives, many of which are produced as recombinant proteins in yeast and sold as a lysate (Cowieson et al., 2006), which argues for the economic feasibility of developing bacteriophage enzymes as feed additives. Production of enzymes by *Pichia pastoris* can serve as a potential source for structural or animal feed studies (Johnson et al., 2010) and lysozyme can be encapsulated (Zhong & Jin, 2009) which has been utilized as a feed additive in the diet of chickens to significantly reduce the concentration of *C. perfringens* in the ileum and reduce intestinal lesions due to the organism (Liu et al., 2010). Therefore, it is conceivable that bacteriophage proteins capable of lysing *C. perfringens* could be expressed in yeast and added as lysates to animal feeds for reducing the bacterium to improve health and food safety for monogastric food-producing animals during production.

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**II. F. OTHER REPORTS**


Simmons, M., D.M. Donovan, G.R. Siragusa, and B.S. Seal. 2010. Recombinant expression of two bacteriophage proteins that lyse *Clostridium perfringens* and share identical sequences in the C-terminal cell wall binding domain of the molecules but are dissimilar in their N-terminal active domains. J. Agric. Food Chem. 58:10330-10337.


Acceptable alternatives to the use of antibiotics in food animal practice need to be explored. The use of immunomodulators is a promising area for therapeutic, prophylactic, and metaphylactic use to prevent and combat infectious disease during periods of peak disease incidence. We developed a method to circumvent the need for production of a recombinant cytokine by using a replication-defective adenovirus vector to express cytokines of interest, including interferon-α (IFN-α) or porcine granulocyte colony-stimulating factor (G-CSF). Type I interferons, such as IFN-α, contribute to innate antiviral immunity by promoting production of antiviral mediators and also play a role in the adaptive immune response. G-CSF enhances neutrophil production and release from the bone marrow and is already licensed for use in humans for treatment of neutropenia and prevention of infections in those with compromised immunity. Porcine reproductive and respiratory syndrome (PRRS) is one of the most devastating and costly diseases to the swine industry world-wide and has been shown to induce a meager IFN-α response. Pigs administered the vector expressing porcine IFN-α and challenged with PRRSV had lower febrile responses and decreased percentage of lung involvement. Viremia was delayed and there was a decrease in viral load in the sera of pigs. In addition, there was an increase in the number of virus-specific IFN-γ secreting cells, as well as an altered cytokine profile in the lung 14 days post-infection, indicating that the presence of IFN-α at the time of infection can alter innate and adaptive immune responses to PRRSV. Together, these results indicate that IFN-α can have protective effects if present during the time of PRRSV infection. Intramuscular administration of the vector expressing porcine G-CSF was found to elicit a sustained neutrophilia, lasting nearly 3 weeks. Thus, it is possible to deliver G-CSF to pigs for a sustained increase in circulating neutrophil numbers in pigs, which may be a useful alternative to antibiotics for prevention of infectious disease, especially during times of stress and pathogen exposure such as post-weaning and post-partum.
II. F. 3. One Health Symposium: Raw Milk

A One Health View of Milk Pasteurization: Early history, expanded applications and raw milk advocacy – R.W. Currier

Got Milk? Indiana’s Approach to Raw Milk – B. Marsh

Allowing the sale of raw milk product in Maine – D. Hoenig

The Public Health Impact of Raw Milk – S. Bosch

Dairy Industry Perspective – J. Howie

Overview: The One Health Symposium on Raw Milk was opened by Dr. Sandi Norman, Chairman of the USAHA Committee on Public Health and Rabies by welcoming participants to the open discussion on the history, progression and attitudes toward raw milk and milk products. Using perspectives from states who permit the sale of raw milk and those that do not along with the history and disease identification associated with these products, it is hoped that facts presented will lead to productive discussion on the oft debated topic or Raw Milk-Yes or No?
A ONE HEALTH VIEW OF MILK PASTEURIZATION: EARLY HISTORY, EXPANDED APPLICATIONS AND RAW MILK ADVOCACY

Russell W. Currier
Former Iowa State Public Health Veterinarian

Summary: The symposium opened with Dr. Russell Currier, former state public health veterinarian in Iowa who presented a thorough and comprehensive history of milk and its long story of development into primarily a pasteurized product. Currier hoped by presenting the facts over the last several decades that the audience could better understand the dynamics of the conflict between raw and pasteurized milk and more successfully address it.

Currier’s talk encompassed the history of the dairy industry from the domestication of cattle through the common pasture era in towns to provide fresh milk to development of cities and the movement of cattle to the country. The advent of “swill milk” and the increase in infant mortality related to unsanitary food practices, in particular milk, was noted. The development of condensed milk, which helped feed the Union Army during the Civil War. In the 1850s, Louis Pasteur developed the pasteurization process for beer and wine which was eventually adapted for milk. This new process prevented spoilage and did not alter the taste of the milk. While wine and beer brewers began using this process in the 1870s, it would be a while before it became the standard for milk.

Many but not all physicians recognized the value of this process to prevent infant milk-borne infections and deaths. One astute businessman, Nathan Straus, proprietor of Macy’s Department Store, assumed the mantle of leadership to promote pasteurization and funded free or subsidized milk to New York children beginning in 1893. Alternatively – with the common misperception this process diminished the nutritive qualities of milk - physicians at Harvard Medical School drafted a certification plan for improved dairy hygiene in 1891 and became the mantle of advocacy for Dr. Henry Coit, a physician in New York, whose son died from a milk-transmitted infection. This prompted Coit to establish the American Association of Medical Milk Commissions [AAMMC] that greatly assisted in improving overall dairy hygiene in the US, albeit while promoting raw milk. Concurrently, Nathan Straus, - by dint of tireless efforts - persuaded Chicago to be the first city to mandate the pasteurization process in 1909 followed by New York a year later.

A search of records indicates that during the period 1890 to 1910, there were scores of epidemics of milk-borne illness every year in the US including primarily typhoid fever, diphtheria, and streptococcal infections (scarlet fever and septic sore throat). Interestingly most of these episodes were from human pathogen contamination from hand milking followed by poor sanitation practices, and substandard refrigeration. It resulted in infant mortality rates (number of deaths < 1 year of age per 1,000 live births per
year) that approached an abysmal 400/1,000 in the pre-pasteurization era, then dropping to below 100 by 1910. While improved refrigeration and transportation played a role along with better living standards and were all influential, pasteurization came to be recognized as a major enhancement to prevent milk-borne disease and deaths in the 1890-1910 time-frames. In spite of this process, AAMMC programs were concurrently established in a number of states and locales to improve dairy hygiene and preclude the need for pasteurization. ‘Certified’ dairy produce was priced at a significant premium over pasteurized products, muting widespread acceptance and marketability.

Interestingly, bovine tuberculosis, and caprine brucellosis – prominent legacy diseases for veterinarians and producers - were relatively minor factors in milk transmitted disease. Difficulty in recognition and longer incubation periods for these two diseases also served to diminish their influence as major milkborne epidemic disease. Likewise bovine brucellosis was a minor problem in the late-19th century and expanded in distribution in later decades when pasteurization was more widely practiced.

Pasteurization came to be accepted as the final safeguard in overall improved dairy hygiene, leading the Food and Drug Administration to enact the Standard Milk Ordinance in 1924 known today as the Grade A Pasteurized Milk Ordinance (PMO). Commercial dairies adopted this over time and AAMMC certified dairies declined during the pre-WW II era. Nevertheless a few dairies continued to produce ‘certified’ milk or offer it along with pasteurized products until as recently as 1999 when the last surviving AAMMC-certified dairy in California closed incidental to merger with a large national firm.

Currently raw milk is produced and marketed in intra-state commerce in one form or another in 42 of the 50 states. Now as sort of a maligned sector of the evolving ‘back to small organically operated farms’, a new more militant group of independent dairy operators are promoting sales of raw milk in contemporary America. Not surprisingly a different group of diseases - both zoonotic and environmentally sourced - has evolved or ‘emerged’ including salmonellosis, campylobacteriosis, listeriosis, and shiga toxin-producing E. coli. Summary evidence from recent outbreaks was being reviewed.

In the face of official investigations of raw milk episodes, the operators disavow or contest epidemiological evidence implicating raw milk products and continue to market raw milk as a health food with claims of almost panacea-like qualities. The contentious debate in the US on raw vs. pasteurized milk continues with militant forces and views on both sides, and has persisted for 125 years. Details of the personalities, events, and trends of raw vs. pasteurized milk will be discussed, as it remains an ever expanding challenge for contemporary agriculture and public health agencies to successfully address. As we look to the future, a ‘one health’ partnership to address raw milk is essential as the contentious drama between Straus and Coit in the first decade of the 20th century continues in the 21st century.
GOT MILK? INDIANA’S APPROACH TO RAW MILK

Bret Marsh
Indiana State Veterinarian

Summary: Dr. Bret Marsh, state veterinarian from Indiana presented the perspective from a state that requires pasteurization of milk for human consumption. Current legislation mandated a study of the issue of farmer selling unpasteurized milk to consumers. Indiana Board of Animal Health formed an Advisory Committee, took public comment and will present a report to the governor regarding its findings.

Arguments for and against pasteurization were identified. Advocates for pasteurization identify the elimination of dangerous disease causing organisms, on farm hygienic practices will not eliminate contamination, no reduction in milk’s nutritional value and support from many public health institutions. The CDC identified dairy association disease outbreaks as being from raw products 82% of the time. States allowing raw milk sales have more outbreaks than those who do not.

Unpasteurized milk proponents believe raw milk has beneficial properties that are changed or destroyed by pasteurization, consuming raw milk can “cure” some conditions, pasteurized milk causes of exacerbates certain conditions and pasteurization does not guarantee safety. They believe that advances in technology have solved the problems that brought on pasteurization and that consumers should be able to choose to drink raw milk even with the risks. Right now over 30 states allow raw milk to be sold in one form or another and 20 states prohibit raw milk sales.

States that do allow it have specific sanitary standards and require specific packaging and labeling. Other countries such as Canada ban sales to consumers and the European Union allows its member states to decide independently. Continued study in Indiana will conclude with a report taking in all these factors and making a recommendation to the Governor and Legislature.
ALLOWS THE SALE OF RAW MILK PRODUCT IN MAINE

Donald Hoenig
Former Maine State Veterinarian

Summary: Dr. Don Hoenig, outgoing Maine state veterinarian, discussed the status of the dairy industry in Maine which has liberally allowed the sale of raw milk and its products. Maine has increased its numbers of farms in the last agricultural census as many young people are getting into farming. Their dairy industry includes 305 commercial dairies, most with 60 to 200 milkers. The last 15 years has seen tremendous growth in small dairies with raw milk and goat growing at the fastest rate.

Milk is one of the most highly regulated food products. Maine follows the Pasteurized Milk Ordinance and provides inspection and testing at the farm, processor and laboratory level. Many dairies have quality standards that exceed FDA standards. All farms must be registered with the Maine Department of Agriculture and they also conduct education and outreach meetings. Producer meeting are offered three times a year along with public education which can be difficult. The food sovereignty movement presents an ongoing challenge for departments as this can increase expenditures at the state level.

Maine requires raw milk farmers to be registered and label their product as “not pasteurized”. They are inspected quarterly and their milk is tested at the same level as pasteurized product. They need to meet the same cell count and antibiotic testing standards. No further tests are run unless the standard tests are out of compliance. Some states do conduct additional pathogen testing on raw milk.

Hoenig identified the many organisms that can be present in raw milk and noted that no milk is safe unless it is handled properly. Outbreaks attributed to raw milk were again cited and the most likely victims of these outbreaks include children, the elderly, and the immuno-compromised. He noted again the benefits cited by raw milk advocates and the passion with which they want to market their product. The demand continues to increase in the state of Maine and across the country.
II. F. OTHER REPORTS

THE PUBLIC HEALTH IMPACT OF RAW MILK

Stacey Bosch
Centers for Disease Control and Prevention

Summary: Dr. Stacey Bosch provided an overview of illnesses and outbreaks caused by consuming unpasteurized dairy products in the US during 1993-2006. This 2012 study was noted by all the previous presenters. The CDC worked to determine through a retrospective study whether state regulations restricting the availability of unpasteurized products reduced the incidence of foodborne disease outbreaks linked to dairy products. A previous study of 1973 to 1992 showed that a vast majority (87%) of raw milk associated outbreaks occurred in states that permitted unpasteurized product.

During 1993-2006, there were a total of 121 dairy product associated outbreaks causing 4,413 cases, 239 hospitalizations and 3 deaths. The current study showed that 60% of dairy product associated outbreaks of illness involved unpasteurized dairy products. Of that number, 55 outbreaks and 1,112 cases occurred in states where the sale of unpasteurized dairy products is permitted. More of the hospitalizations (13% vs 1%) and two or three deaths were also associated with unpasteurized product.

CDC has concluded that unpasteurized dairy product continues to cause illness and outbreaks. Outbreaks are likely underreported and that unpasteurized product is less than 1% of dairy consumed yet causes 60% of the outbreaks. Given the number of outbreaks caused by unpasteurized dairy products, the risk is 150 times greater per unit consumed.

The two major recommendations were that states should consider further restricting the distribution of unpasteurized dairy products along with educating consumers about the health risks of consuming unpasteurized products. Consumers are best educated through a coalition of local, state and federal public health agencies along with consumer and advocacy group. Bosch acknowledges all the contributors to the study and Dr. Adam Langer for his slide presentation.
Mr. Jim Howie, director of dairy development for the Southern Marketing Agency, presented the dairy industry viewpoint. His presentation “Pasteurized Milk - Healthy, Nutritious and Safe - “It's for YOU!” documented the beneficial and pathogenic bacteria in milk. He noted that farmers, processors and regulatory officials working together developed procedures at all levels to make US milk and dairy products the safest in the world.

Howie enumerated the beneficial effects of pasteurization and cited scientific evidence that there was no significant difference in the nutritional value of pasteurized vs. non pasteurized milk. He also cited the recent CDC study identifying a majority of dairy product outbreaks and illnesses associated with unpasteurized dairy products.

Then he addresses the myths that have been proclaimed by raw milk advocates such as pasteurized makes milk less nutritional, causing allergic reactions or causing lactose intolerance, none of which are true or can be proven. Howie dispels a number of myths regarding the “healing” qualities of raw milk such as having antimicrobial properties or “curing” illnesses. No scientific evidence has ever shown any of these myths to be true.

In his presentation Howie noted that the FDA recommended taking precautions to avoid food-borne illness from raw milk or other unpasteurized dairy products. There is increased risk of these illnesses in the young, the elderly, pregnant women or those with compromised immune function noting that they should avoid raw milk. Children are involved in two thirds of the outbreaks associated with unpasteurized milk.

Why is the industry opposed to unpasteurized milk and its products? They are concerned about the health of the consumer including all the at risk groups. They believe the risk is too great and the economic impact to the dairy industry and all related businesses could be substantial. Howie cited how 60% of consumers will change their behavior in the face of a food borne outbreak, but they are not very good at following safety advice. They will stop eating all peanut butter or melons instead of a specific brand or type. These consumers will change their buying habits for an average of six months which could have a devastating effect on the dairy industry.

A question and answer period followed the presentations in which all speakers were eligible for questions. The audience participated in discussion regarding both sides of the issue and several state representatives commented on their individual efforts and situation related to both pasteurized and unpasteurized milk. After the discussion had ended, Dr. Norman concluded the symposium by thanking all the speakers and noting the conversation on the subject of raw milk would be on going as consumers, states and federal official consider all the options.
III. Organizational Matters

A. Bylaws of USAHA
B. USAHA Administrative Policies
C. Previous Meetings
D. USAHA Medal of Distinction Award
III. A. BYLAWS OF THE UNITED STATES ANIMAL HEALTH ASSOCIATION
APPROVED 2007

ARTICLE I – NAME

The name of this Association shall be “The United States Animal Health Association.”

ARTICLE II – PURPOSE

The United States Animal Health Association is a forum for communication and coordination among State and Federal governments, universities, industry, and other concerned groups for consideration of issues of animal health and disease control, animal welfare, food safety and public health. It is a clearinghouse for new information and methods, which may be incorporated into laws, regulations, policy, and programs. It develops solutions of animal health-related issues based on science, new information and methods, public policy, risk/benefit analysis and the ability to develop a consensus for changing laws, regulations, policies, and programs.

ARTICLE III – MEMBERS

3.1. Classes of Members. The classes of members are: Official Agency Members; Allied Organization Members; Individual Members; Student Members; Elected Regional Delegate Members; International Members; Life Members; and, Honorary Members.

a. Official Agency Member. The animal health department or agency of each state, U. S. territory or commonwealth, and the District of Columbia; the animal health department of the United States of America; and such other governmental departments or agencies as the Board of Directors may, by a two-thirds majority vote, approve.

b. Allied Organization Member. Any non-profit organization that is national in scope and actively and directly concerned with and supportive of the interests and objectives of the Association as outlined in Article II-Purpose, may become a member upon approval of the Board of Directors by a two-thirds majority vote.
c. Individual Member. Any person engaged in work related to animal production, animal health, food safety, public health, veterinary medicine and animal research and who supports the interests and objectives of the Association as outlined in Article II-Purpose, may become a member upon approval of the Executive Committee by a majority vote.

d. Elected Regional Delegate Member. Such elected regional delegates as provided for in Article VI-Board of Directors shall by virtue of such election automatically become members of the Association and shall serve from the close of the annual meeting following their election to the close of the following annual meeting and shall pay dues as the Board of Directors may determine.

e. Student Member. Any person enrolled in the study of animal production, animal health, food safety, public health, veterinary medicine, and animal health research who supports the interests and objectives of the Association as outlined in Article II-Purpose is eligible to become a member of the Association. Student members may take part in the open proceedings and meetings of the Association but shall not hold voting privileges as provided in 3.2.

f. International Member. The chief official agency member from any foreign federal animal health, food safety, public health and animal health research agency or department, and any foreign national animal industry organization or person who supports the interests and objectives of the Association as outlined in Article II-Purpose, or said person’s designee, is eligible to become a member of the Association upon approval of the Board of Directors by a two-thirds majority. International Members may take part in the open proceedings and meetings of the Association but shall not hold voting privileges as provided in 3.2. However, the Association recognizes that Australia, Canada, Mexico and New Zealand are voting members and shall continue to remain full voting members after the adoption of these bylaws. New International Members shall obtain voting rights only by amendment of the bylaws.

g. Life Member. Any individual member who has maintained membership in the Association for 35 years, or if such member is
III. A. USAHA BYLAWS

at the point of retirement, for 25 years, is eligible to be a life member. Past Presidents of the Association are deemed to be life members. Life members shall have all the privileges of regular membership and shall be exempted from payment of all dues. Election to Life Membership of individual members shall be by a majority vote of the Board of Directors. Life Members shall be exempt from the payment of one-half of annual meeting registration fees; provided that retired past presidents who receive no remuneration for expenses incurred while in attendance are fully exempt from the payment of annual meeting registration fees.

h. Honorary Member. Any person not otherwise a member of the Association who has contributed materially to the advancement of animal science, food safety, public health, veterinary medicine, animal research, or the purposes of the Association, may be nominated by the Executive Committee for Honorary Membership. Honorary Membership shall be conferred by a majority vote of the Board of Directors. Honorary Members shall be exempt from the payment of all dues and shall not have voting privileges as provided in 3.2.

3.2. Voting. Each member shall have one vote, unless otherwise provided in these By-Laws.

a. By State and Federal Official Agency Members and Allied Organization Members. The director or chief executive officer of each Official Agency Member and Allied Organization Member shall appoint and certify in writing to the Executive Director of the Association a person to be its representative who shall represent, vote, and act for each of these classifications of member in all the affairs of the USAHA, until further notification.

3.3. Dues. The Board of Directors at any annual meeting shall have the power to determine the amount of dues.

a. Non-payment of Dues. Subject to any policy the Board of Directors may establish for reinstatement, failure to pay dues within 90 days of notice of delinquency shall result in automatic termination of membership.
III. A. USAHA BYLAWS

b. Voluntary Withdrawal of Membership. A member may voluntarily terminate membership effective upon submission of notice of withdrawal to the Association but shall not be entitled to a refund of any dues paid.

3.4. Effective Date of Membership. Membership shall become effective upon submission of written application in the form required, satisfaction of eligibility requirements, election to membership by an appropriate vote of the Executive Committee, and payment of annual dues.

3.5. Suspension or Expulsion. For cause, and upon reasonable notice setting forth the specific reasons therefore any member may be suspended or terminated. Sufficient cause for such suspension or termination of membership shall be violation of these bylaws or any lawful rule or practice duly adopted by this Association, or any other conduct prejudicial to its interests. Suspension or expulsion shall be by two-thirds vote of the entire membership of the Board of Directors.

ARTICLE IV – MEETINGS

4.1. Annual. There shall be an annual meeting between September 15 and November 15 for receiving annual reports and the transaction of other business.

a. Notice Requirements. Written notice setting forth the Agenda and location of the annual meeting shall be mailed or transmitted electronically to all members at least 60 days prior to the first day of such meeting.

b. Annual Meeting Location. The location of the annual meeting shall be selected by the Regional Districts on the following rotational basis: North Central, Northeast, Western, and Southern; and with the concurrence of the state animal health official of the state in which the meeting is to be held. The location and site shall be finally selected in accordance with guidelines proposed by the Executive Director and approved by the Executive Committee. The Board of Directors shall be advised of the selected meeting location at least five years in advance of the meeting. In the event that any annual meeting location becomes unavailable and/or
III. A. USAHA BYLAWS

unacceptable the Executive Committee is authorized to select an alternate location.

c. Closure. The annual meeting shall be considered officially closed upon the completion of the Board of Directors’ meeting held on the last day of the annual meeting.

4.2. Special. Special meetings may be called by the President, in consultation with the Executive Committee, or by a majority of the Board of Directors. Notice of any special meeting shall be mailed, published in the Association newsletter and/or transmitted electronically to the membership with a statement of time and place and information as to the subject(s) to be considered at least 30 days prior to the date of the meeting. Emergency situations shall be dealt with by the Executive Director with the approval of the Executive Committee who shall provide as much notice to the Board of Directors as may be practical under the circumstances.

4.3. Committee and General Membership Meetings. Unless otherwise specifically set forth in these bylaws, all committee and general membership actions require a majority vote provided a quorum of the voting membership is present.

4.4 Quorum. A quorum of the Executive Committee shall consist of two-thirds of its membership. A quorum of the Board of Directors shall consist of thirty (30) or more members, providing that a majority of those in attendance is comprised of Official Agency Members. A quorum of all other committees shall be ten (10) voting members or thirty percent (30%) of the committee membership, whichever is less. A quorum of the general membership shall consist of thirty (30) or more members.

4.5 Proxy Voting. Proxy voting (the power of attorney given by one person to another to vote in his or her stead) is not permitted in any meeting.

ARTICLE V – OFFICERS AND EMPLOYEES

5.1. Elected Officers. The elected officers of the Association shall be a President, President-Elect, First Vice-President, Second Vice-
III. A. USAHA BYLAWS

President, Third Vice-President, and Treasurer. They shall be voting members in good standing of the Association.

a. President. The President is the chief officer of the Association and shall preside at the annual meeting and all meetings of the Executive Committee and perform such other duties as customarily belong to that office or which the Board of Directors or Executive Committee from time to time may assign. The president is an ex-officio member of all Committees and may designate an appropriately qualified member as his designee to attend any committee meetings of the Association in his place and stead.

b. President-Elect. The President-Elect shall act in place of the President in the event of his/her absence, death, or inability to act. When so acting the President-Elect shall have all the powers of and be subject to all restrictions upon the President. Specifically he/she shall be the chairman of all meetings of the Board of Directors. He/she shall perform such other duties as the President, Board of Directors or Executive Committee from time to time may assign. The President-Elect shall automatically become President upon election at the close of the annual meeting.

c. First Vice-President. The First Vice-President shall act in place of the President Elect in the event of his/her absence, death or inability to act; and shall perform such other duties as the President, Board of Directors or Executive Committee may assign.

d. Second Vice-President. The Second Vice-President shall act in place of the First Vice-President in the event of his/her absence, death or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.

e. Third Vice-President. The Third Vice-President shall take the place of the Second Vice-President in the event of his/her absence, death, or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.

f. Treasurer. The Treasurer shall be the chief financial officer of the Association, shall be chairman of the Audit Committee and
perform those duties that are delegated to the office by the Board of Directors and the Executive Committee. The treasurer shall not be responsible for the day-to-day financial transactions of the Association, which will be assumed by the Executive Director.

g. Election.

1) The Committee on Nominations and Resolutions shall annually report its recommendations for the offices of President, President-Elect, First Vice-President, Second Vice-President, Third Vice-President, Treasurer and Regional Delegates to the Association membership at the first business session.

2) The District from which the President originated shall submit a nominee for the office of Third Vice President.

3) Should vacancy(ies) occur before the next annual meeting, the District(s) from which the officer(s) vacated shall submit a nominee for the office of Second Vice President (if two vacancies occur a First Vice President will also need to be nominated).

4) Nominees for Regional Delegates from the Districts shall be selected by the individual districts and supplied in a timely fashion to the Committee on Nominations and Resolutions for inclusion in its report.

5) The Committee on Nominations report will be presented during the first business session. The committee report shall be posted on the registration bulletin board immediately following its presentation at the first business session. The report shall be read again during the second business session at a time certain specified in the program for “Report of Action of the Committee on Nominations and Resolutions.” If a paper is being presented at the specified time, the presentation will be completed and, immediately after, the report shall be read. If the program is ahead of schedule, a recess will be taken until the time specified in the program for the amendments to the slate presented by the Committee.
III. A. USAHA BYLAWS

6) The report or amendments approved by a majority vote of the membership is forwarded to the Board of Directors. The acceptance of the report by a majority vote of the Board of Directors shall constitute election of the nominees to office.

h. Term. The officers shall serve for one year or until their successors are elected and qualify.

5.2. Executive Director. The Executive Director shall be employed by and serve at the pleasure of the Executive Committee, manage the Association’s day-to-day affairs and perform such other duties as customarily belong to that office or as the Board of Directors or Executive Committee may assign. The Executive Committee shall prepare and negotiate a contract with the Executive Director for a period of not more than five (5) years which shall be subject to approval by a majority of the Board of Directors. If the Association does not have an Executive Director, the Board of Directors shall elect a Secretary.

ARTICLE VI – BOARD OF DIRECTORS

6.1. Board of Directors. The Board of Directors shall have authority over all matters of the Association within the limits of the bylaws.

6.2 Composition. The Board of Directors shall be composed of the following:
   a. The Official Agency Members or their designees
   b. One representative selected by each of the Allied Organization Members
   c. Two delegates-at-large from each of the four regional districts
   d. Past presidents of the Association
   e. The International Member who is the chief animal health executive officer representing the principal federal animal health department of Canada, Mexico, Australia and New Zealand, or said person’s designee.
   f. Members of the Executive Committee
III. A. USAHA BYLAWS

6.3. Meetings. The Board of Directors shall have a regular meeting at the time and place of the annual meeting, and shall meet at such other times and places selected by the President or by request of a majority of the directors, in which latter event, the President shall promptly set the time and place of the meeting. Notice of all meetings of the Board of Directors shall be mailed, published in the Association newsletter or transmitted electronically at least thirty days in advance of such meetings. The President, on such reasonable notice as may be practicable under the circumstances, may call emergency meetings of the Board of Directors. At any meeting of the Board of Directors, the President Elect (Chairman of the Board of Directors), with a majority vote of the Board of Directors, may call for an Executive Session limiting attendance.

6.4. Duties. The Board of Directors shall: receive all committee reports and accept or reject all or part of them; review and approve or disapprove with comment the actions of the Executive Committee; and perform such other functions set forth in the By-Laws of the Association.

ARTICLE VII – EXECUTIVE COMMITTEE

7.1. Executive Committee. The Association shall have an Executive Committee composed of the elected officers and the immediate Past President of the Association. In addition the Executive Director shall serve as an ex officio, non-voting member of the Executive Committee and shall not be counted for the purpose of determining a quorum.

7.2. Duties. The Executive Committee shall manage the financial, administrative and internal affairs of the Association when the Board of Directors is not in session. To exercise the authority of the Board of Directors, the Executive Committee must act as a whole, and must forthwith submit its action for approval at the next meeting of the Board of Directors.

7.3. Meetings. The Executive Committee shall meet at least four times each fiscal year at such time and place and upon such notice as the President determines. The Executive Committee is authorized to take action upon the concurring votes of a majority of its total membership, provided that a quorum is present.
7.4. Emergency Meetings. Should the President determine that an emergency situation exists, the President may convene a telephone or other type of electronic conference meeting of the Executive Committee, which may then act provided a quorum participates.

ARTICLE VIII – ORGANIZATIONAL DISTRICTS

8.1. Districts. The Association shall be organized into five districts composed of the Northeast Regional District, the North Central Regional District, the Southern Regional District, the Western Regional District and the District-At-Large.


b. The North Central Regional District consists of Association members of the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

c. The Southern Regional District consists of Association members of the states of Alabama, Arkansas, Georgia, Florida, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; and the Virgin Islands and Puerto Rico.

d. The Western Regional District consists of Association members of the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

e. The District-At-Large shall be composed of the Allied Organization Members and the Elected Regional Delegate Members and Past Presidents.
 ARTICLE IX – STANDING AND SPECIAL COMMITTEES

9.1. General. The President shall annually appoint from the members of the Association such standing or special committees or subcommittees and their chairpersons as may be required by the bylaws or as he/she may find necessary. Each committee shall meet at least once per year at the time of the annual meetings of the Association, and at such other times as the President of the Association and committee Chairman deem necessary to accomplish the work of the Committee. Only members of the Association permitted by these by-laws are permitted to vote on the work of the committee.

9.2. Program Committee. A program committee shall be appointed by the President and shall consist of the chairpersons of all committees and the elected officers of the Association to develop the programs for the annual and any special meetings of the Association with the goal of furthering the purposes of the Association. The Program Committee shall be chaired by the President-Elect and co-chaired by the First Vice-President.

9.3. Committee on Nominations and Resolutions. The Committee on Nominations and Resolutions shall be comprised of the living past presidents of the Association, the Presidents of the Northeast, North Central, Southern and Western Regional Districts, and the President of the District-At-Large.

a. Chairman. The immediate past President of the Association shall chair this committee.

b. Nomination of Elected Officers. This Committee shall receive, consider and recommend to the Association’s membership at the annual meeting nominations for the elected officers specified in 5.1 and delegates from each district as specified in 6.2.c. The recommendation of elected officers and delegates from each district shall be submitted no later than the third day of September next preceding the annual meeting at which the election will be held.

c. Resolutions. This committee shall review all resolutions of the standing and special committees (the Executive Committee
and Board of Directors are standing Committees) for ambiguities and redundancy, but shall not alter their intent. After this review, this committee shall present the resolutions to the general membership for approval, which shall require a majority vote.

9.4. Audit Committee. The Audit Committee shall receive the annual audit report, and confirm that all financial affairs of the Association are in order and make such recommendations to the Board of Directors as may be necessary to ensure the proper management of the finances of the Association.

9.5. Special Committees. The President with the advice of the Executive Committee shall appoint the chairman and members of such other committees as are necessary to accomplish the purposes of the Association.

ARTICLE X – MISCELLANEOUS

10.1. Amendments.

a. These bylaws may be amended by: (1) Specific proposed amendment(s) being presented in writing to the Executive Committee for review. The Executive Committee shall then provide their recommendations on the proposed amendments to the Board of Directors for deliberation and action; (2) If preliminarily approved by majority vote of the Board of Directors, the proposed amendment(s) shall then be presented to the membership; by publication in the next annual meeting proceedings; (3) The proposed amendment(s) shall then be presented to the membership at the next annual meeting.

b. Amendments to bylaws shall be presented section-by-section at a meeting of the members and shall be approved only upon an affirmative vote of two-thirds of the voting members, provided a quorum is present.

c. In the event the amendment(s) proposed are not approved by the Board of Directors as set forth in (1), then the proposed amendment(s) may be presented by a petition signed by at least thirty members which shall result in their proceeding
III. A. USAHA BYLAWS

through steps (2) and (3) above as if the Board of Directors had initially approved the proposed amendment(s).

10.2. Fiscal Year. The Executive Committee shall from time to time establish the Association’s fiscal year.

10.3. Parliamentary Procedure. Robert’s Rules of Order Newly Revised shall govern the proceedings of the Association, the Board of Directors and all committees in all cases not otherwise provided for in applicable federal or state statute or rule, the articles of incorporation or bylaws of the Association or its policies or procedures.

10.4. Confidential Information. Confidential information of the Association shall be maintained in confidence and not used for any other than Association purposes nor disclosed to others, except as permitted by law, these bylaws or written consent of the Association, by Association members, directors, officers, employees and agents.

10.5. Liability of Officers and Directors. The officers and directors of the Association shall not be personally liable for the debts or actions of the Association.

10.6. Annual Audit. The Association shall cause an independent certified public accountant, selected by the Executive Committee, to make an annual examination of its financial accounts and shall submit the report of examination to Audit Committee.

10.7. Compensation/Reimbursement. No member of the Board of Directors, committee member or elected officer of the Association shall receive any compensation for his or her services as such. The Association shall develop policies providing for reimbursement of expenses reasonably incurred in attending meetings and performing special assignments of the Association by the elected officers.

10.8. Dissolution. In the event of dissolution, the Association shall distribute its assets as required by the laws and statutes of the State of Delaware; and distribute its remaining net assets in a manner permitted an entity to maintain its status as exempt from taxation under Section 501 (c) (5) of the Internal Revenue Code of 1986, as amended, or any successor provision.
II. B. USAHA ADMINISTRATIVE POLICIES

ESTABLISHMENT AND OPERATION OF STANDING COMMITTEES

2012

1. All members of standing committees must be official members of USAHA in good standing in accordance with Section 3.4 of the bylaws.

2. The Chair, Vice Chair, and all members of USAHA Committees shall be appointed by the President. It is expected that member appointments will be made in consultation with Committee Chair.

3. Efforts should be made to keep committee size to a manageable number of members, and to maintain a geographical balance, as well as an appropriate balance of State, federal, industry and technical members.

4. Committee Chairs shall be appointed for term of not more than five years, and should not be reappointed Chair for at least one year.

5. All USAHA members present at committee meetings may enter into discussions. Only committee members may introduce resolutions or vote on items of business.

6. Committees shall submit reports only to the Board of Directors and Resolutions only to the Committee on Nominations and Resolution. Committee reports are not considered official actions until approved by the Board of Directors. Committee resolutions are not considered official actions of USAHA until approved by the general membership.

7. Committee Chairs may appoint subcommittees as necessary. Subcommittee members must be members of the parent committee. Subcommittees shall deliberate only the subject matter(s) delegated to them by the parent committee and shall report only to the parent committee.

8. Committee rosters for the current year should be finalized no later than 30 days prior to the start of the Annual Meeting.

PARTICIPATION IN USAHA OF FEDERAL AGENCIES AND FEDERAL EMPLOYEES

2009

Federal agencies and personnel have long been an integral and valuable part of USAHA. Agencies have taken part in the organization through official membership and representation on the
Board of Directors. This provides the opportunity for presenting agency positions and concerns to the Association. Individual membership and participation of numerous animal health, food safety, and research professionals from a variety of federal agencies is critical to the committees’ success.

A major function of USAHA is development of policies and procedures of national disease control and eradication programs. This means that many committee findings and resolutions constitute recommendations to the appropriate federal agency which is responsible for the area of concern. Some of these recommendations are contrary to agency policy or position. For this reason, federal employees should actively share their expertise and opinions as committee members, but should not serve as chairs where they would be making recommendations to their employer.

A number of committees have used federal employees as assistant chairs to good advantage. Also, committees which do not deal with federal agency policy may be chaired by federally-employed USAHA members where appropriate.

The Executive Committee is responsible for the daily activities of the Association, and represents the Association on a year-round basis. To avoid conflict of interest, federal employees should not serve in elected officer positions of the Association. Individuals that serve as an officer that become employed by the federal government should resign their officer position, and a replacement should be sought in accordance with the bylaws.

FINANCIAL AND INVESTMENT POLICY
2008

The following policy outlines the administrative principles of the United States Animal Health Association reserve funds.

Goals
1. Build and maintain two year’s operation expenses in reserves.
2. Maintain adequate liquidity in the instance funds must be called for use.
3. Earn reasonable interest on reserves to maintain principle and exceed economic inflation rates.

Delegation of Authority
Both Treasurer and Executive Director should be designated as signors on any USAHA accounts. At this time, USAHA will not employ a
third-party account manager to manage investments. However, USAHA may utilize the services of a brokerage manager for locating investment opportunities and advice.

Responsibilities

- **Treasurer**: Primary authority for investment decisions, acting within parameters of investment policy. Responsible for monthly review of financials and chairing audit committee.

- **Executive Director**: Manager of investments, to act under direction of Treasurer. Provide research, recommendations to Treasurer for decisions. Responsibility for day-to-day bookkeeping and reporting (to Treasurer/Executive Committee) of financial information. Compile and distribute quarterly investment reports to EC.

- **Executive Committee**: Provide regular review of investments from quarterly reports. Provide oversight of Treasurer and Executive Director decisions.

- **Board of Directors**: Provide approval and/or amendments to investment policy for execution.

**Asset Management**

USAHA shall put at risk no principle of its reserve funds or operating funds. Investments will be held in secured, FDIC insured institutions. Investments should be less than $100,000 in any single financial institution whenever possible.

All cash received will be deposited into the checking account. To the extent possible, the checking account balance should not exceed $100,000 at the end of each monthly reporting period.

Reserve funds shall be invested in Certificates of Deposit, Money Market, Treasury Bills or Treasury Notes as determined by the Treasurer. The following guidelines will assist in determining terms to allow reasonable liquidity should the reserves be needed.

- Maximum of 25% of Reserve Funds in products of greater than 4 years.
- Maximum of 25% of Reserve Funds in products of 24 months to 4 years.
- Minimum of 40% of Reserve Fund in products less than 24 months.
- Minimum of 10% of Reserve funds in money market savings account for immediate liquidity.

USAHA shall make efforts to ladder CD maturity dates so that at least $50,000 comes due in each fiscal quarter.
III. B. USAHA ADMINISTRATIVE POLICIES

This policy will be reviewed annually by the Executive Committee, with any amendments to be brought before the Board of Directors.

**Reserve Fund Balance (2010)**

USAHA targets a financial reserves balance equal to two years of operating expenses. The Treasurer and Executive Director are responsible for monitoring this status, and reporting accordingly to the Executive Committee.

Should the reserve balance drop below the target amount, the following criteria should take place:

**85-99% of Target Balance**

The Executive Committee shall make appropriate budget adjustments to increase funds to target amount within one year, or an appropriate timeframe according to current economic conditions.

**50% - 84% of Target Balance**

The Executive Committee shall make appropriate financial cuts and budget adjustments to increase funds to target amount within three years, or a more appropriate timeframe according to current economic conditions.

**Less than 50%**

The Executive Committee shall undertake a major financial overhaul of the organization and develop a plan to: 1) operate in a sustainable manner and 2) rebuild the reserve funds to the target area. Adjustments should be made immediately upon Executive Committee approval of the new plan, with modifications subject to Board of Directors at the next annual meeting.

Should the above mitigations prove unsuccessful, the Executive Committee should evaluate all options for the organization to reduce expenses to a sustainable manner. This can include merging management with other organizations, merging the organization collectively with another, or ceasing operations altogether, in which case the organization will be dissolved according to the bylaws and applicable laws.

**YEAR-ROUND ACTIVITIES**

**2008**

USAHA is a year-round organization, and is often asked to comment on specific issues related to its mission. USAHA should first refer to its resolutions to address a given issue.

USAHA staff will act upon all resolutions as directed by the membership and Board of Directors, involving necessary
correspondence. For issues that arise, that pertain to resolutions, can have direct action taken as deemed necessary. No additional voting is necessary, though the input of the executive committee is encouraged.

Should an issue be presented that no resolution has been approved, the Executive Director/Secretary will coordinate with President and First Vice President (Chair of Government Relations) to determine if USAHA should address the specific issue, with consensus from the Executive Committee.

SPECIAL FUNDS POLICY
2009

USAHA will manage special funds for Committees and closely related organizations to house finances and bookkeeping services. Special funds will be held separate of the general USAHA fund, and USAHA will record transactions accordingly. USAHA will enter into a written agreement for each account with the primary representative of the group or Committee and a designated treasurer for that account. The designated account treasurer holds authority for all transactions. Special fund oversight is held by the USAHA Treasurer with support of the Secretary/Executive Director.

JOB POSTINGS FOR NEWS ALERTS AND WEB SITE
2010

USAHA has available opportunities for distributing position announcements through its daily News Alert Summaries, currently on a weekly basis. The following policy sets forth guidelines for use of this service.

USAHA Job Postings are available to any member of the association at no fee. The association will post positions to its web site in addition to the distribution among members.

Non-member groups may also submit positions, however, are subject to review and approval for distribution. The following criteria will be considered:

1) Animal health or animal agriculture related
2) Fields of veterinary medicine, research, diagnostics, regulatory, technical services, non-profit, and/or other related supporting disciplines
3) Align with the mission of USAHA

USAHA reserves the right to refuse posting of any position.
III. B. USAHA ADMINISTRATIVE POLICIES

OFFICIAL AGENCY, ALLIED ORGANIZATION MEMBER SUBSTITUTIONS

2011

Official Agency and Allied Organization Members have a designated representative to serve on the board of directors and receive the member benefits for that organization. Occasionally, the designated representative is unable to attend all or some of the annual meeting. In these instances, the representative can designate a substitution to fulfill their obligations on behalf of their agency/organization. This includes:

- Board of Directors Meetings
- Membership Meetings
- Committee Meetings (of which the original representative is an appointed member)

While the USAHA Bylaws state that proxy voting is not allowed, the substitution is treated differently as a transfer of the representative duties.

STUDENT MEMBERSHIP POLICY

2012

Students must be a full-time student in an accredited college or university, in a field of study outlined in the bylaws, part 3.1, E in order to be eligible as a student member and to receive student meeting registration rates.

POLICIES REGARDING USAHA ANNUAL MEETING

ANNUAL MEETING SPEAKER REGISTRATION/COMPLIMENTARY REGISTRATION

Revised 2011

USAHA will not provide complimentary registration to any member or regular attendee of USAHA annual meetings that is speaking on a committee agenda.

USAHA will provide a complimentary registration to non-member, invited speakers by request for committees for the purpose of presenting to a committee or general session. Requests must be submitted to the USAHA office.

USAHA will consider providing for travel expenses for general session and committee speakers on a limited basis. Requests must
be submitted to the Executive Committee in advance, with consideration being given to a proposed speaker's expertise, timeliness of subject matter, likelihood of attending the meeting otherwise, and budgetary capabilities.

VIDEO & AUDIO RECORDING OF COMMITTEE PROCEEDINGS 2008
USAHA prohibits third-party video and audio recording of committee meetings at the Annual Meeting.

THIRD PARTY MEETINGS 2008
USAHA will permit related organizations, with missions consistent with those of USAHA, to partner in its Annual Meeting to provide a venue for their gatherings. Agreements are arranged on a case-by-case basis, with input from the Program Chair and approval by the Executive Committee. In general, these organizations are expected to cover related expenses to USAHA for their event. Attendees are also expected to pay registration fees for the Annual Meeting.

AAVLD PARTNERSHIP 2008
USAHA will maintain a Memorandum of Understanding with AAVLD regarding all issues surrounding the Annual Meeting execution. The MOU will serve as a basis for coordination between the two organizations, and be reviewed annually.

ANNUAL MEETING HOST STATE BENEFITS POLICY 2010
As the State hosting the Annual Meeting is often requested to provide support to the organization in terms of staff, supplies and time commitments, USAHA will provide reciprocal in-kind benefits to the hosting State to help offset those costs. USAHA will provide one complimentary registration for every three (3) paid registrations for host state employees. The state animal health official is responsible for communicating the complimentary registration designees to USAHA by the pre-registration deadline. Exceptions to this guideline are subject to review and approval by the Executive Committee.

DIRECTOR, OFFICER AND STAFF RELATED POLICIES
III. B. USAHA ADMINISTRATIVE POLICIES

REIMBURSEMENT AND EXPENSES
2008

In accordance with the Bylaws, Section 10.7, USAHA may provide reimbursement or stipend to its officers, board of directors or committee leadership for reasonable expenses incurred while performing specific assignments of the Association. Requests must be submitted to the Executive Committee for approval in advance of the assignment. The Executive Committee will remain judicious in granting requests and mindful of budgetary limitations when considering requests.

USAHA will reimburse staff for all reasonable expenses incurred while performing duties of the Association. Each individual will furnish full documentation of expenses for audit purposes, subject to review of the Treasurer.

Mileage will be reimbursed at the federal Internal Revenue Service rate.

CONFLICT OF INTEREST POLICY
2008

Due to increased scrutiny of non-profit organizations, by the IRS and requirements for increased transparency, USAHA should have in place a conflict of interest policy for its Board of Directors, Officers and Employees.

Policy:

Any member or employee involved in a business transaction of the United States Animal Health Association in which a conflict of interest may be present, shall notify the Executive Committee promptly. Said individual shall refrain from voting on such transactions, and exclude themselves from deliberations. The individual will refrain from any personal influence on the transaction. A transaction that involves a conflict of interest should be reviewed against relative competitive bids or proposals. Decisions to pursue a transaction with a potential conflict of interest should first uphold the best interests of USAHA, and include terms that are reasonable to USAHA within the given marketplace.

Approvals will be made by the Executive Committee. A written disclosure summarizing any possible conflict of interest shall be kept on file at the USAHA office. Discussion and resolution shall be indicated in the minutes of the USAHA Executive Committee session.

Conflict of interest should be disclosed if: a transaction of USAHA involves any close relative of a Director or Employee as the direct
vendor/provider, or the Director/Employee stands material gain through a transaction. A Director or Employee holds financial interest if holdings are of 5% or greater of the potential vendor, or holds position of influence with an organization that seeks to do business with USAHA.

A close relative is defined as any parent, spouse, sibling, child, grandchild, or spouse of the aforementioned. Also to be included would be any individual residing in the same household that would resemble a parental or marital relationship.

WHISTLEBLOWER POLICY
2008

Employees and members of USAHA should report illegal or unethical activities, directly relating to the business of USAHA, to the President. The President, in consultation with the Executive Committee, will then determine appropriate actions for investigation, reporting to proper authorities, and reconciliation as necessary.

Employees and members will be provided full confidentiality for reporting such activities, and the President and Executive Committee will ensure due diligence in protecting against retaliation by the organization, its members or other employees and supervisors.

DOCUMENT RETENTION AND DESTRUCTION POLICY
2008

USAHA will maintain all financial records for seven years. They will then be disposed of by either cross-shredding or incineration. Meeting registrations and membership renewals will be kept for three years.

USAHA PROFESSIONAL DEVELOPMENT SUPPORT
2011

USAHA sees the importance of continuing education for its employees. USAHA may support the opportunities sought by its employees to enhance his/her skill sets. The following is an outline of benefit for employees.

USAHA may provide support as follows:

General

Support for professional development must be pre-approved by the employee’s supervisor prior to commitment in order to receive
benefits. Any opportunity should be directly beneficial to current job functions or can be justified as direct future benefit to the Association.  

**Flexible Scheduling:**
USAHA may work with employee to accommodate scheduling of work hours to allow for professional development. This can include:
- University/College courses during normal work hours
- Conferences/seminars for professional development
- Other events with pre-approval of supervisor

Employees should strive to maintain a full work week (40 hours) by making up any lost time at hours mutually agreed upon by employee and supervisor.

**Academic Courses**
USAHA may support tuition for courses directly beneficial to the employee’s job duties, up to $1000 per fiscal year. Tuition will be reimbursed upon completion of the course by the employee, with a minimum of a C grade or relative “passing” status when grading is not applicable. Courses will be considered regardless of degree/non-degree track.

(*Reimbursements are a taxable benefit.)

**Conference/Seminar registration**
USAHA may support registration costs for conferences, seminars or other related courses (self-directed, web-based, etc.) Such programs should enhance the employee’s ability to do current job functions, or expand skill sets to take on additional duties. USAHA may support up to 3 conferences per year to a maximum of $1000, unless employee is taking academic courses.

**Travel**
Travel, lodging and meals are reimbursable at federal per diem rates for development opportunities outside of local meetings, such as the St. Joseph or Kansas City areas.
III. C. Previous Meetings of the United States Animal Health Association
<table>
<thead>
<tr>
<th>Meeting</th>
<th>Date</th>
<th>Place of Meeting</th>
<th>President</th>
<th>Secretary/Executive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sept. 27-28, 1897 †</td>
<td>Fort Worth, TX</td>
<td>*Mr. C.P. Johnston, Springfield, IL</td>
<td>*Mr. D. O. Lively, Forth Worth, TX</td>
</tr>
<tr>
<td>2</td>
<td>Oct. 11-12, 1898</td>
<td>Omaha, NE</td>
<td>*Mr. C.P. Johnston, Springfield, IL</td>
<td>*Mr. Taylor Riddie, KS</td>
</tr>
<tr>
<td>3</td>
<td>Oct. 11-12, 1899 ††</td>
<td>Chicago, IL</td>
<td>*Mr. C.P. Johnston, Springfield, IL</td>
<td>*Mr. Mortimer Levering, Lafayette, IN</td>
</tr>
<tr>
<td>4</td>
<td>Oct. 2-3, 1900</td>
<td>Louisville, KY</td>
<td>*Mr. C.P. Johnston, Springfield, IL</td>
<td>*Dr. E.T. Eisenman, Louisville, KY</td>
</tr>
<tr>
<td>5</td>
<td>Oct. 8-9, 1901</td>
<td>Buffalo, NY</td>
<td>*Dr. E.P. Niles, VA</td>
<td>*Dr. E.T. Eisenman, Louisville, KY</td>
</tr>
<tr>
<td>6</td>
<td>Sept. 23-24, 1902</td>
<td>Wichita, KS</td>
<td>*Mr. W.H. Dunn, TN</td>
<td>*Mr. Wm. P. Smith, Monticello, IL</td>
</tr>
<tr>
<td>7</td>
<td>Sept. 22-23, 1903</td>
<td>Denver, CO</td>
<td>*Mr. E. Bolton, Woodward, OK</td>
<td>*Mr. Wm. P. Smith, Monticello, IL</td>
</tr>
<tr>
<td>8</td>
<td>Aug. 23-24, 1904</td>
<td>St. Louis, MO</td>
<td>*Dr. J.C. Norton, AZ</td>
<td>*Mr. Wm. P. Smith, Monticello, IL</td>
</tr>
<tr>
<td>9</td>
<td>Aug. 15-16, 1905</td>
<td>Guthrie, OK</td>
<td>*Mr. Wm. P. Smith, Monticello, IL</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>10</td>
<td>Aug. 15-16, 1906</td>
<td>Springfield, IL</td>
<td>*Mr. M. M. Hankins, Quanah, TX</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>11</td>
<td>Sept. 16-17, 1907</td>
<td>Richmond, VA</td>
<td>*Dr. D. F. Luckey, Columbia, MD</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>12</td>
<td>Sept. 14-16, 1908</td>
<td>Washington, DC</td>
<td>*Dr. Charles G. Lamb, CO</td>
<td>*Dr. C. E. Cotton, St. Paul, MN</td>
</tr>
<tr>
<td>13</td>
<td>Sept. 13-15, 1909 ‡</td>
<td>Chicago, IL</td>
<td>*Dr. W. H. Dalrymple, Baton Rouge, LA</td>
<td>*Dr. C. E. Cotton, St. Paul, MN</td>
</tr>
<tr>
<td>14</td>
<td>Dec. 5-7, 1910</td>
<td>Chicago, IL</td>
<td>*Dr. C. E. Cotton, St. Paul, MN</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>15</td>
<td>Dec. 5-6, 1911</td>
<td>Chicago, IL</td>
<td>*Dr. John F. Devine, Goshen, NY</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>16</td>
<td>Dec. 3-5, 1912</td>
<td>Chicago, IL</td>
<td>*Dr. Macyck P. Ravener, Madison, IL</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>17</td>
<td>Dec. 2-4, 1913</td>
<td>Chicago, IL</td>
<td>*Dr. Peter F. Bahnsen, Atlanta, GA</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>18</td>
<td>Feb. 16-18, 1914</td>
<td>Chicago, IL</td>
<td>*Dr. S.H. Ward, St. Paul, MN</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>19</td>
<td>Dec. 2-3, 1915</td>
<td>Chicago, IL</td>
<td>*Dr. J. L. Gibson, Des Moines, IA</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>20</td>
<td>Dec. 5-7, 1916</td>
<td>Chicago, IL</td>
<td>*Dr. O. E. Dyson, Springfield, IL</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>21</td>
<td>Dec. 3-5, 1917</td>
<td>Chicago, IL</td>
<td>*Dr. J. G. Wills, Albany NY</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>22</td>
<td>Dec. 2-4, 1918</td>
<td>Chicago, IL</td>
<td>*Dr. M. Jacob, Knoxville, TX</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>23</td>
<td>Dec. 1-3, 1919</td>
<td>Chicago, IL</td>
<td>*Dr. G. W. Dumphy, Lansing, MI</td>
<td>*Dr. D. M. Cambpell, Chicago, IL</td>
</tr>
<tr>
<td>Meeting</td>
<td>Date</td>
<td>Place of Meeting</td>
<td>President</td>
<td>Secretary/Executive</td>
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<td>24</td>
<td>Nov. 29-Dec. 1, 1920</td>
<td>Chicago, IL</td>
<td>*Dr. S. F. Musselman, Frankfort, KY</td>
<td>*Dr. D. M. Cambpell, Chicago, IL</td>
</tr>
<tr>
<td>25</td>
<td>Dec. 28-30, 1921</td>
<td>Chicago, IL</td>
<td>*Dr. W. F. Crewe, Bismarck, MD</td>
<td>*Dr. Theo. Burnett, Columbus, OH</td>
</tr>
<tr>
<td>26</td>
<td>Dec. 6-8, 1922</td>
<td>Chicago, IL</td>
<td>*Dr. T. E. M. Munce, Harrisburg, PA</td>
<td>*Dr. Theo. Burnett, Columbus, OH</td>
</tr>
<tr>
<td>27</td>
<td>Dec. 5-7, 1923</td>
<td>Chicago, IL</td>
<td>*Dr. W. J. Butler, Henena, MT</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>28</td>
<td>Dec. 3-5, 1924</td>
<td>Chicago, IL</td>
<td>*Dr. J. G. Ferneyhough, Richmond, VA</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>29</td>
<td>Dec. 2-4, 1925</td>
<td>Chicago, IL</td>
<td>*Dr. J. H. McNeil, Trenton, NJ</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>30</td>
<td>Dec. 1-3, 1926</td>
<td>Chicago, IL</td>
<td>*Dr. John R. Mohler, Washington, DC</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>31</td>
<td>Nov. 30-Dec. 2, 1927</td>
<td>Chicago, IL</td>
<td>*Dr. L. Van Es, Lincoln, NE</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>32</td>
<td>Dec. 5-7, 1928</td>
<td>Chicago, IL</td>
<td>*Dr. A. C. Cary, Auburn, AL</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>33</td>
<td>Dec. 4-6, 1929</td>
<td>Chicago, IL</td>
<td>*Dr. Chas. O. Lamb, Denver, CO</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>34</td>
<td>Dec. 3-5, 1930</td>
<td>Chicago, IL</td>
<td>*Dr. A. E. Wright, Washington, DC</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>35</td>
<td>Dec. 2-4, 1931</td>
<td>Chicago, IL</td>
<td>*Dr. J. W. Connaway, Columbia, MD</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>36</td>
<td>Nov. 30-Dec. 2, 1932</td>
<td>Chicago, IL</td>
<td>*Dr. Peter Malcolm, Des Moines, IA</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>37</td>
<td>Dec. 6-8, 1933</td>
<td>Chicago, IL</td>
<td>*E. T. Faulder, Albany, NY</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>38</td>
<td>Dec. 5-7, 1934</td>
<td>Chicago, IL</td>
<td>*Dr. T. E. Robinson, Providence, RI</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>39</td>
<td>Dec. 4-6, 1935</td>
<td>Chicago, IL</td>
<td>*Dr. Edward Records, Reno, NV</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
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<td>40</td>
<td>Dec. 2-4, 1936</td>
<td>Chicago, IL</td>
<td>*Dr. Walter Wisnicky, Madison, WI</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
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<td>41</td>
<td>Dec. 1-3, 1937</td>
<td>Chicago, IL</td>
<td>*Dr. R. W. Smith, Concord, NH</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>42</td>
<td>Nov. 30-Dec. 2, 1938</td>
<td>Chicago, IL</td>
<td>*Dr. D. E. Westmoreland, Frankfort, KY</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
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<td>43</td>
<td>Dec. 6-8, 1939</td>
<td>Chicago, IL</td>
<td>*Dr. J. L. Axby, Indianapolis, IN</td>
<td>*Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>44</td>
<td>Dec. 4-6, 1940</td>
<td>Chicago, IL</td>
<td>*Dr. H. D. Port, Cheyenne, WY</td>
<td>*Dr. Mark Welsh, College Park MD</td>
</tr>
<tr>
<td>45</td>
<td>Dec. 3-5, 1941</td>
<td>Chicago, IL</td>
<td>*Dr. E. A. Crossman, Boston, MA</td>
<td>*Dr. Mark Welsh, College Park MD</td>
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<tr>
<td>46</td>
<td>Dec. 2-4, 1942</td>
<td>Chicago, IL</td>
<td>*Dr. I. S. McAdory, Auburn, AL</td>
<td>*Dr. Mark Welsh, College Park MD</td>
</tr>
<tr>
<td>47</td>
<td>Dec. 1-3, 1943</td>
<td>Chicago, IL</td>
<td>*Dr. W. H. Hendricks, Salt Lake City, UT</td>
<td>*Dr. R. A. Hendershot, Trenton, NJ</td>
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<td>Secretary/Executive</td>
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<td>48</td>
<td>Dec. 6-8, 1944</td>
<td>Chicago, IL</td>
<td>*Dr. J. M. Sutton, Atlanta, GA</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>49</td>
<td>Dec. 5-7, 1945</td>
<td>Chicago, IL</td>
<td>*Dr. C. U. Duckwork, Sacramento, CA</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>50</td>
<td>Dec. 4-6, 1946</td>
<td>Chicago, IL</td>
<td>*Dr. William Moore, Raleigh, NC</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>51</td>
<td>Dec. 3-5, 1947</td>
<td>Chicago, IL</td>
<td>*Dr. Will J. Miller, Topeka, KS</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>52</td>
<td>Oct. 13-15, 1948</td>
<td>Denver, CO</td>
<td>*Dr. Jean V. Knapp, Tallahassee, FL</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>53</td>
<td>Oct. 12-14, 1949</td>
<td>Columbus, OH</td>
<td>*Dr. T. O. Brandenburg, Bismarck, ND</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>54</td>
<td>Nov. 1-3, 1950</td>
<td>Phoenix, Az</td>
<td>*Dr. C. P. Bishop, Harrisburg, PA</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>55</td>
<td>Nov. 14-16, 1951</td>
<td>Kansas City, KS</td>
<td>*Mr. F. E. Mollin, Denver, CO</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>56</td>
<td>Oct. 29-31, 1952</td>
<td>Louisville, KY</td>
<td>*Dr. Ralph L. West, St. Paul, MN</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>57</td>
<td>Sept. 23-25, 1953</td>
<td>Atlantic City, NJ</td>
<td>*Dr. T. Childs, Ottawa, Canada</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>58</td>
<td>Nov. 10-12, 1954</td>
<td>Omaha, NE</td>
<td>*Dr. T. C. Green, Charleston, WV</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>59</td>
<td>Nov. 16-18, 1955</td>
<td>New Orleans, LA</td>
<td>*Dr. H. E. Wilkins, Helena, MT</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>60</td>
<td>Nov. 28-30, 1956</td>
<td>Chicago, IL</td>
<td>*Dr. A. L. Brueckner, Baltimore, MD</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<td>61</td>
<td>Nov. 13-15, 1957</td>
<td>St. Louis, MO</td>
<td>*Dr. G. H. Good, Cheyenne, WY</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>62</td>
<td>Nov. 4-6, 1958</td>
<td>Miami Beach, FL</td>
<td>*Dr. John G. Milligan, Montgomery, AL</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>63</td>
<td>Nov. 15-18, 1959</td>
<td>San Francisco, CA</td>
<td>*Mr. F. G. Buzzell, Augusta, ME</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>64</td>
<td>Oct. 17-21, 1960</td>
<td>Charleston, WV</td>
<td>*Dr. J. R. Hay, Chicago, IL</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>65</td>
<td>Oct. 30-Nov. 3, 1961</td>
<td>Minneapolis, MN</td>
<td>*Dr. A. P. Schneider, Boise, ID</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>66</td>
<td>Oct. 30-Nov. 2, 1962</td>
<td>Washington, DC</td>
<td>*Dr. W. L. Bendix, Richmond, VA</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<td>67</td>
<td>Oct. 15-18, 1963</td>
<td>Albuquerque, NM</td>
<td>*Dr. T. J. Grennan, Jr. Providence, RI</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<td>69</td>
<td>Oct. 25-29, 1965</td>
<td>Lansing, MI</td>
<td>*Dr. J. W. Safford, Helena, MT</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<td>70</td>
<td>Oct. 10-14, 1966</td>
<td>Buffalo, NY</td>
<td>Dr. C. L. Campbell, Tallahassee, FL</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<td>71</td>
<td>Oct. 16-20, 1967</td>
<td>Phoenix, AZ</td>
<td>*Dr. Grant S. Kaley, Albany, NY</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<td>Meeting</td>
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<td>Place of Meeting</td>
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<td>Secretary/Executive</td>
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<td>72</td>
<td>Oct. 6-11, 1968</td>
<td>New Orleans, LA</td>
<td>*Dr. John F. Quinn, Lansing, MI</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>73</td>
<td>Oct. 12-19, 1969</td>
<td>Milwaukee, WI</td>
<td>*Dr. John L. Oharra, Reno, NV</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>74</td>
<td>Oct. 18-23, 1970</td>
<td>Philadelphia, PA</td>
<td>*Dr. Frank B. Wheeler, Baton Rouge, LA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>75</td>
<td>Oct. 24-29, 1971</td>
<td>Oklahoma City, OK</td>
<td>*Dr. M.D. Mitchell, Pierre, SD</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>76</td>
<td>Nov. 5-10, 1972</td>
<td>Miami Beach, FL</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>77</td>
<td>Oct. 14-19, 1973</td>
<td>St. Louis, MO</td>
<td>*Dr. W. C. Tobin, Denver, CO</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>78</td>
<td>Oct. 13-18, 1974</td>
<td>Roanoke, VA</td>
<td>*Mr. O. H. Timm, Dixon, CA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>79</td>
<td>Nov. 2-7, 1975</td>
<td>Portland, OR</td>
<td>*Dr. J. E. Andrews, GA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>80</td>
<td>Nov. 7-12, 1976</td>
<td>Miami Beach, FL</td>
<td>*Dr. H. E. Goldstein, Columbus, OH</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>81</td>
<td>Oct. 16-21, 1977</td>
<td>Minneapolis, MN</td>
<td>*Dr. A. E. Janawicz, Montpelier, VT</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>82</td>
<td>Oct. 21-Nov. 3, 1978</td>
<td>Buffalo, NY</td>
<td>**Dr. L. E. Bartell, Sacramento, CA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>83</td>
<td>Oct. 28-Nov. 2, 1979</td>
<td>San Diego, CA</td>
<td>*Dr. T. F. Zweigart, Raleigh, NC</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>84</td>
<td>Nov. 2-7, 1980</td>
<td>Louisville, KY</td>
<td>*Mr. B. W. Hawkins, Ontario, OR</td>
<td>*Dr. J. C. Shook, Hyattsville, MD</td>
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<tr>
<td>85</td>
<td>Oct. 11-16, 1981</td>
<td>St. Louis, MO</td>
<td>*Dr. L. W. Hinchman, Indianapolis, IN</td>
<td>*Dr. J. C. Shook, Hyattsville, MD</td>
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<td>86</td>
<td>Nov. 7-12, 1982</td>
<td>Nashville, TN</td>
<td>Dr. G. B. Rea Salem, OR</td>
<td>*Dr. J. C. Shook, Hyattsville, MD</td>
</tr>
<tr>
<td>87</td>
<td>Oct. 15-21, 1983</td>
<td>Las Vegas, NV</td>
<td>Dr. J. R. Ragan, Nashville, TN</td>
<td>*Dr. J. C. Shook, Hyattsville, MD</td>
</tr>
<tr>
<td>88</td>
<td>Oct. 21-26, 1984</td>
<td>Fort Worth, TX</td>
<td>*Mr. J. O. Pearce, Jr. Okeechobee, FL</td>
<td>*Dr. J. C. Shook, Hyattsville, MD</td>
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<tr>
<td>89</td>
<td>Oct. 27-Nov. 1, 1985</td>
<td>Milwaukee, WI</td>
<td>*Dr. David U. Walker, Montpelier, VT</td>
<td>*Dr. J. C. Shook, Hyattsville, MD</td>
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<td>90</td>
<td>Oct. 14-19, 1986</td>
<td>Louisville, KY</td>
<td>*Dr. N. W. Kruse, Lincoln, NE</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>91</td>
<td>Oct. 25-30, 1987</td>
<td>Salt Lake City, UT</td>
<td>*Dr. J. F. Hudelson, Denver, Co</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>92</td>
<td>Oct. 16-21, 1988</td>
<td>Little Rock, AR</td>
<td>*Dr. J. A. Cobb, Atlanta, GA</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>93</td>
<td>Oct. 28-Nov. 3, 1989</td>
<td>Las Vegas, NV</td>
<td>Mr. P. E. Bradshaw, Griggsville, IL</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>94</td>
<td>Oct. 6-12, 1990</td>
<td>Denver, CO</td>
<td>Dr. M. A. Van Buskirk, Harrisburg, PA</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>95</td>
<td>Oct. 26-Nov. 1, 1991</td>
<td>San Diego, CA</td>
<td>*Dr. P. L. Smith, Sacramento, CA</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>Meeting</td>
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<td>Place of Meeting</td>
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<td>Secretary/Executive</td>
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<td>96</td>
<td>Oct. 31-Nov. 6, 1992</td>
<td>Louisville, KY</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>97</td>
<td>Oct. 23-29, 1993</td>
<td>Las Vegas, NV</td>
<td>Dr. T. J. Hagerty, St. Paul, MN</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>98</td>
<td>Oct. 29-Nov. 4, 1994</td>
<td>Grand Rapids, MI</td>
<td>Mr. J. B. Finley, Jr., Encinal, TX</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>99</td>
<td>Oct. 28-Nov. 3, 1995</td>
<td>Reno, NV</td>
<td>Dr. H. Wesley Towers, Dover, DE</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>100</td>
<td>Oct. 12-18, 1996</td>
<td>Little Rock, AR</td>
<td>Dr. M. R. Marshall, Salt Lake City, UT</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>101</td>
<td>Oct. 17-24, 1997</td>
<td>Louisville, KY</td>
<td>Dr. Larry L. Williams, Lincoln NE</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>102</td>
<td>Oct. 3-9, 1998</td>
<td>Minneapolis, MN</td>
<td>Dr. Jones W. Bryan, Columbia, SC</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>103</td>
<td>Oct. 7-14, 1999</td>
<td>San Diego, CA</td>
<td>Dr. Richard H. McCapes, Davis, CA</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>104</td>
<td>Oct. 19-26, 2000</td>
<td>Birmingham, AL</td>
<td>Dr. Ernest W. Zirkle, Trenton, NJ</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
</tr>
<tr>
<td>105</td>
<td>Nov. 1-8, 2001</td>
<td>Hershey, PA</td>
<td>Dr. Bob R. Hillman, Boise, ID</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
</tr>
<tr>
<td>106</td>
<td>Oct. 1-24, 2002</td>
<td>St. Louis, MO</td>
<td>Dr. Maxwell Lea, Jr., Baton Rouge, LA</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
</tr>
<tr>
<td>107</td>
<td>Oct. 9-16, 2003</td>
<td>San Diego, CA</td>
<td>*Mr. Bob Frost, Lincoln, CA</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
</tr>
<tr>
<td>108</td>
<td>Oct. 21-27, 2004</td>
<td>Greensboro, NC</td>
<td>Dr. Donald Lein, Ithaca, NY</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
</tr>
<tr>
<td>109</td>
<td>Nov. 3-9, 2005</td>
<td>Hershey, PA</td>
<td>Dr. Richard D. Willer, Phoenix, AZ</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
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<tr>
<td>110</td>
<td>Oct. 12-18, 2006</td>
<td>Minneapolis, MN</td>
<td>Dr. Bret D. Marsh, Indianapolis, IN</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
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<tr>
<td>111</td>
<td>Oct. 18-24, 2007</td>
<td>Reno, NV</td>
<td>Dr. Lee M. Myers, Atlanta, GA</td>
<td>§Dr. J. Lee Alley, Montgomery, AL / Mr. Benjamin Richey, St. Joseph, MO</td>
</tr>
<tr>
<td>112</td>
<td>Oct. 23-29, 2008</td>
<td>Greensboro, NC</td>
<td>Mr. James W. Leafstedt, Alcester, SD</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
</tr>
<tr>
<td>113</td>
<td>Oct. 8-14, 2009</td>
<td>San Diego, CA</td>
<td>Dr. Donald E. Hoenig, Belfast, ME</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<tr>
<td>114</td>
<td>Nov. 11-17, 2010</td>
<td>Minneapolis, MN</td>
<td>Dr. Richard E. Breitmeyer, Sacramento, CA</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
</tr>
<tr>
<td>115</td>
<td>Sept. 29- Oct.5, 2011</td>
<td>Buffalo, NY</td>
<td>Dr. Steven L. Halstead, East Lansing, MI</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
</tr>
<tr>
<td>116</td>
<td>Oct. 18-24, 2012</td>
<td>Greensboro, NC</td>
<td>Dr. David T. Marshall, Raleigh, NC</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
</tr>
</tbody>
</table>
**Key**

* Deceased
** Resigned Dec. 12, 1977
† Reprinted in 54th Annual Proceedings

†† Last meeting of the Interstate Association of Livestock Sanitary Boards
§ USAHA transitioned to an Executive Director, in lieu of the Secretary, effective 2006-2007
++ Reprinted in 66th Annual Proceedings
III. D. USAHA Medal of Distinction Award Winners
USAHA MEDAL OF DISTINCTION RECIPIENTS

110th Annual Meeting, Minneapolis, Minnesota – 2006
Dr. Clarence L. Campbell, Tallahassee, Florida
Dr. Richard H. McCapes, Davis, California

111th Annual Meeting, Reno, Nevada – 2007
Dr. J. Lee Alley, Montgomery, Alabama
Mrs. Linda B. Ragland, Richmond, Virginia

Dr. John C. Shook, Mechanicsburg, Pennsylvania

113th Annual Meeting, San Diego, California – 2009
Dr. Bret E. Marsh, Indianapolis, Indiana

114th Annual Meeting, Minneapolis, Minnesota – 2010
Mr. Neal F. Black, Eagan, Minnesota
Dr. Thomas J. Hagerty, St. Michael, Minnesota

Dr. Bob E. Hillman, Boise, Idaho

Dr. John E. Ragan, Bowie, Maryland
IV. GLOSSARY OF COMMONLY USED ACRONYMS
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
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<tbody>
<tr>
<td>AAEP</td>
<td>American Association of Equine Practitioners</td>
</tr>
<tr>
<td>AAHSC</td>
<td>Aquatic Animal Health Standards Commission</td>
</tr>
<tr>
<td>AAMMC</td>
<td>American Association of Medical Milk Commissions</td>
</tr>
<tr>
<td>AAVCT</td>
<td>American Academy of Veterinary and Comparative Toxicology</td>
</tr>
<tr>
<td>AAVLD</td>
<td>American Association of Veterinary Laboratory Diagnosticians</td>
</tr>
<tr>
<td>ABADRL</td>
<td>Arthropod-Borne Animal Disease Research Laboratory</td>
</tr>
<tr>
<td>ABADRU</td>
<td>Arthropod-Borne Animal Diseases Research Unit</td>
</tr>
<tr>
<td>ABSL</td>
<td>Animal Biosafety Levels</td>
</tr>
<tr>
<td>AC</td>
<td>Animal Care (USDA-APHIS)</td>
</tr>
<tr>
<td>ACE</td>
<td>Antigen Capture ELISA</td>
</tr>
<tr>
<td>ACVIM</td>
<td>American College of Veterinary Internal Medicine</td>
</tr>
<tr>
<td>ADOL</td>
<td>Avian Disease and Oncology Laboratory</td>
</tr>
<tr>
<td>ADRU</td>
<td>Animal Disease Research Unit</td>
</tr>
<tr>
<td>ADT</td>
<td>Animal disease traceability</td>
</tr>
<tr>
<td>AF</td>
<td>Accredited free</td>
</tr>
<tr>
<td>AFIA</td>
<td>American Feed Industry Association</td>
</tr>
<tr>
<td>AFRI</td>
<td>Agriculture and Food Research Initiative</td>
</tr>
<tr>
<td>AFS</td>
<td>American Fisheries Society</td>
</tr>
<tr>
<td>AFWA</td>
<td>Association of Fish and Wildlife Agencies</td>
</tr>
<tr>
<td>AGID</td>
<td>Agar gel immunodiffusion</td>
</tr>
<tr>
<td>AGPs</td>
<td>Antibiotics growth promoters</td>
</tr>
<tr>
<td>AHC</td>
<td>American Horse Council</td>
</tr>
<tr>
<td>AHEM</td>
<td>Animal Health Emergency Management</td>
</tr>
<tr>
<td>AHP</td>
<td>Animal Health and Production Division</td>
</tr>
<tr>
<td>AHPA</td>
<td>Animal Health Protection Act</td>
</tr>
<tr>
<td>AHS</td>
<td>African Horse Sickness</td>
</tr>
<tr>
<td>AHSISC</td>
<td>Animal Health Surveillance and Information Systems Committee</td>
</tr>
<tr>
<td>AHSM</td>
<td>Animal Health Surveillance and Management</td>
</tr>
<tr>
<td>AI</td>
<td>Avian influenza</td>
</tr>
<tr>
<td>AICAP</td>
<td>Avian Influenza Coordinated Agricultural Program</td>
</tr>
<tr>
<td>AI-CMC</td>
<td>Avian Influenza Crisis Management Center</td>
</tr>
<tr>
<td>AMPs</td>
<td>Antimicrobial peptides</td>
</tr>
<tr>
<td>aMPV</td>
<td>Avian metapneumovirus</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
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<td>---------</td>
<td>-------------</td>
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<tr>
<td>AMR</td>
<td>Antimicrobial resistance</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
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<tr>
<td>ANV</td>
<td>Avian Nephritis Virus</td>
</tr>
<tr>
<td>APHIS</td>
<td>Animal and Plant Health Inspection Service</td>
</tr>
<tr>
<td>APIC</td>
<td>Association for Professionals in Infection Control and Epidemiology</td>
</tr>
<tr>
<td>ARC</td>
<td>Agricultural Research Center</td>
</tr>
<tr>
<td>ARS</td>
<td>Agricultural Research Service</td>
</tr>
<tr>
<td>ASF</td>
<td>African Swine Fever</td>
</tr>
<tr>
<td>AVBP</td>
<td>Association of Veterinarians in Broiler Production</td>
</tr>
<tr>
<td>AVEP</td>
<td>Association of Veterinarians in Egg Production</td>
</tr>
<tr>
<td>AVIC</td>
<td>Area veterinarian in charge</td>
</tr>
<tr>
<td>AVMA</td>
<td>American Veterinary Medical Association</td>
</tr>
<tr>
<td>AVMC</td>
<td>Aquatic Vet Med Committee</td>
</tr>
<tr>
<td>AWA</td>
<td>Animal Welfare Act</td>
</tr>
<tr>
<td>AWI</td>
<td>Animal Welfare Institute</td>
</tr>
<tr>
<td>AWW</td>
<td>Adjusted weaning weight</td>
</tr>
<tr>
<td>AZA</td>
<td>Association of Zoos and Aquariums</td>
</tr>
<tr>
<td>BCF</td>
<td>Bacterial culture of the feces</td>
</tr>
<tr>
<td>BCG</td>
<td>Bacille Calmette-Guerin</td>
</tr>
<tr>
<td>BEAP</td>
<td>Brucellosis Emergency Action Plan</td>
</tr>
<tr>
<td>BHS</td>
<td>Bighorn Sheep</td>
</tr>
<tr>
<td>BMAPs</td>
<td>Brucellosis Management Action Plans</td>
</tr>
<tr>
<td>BMPs</td>
<td>Best management practices</td>
</tr>
<tr>
<td>BMST</td>
<td>Brucellosis Milk Surveillance Testing</td>
</tr>
<tr>
<td>BNC</td>
<td>Bi-National Committee</td>
</tr>
<tr>
<td>BOAH</td>
<td>Board of Animal Health</td>
</tr>
<tr>
<td>BQA</td>
<td>Beef Quality Assurance</td>
</tr>
<tr>
<td>BQFS</td>
<td>Bison Quarantine Feasibility Study</td>
</tr>
<tr>
<td>BRD</td>
<td>Bovine Respiratory Disease</td>
</tr>
<tr>
<td>BRSV</td>
<td>Bovine respiratory syncytial virus</td>
</tr>
<tr>
<td>BRT</td>
<td>Brucellosis ring test</td>
</tr>
<tr>
<td>BSC</td>
<td>Biological Standard Commission</td>
</tr>
<tr>
<td>BSE</td>
<td>Bovine Spongiform Encephalopathy</td>
</tr>
<tr>
<td>BSL</td>
<td>Bio-Safety Level (Laboratory)</td>
</tr>
</tbody>
</table>
IV. GLOSSARY OF ACRONYMS

BTV  Bluetongue Virus
BVDV  Bovine viral diarrhea virus
CABS  Consortium for the Advancement of Brucellosis Science
CAC  Codex Alimentarius Commissions
CAHFS  California Animal Health and Food Safety Laboratory
CAHFSE  Collaboration for Animal Health, Food Safety and Epidemiology
CAST  Council for Agricultural Science and Technology
CAstV  Chicken Astrovirus
CBPP  Contagious Bovine Pleuropneumonia
CC(T)  Comparative cervical (tuberculin)
CD  Clostridial Dermatitis
CDC  Centers for Disease Control and Prevention
CDLVWD  Committee on Diagnostic Laboratory and Veterinary Workforce Development
CEAH  Centers for Epidemiology and Animal Health
CEI  Center for Emerging Issues
CEM  Contagious Equine Metritis
CENAPA  National Parasite and Toxic Residue Laboratory (Mexico)
CENASA  National Animal Disease Laboratory (Mexico)
CEO  Chick embryo origin
CFIA  Canadian Food Inspection Agency
CFR  Code of Federal Regulations
CFSAN  Center for Food Safety and Applied Nutrition
CFT  Caudal fold tuberculin test
CFU  Colony forming units
CI/KR  Critical infrastructure and key resources
CIMBS  The Center for Research at the Interface of Mathematical and Biological Sciences
CISS  Comprehensive and Integrated Swine Surveillance
CMC  Crisis Management Center
CNS  Central Nervous System
COB  Continuity of Business
COMEXA  Mexico - United States Commission on the Eradication of Livestock Screwworm
CONASA  Consejo Nacional de Salud Animal
COOL  Country of Origin Labeling
IV. GLOSSARY OF ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>COSDA</td>
<td>Communications Officers for State Department of Agriculture</td>
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<tr>
<td>CPA</td>
<td>Mexico - United States Commission on the Eradication of Foot-and-Mouth Disease and Other Foreign Animal Diseases</td>
</tr>
<tr>
<td>CPG</td>
<td>Compliance policy guide</td>
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<tr>
<td>CPI</td>
<td>Consumer price index</td>
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<tr>
<td>CRIS</td>
<td>Current Research Information System</td>
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<tr>
<td>CRISPR</td>
<td>Clustered regularly interspaced short palindromic repeat</td>
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<tr>
<td>CRWAD</td>
<td>Conference of Research Workers in Animal Diseases</td>
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<tr>
<td>CSF</td>
<td>Classical swine fever</td>
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<td>CSPS</td>
<td>Caprine Scrapie Prevalence Study</td>
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<td>CSREES</td>
<td>Cooperative State Research Education and Extension Service (USDA)</td>
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<td>CSTE</td>
<td>Council of State and Territorial Epidemiologists</td>
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<tr>
<td>CVB</td>
<td>Center for Veterinary Biologics (USDA)</td>
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<tr>
<td>CVB-IC</td>
<td>Center for Veterinary Biologics - Inspection and Compliance (USDA)</td>
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<tr>
<td>CVI</td>
<td>Certificate of Veterinary Inspection</td>
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<tr>
<td>CVM</td>
<td>Center for Veterinary Medicine (FDA)</td>
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<td>CWD</td>
<td>Chronic wasting disease</td>
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<td>DAL</td>
<td>District at Large (USAHA)</td>
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<td>DBE</td>
<td>Designated Brucellosis Epidemiologist</td>
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<td>DEA</td>
<td>Drug Enforcement Administration</td>
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<td>DHHS</td>
<td>Department of Health and Human Services</td>
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<td>DHIA</td>
<td>Dairy Herd Improvement Association</td>
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<td>DHS</td>
<td>Department of Homeland Security</td>
</tr>
<tr>
<td>DIVA</td>
<td>Differentiating Affected from Vaccinated Animals</td>
</tr>
<tr>
<td>DJC</td>
<td>Designated Johne’s Coordinator</td>
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<tr>
<td>DNA</td>
<td>Deoxyribonucleic acid</td>
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<td>DNR</td>
<td>Department of Natural Resources</td>
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<tr>
<td>DOD</td>
<td>Department of Defense</td>
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<tr>
<td>DOI</td>
<td>Department of the Interior</td>
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<tr>
<td>DPI</td>
<td>Day post-inoculation</td>
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<tr>
<td>DPP</td>
<td>Dual Path Platform</td>
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<tr>
<td>dRIT</td>
<td>Direct rapid immunohistochemistry test</td>
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<td>DRMS</td>
<td>Dairy Records Management System</td>
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<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>DS</td>
<td>Diplomatic security</td>
</tr>
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<td>DSA</td>
<td>Designated surveillance area</td>
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<td>DVM</td>
<td>Doctor of Veterinary Medicine</td>
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<tr>
<td>EAV</td>
<td>Equine arteritis virus</td>
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<tr>
<td>EC</td>
<td>Executive Committee (USAHA)</td>
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<td>ECSR</td>
<td>Equine, Cervid and Small Ruminant</td>
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<td>ECVI</td>
<td>Electronic Certificate of Veterinary Inspection (eCVI)</td>
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<td>EDEN</td>
<td>Extension Disaster Education Network</td>
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<tr>
<td>EHD(V)</td>
<td>Epizootic hemorrhagic disease (virus)</td>
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<tr>
<td>EIA</td>
<td>Equine infectious anemia</td>
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<tr>
<td>EIS</td>
<td>Environmental Impact Statement</td>
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<td>ELISA</td>
<td>Enzyme Linked Immunosorbent Assay</td>
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<tr>
<td>EM</td>
<td>Election microspray</td>
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<tr>
<td>EM&amp;D</td>
<td>Emergency Management and Diagnostics</td>
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<tr>
<td>END</td>
<td>Exotic Newcastle disease</td>
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<tr>
<td>EP</td>
<td>Equine piroplasmosis</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
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<tr>
<td>ESF</td>
<td>Emergency Support Function</td>
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<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FAD</td>
<td>Foreign animal disease(s)</td>
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<tr>
<td>FADD</td>
<td>Foreign animal disease diagnostician</td>
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<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<tr>
<td>FAS</td>
<td>Foreign Agricultural Service (USDA)</td>
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<tr>
<td>FAST</td>
<td>Federal and State Transport</td>
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<tr>
<td>FAV</td>
<td>Food, Agriculture and Veterinary Defense</td>
</tr>
<tr>
<td>FBS</td>
<td>Farm business survey</td>
</tr>
<tr>
<td>FD&amp;C</td>
<td>Food, Drug and Cosmetic Act</td>
</tr>
<tr>
<td>FDA</td>
<td>Food and Drug Administration</td>
</tr>
<tr>
<td>FDN</td>
<td>Focal duodenal necrosis</td>
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<tr>
<td>FEMA</td>
<td>Federal Emergency Management Agency (DHS)</td>
</tr>
<tr>
<td>FERN</td>
<td>Food Emergency Response Network</td>
</tr>
<tr>
<td>FFPE</td>
<td>Formalin-fixed, paraffin-embedded</td>
</tr>
<tr>
<td>FHS</td>
<td>Fish Health Section</td>
</tr>
<tr>
<td>FMD</td>
<td>Foot-and-mouth disease</td>
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<tr>
<td>FPA</td>
<td>Fluorescent polarization assay</td>
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</table>
IV. GLOSSARY OF ACRONYMS

FPD  Foreign poultry diseases
FSIS  Food Safety and Inspection Service
FWD-IRN  Food and Waterborne Diseases Integrated Research Network
FWS  Fish and Wildlife Services
FY  Fiscal Year
GAP  Good aquaculture practice
GCC  Government Coordinating Council
GDB  Generic Database
GFRA  Global FMD Research Alliance
GIEFA  InterHemispheric Group for the Eradication of FMD
GMP  Good management practices
GPS  Global Positioning Systems
GTNP  Grand Teton National Park
GWAS  Genome-wide association study
GYA  Greater Yellowstone Area
GYE  Greater Yellowstone Ecosystem
GYIBC  Greater Yellowstone Area Interagency Brucellosis Committee
HA  Hemagglutinin
HACCP  Hazard analysis and critical control points
HCP  Herd certification program
HD  Hemorrhagic disease
HEYM  Herrold's egg yolk medium
HHS  Department of Health and Human Services
HL7  Health Level Seven
HPAI  Highly pathogenic avian influenza
HSIN  Homeland Security Information System
HSUS  Humane Society of the United States
HVT  Herpesvirus of turkeys
IAI  Integrated agricultural intelligence
IBH  Inclusion body hepatitis
IBMP  Interagency Bison Management Plan
ICP  Incident Command Post
ICS  Incident Command System
ICVI  Interstate certificate of veterinary inspection
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
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<tbody>
<tr>
<td>IFAH</td>
<td>International Federation for Animal Health</td>
</tr>
<tr>
<td>IHC</td>
<td>Immunohistochemistry</td>
</tr>
<tr>
<td>ILRI</td>
<td>International Livestock Research Institute</td>
</tr>
<tr>
<td>IMT</td>
<td>Incident Management Teams</td>
</tr>
<tr>
<td>IS</td>
<td>International Services (USDA)</td>
</tr>
<tr>
<td>ISDH</td>
<td>Indiana State Department of Health</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standards Organization</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>ITRCB</td>
<td>International Technical Regulatory Capacity Building</td>
</tr>
<tr>
<td>IVD</td>
<td>Idiopathic vesicular disease</td>
</tr>
<tr>
<td>JDIP</td>
<td>Johne’s Disease Integrated Program</td>
</tr>
<tr>
<td>JEI</td>
<td>Johne's Education Initiative</td>
</tr>
<tr>
<td>JPPD</td>
<td>Johnin purified protein derivative</td>
</tr>
<tr>
<td>JSA</td>
<td>Joint Subcommittee on Aquaculture</td>
</tr>
<tr>
<td>KAP</td>
<td>Knowledge, attitudes, and practice</td>
</tr>
<tr>
<td>LBMS</td>
<td>Live Bird Marketing System</td>
</tr>
<tr>
<td>LC/MS</td>
<td>Liquid Chromatography/Mass Spectroscopy</td>
</tr>
<tr>
<td>LCMV</td>
<td>Lymphocytic Choriomeningitis virus</td>
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<td>LID</td>
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<td>LPAI</td>
<td>Low Pathogenic avian influenza</td>
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<td>LPDV</td>
<td>Lymphoproliferative disease virus</td>
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<td>LPNAI</td>
<td>Low pathogenic notifiable avian influenza</td>
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<td>LTR</td>
<td>Long terminal repeat</td>
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<td>MA</td>
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<td>MAA</td>
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<td>MAC</td>
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<td>MAP</td>
<td><em>Mycobacterium Avium</em> Paratuberculosis</td>
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<tr>
<td>MDR</td>
<td>Multi-drug resistant</td>
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<td>MG</td>
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<td>OCVI</td>
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<td>OD</td>
<td>Optical density</td>
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<td>ODAFF</td>
<td>Oklahoma Department of Agriculture, Food and Forestry</td>
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<td>OIE</td>
<td>World Animal Health Organization</td>
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<td>OM</td>
<td>Osteomyelitis</td>
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<td>OPPV</td>
<td>Ovine progressive pneumonia virus</td>
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<td>ORST</td>
<td>Outbreak Response and Surveillance Team</td>
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<td>Oral rabies vaccination</td>
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<td>OSTP</td>
<td>Office of Science and Technology Policy</td>
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<td>OTC</td>
<td>Over-the-counter</td>
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<td>PAC</td>
<td>Positive amplification</td>
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<td>PADOH</td>
<td>Pennsylvania Department of Health</td>
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<td>PAMTA</td>
<td>Preservation of Antibiotics for Medical Treatment Act</td>
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<tr>
<td>Acronym</td>
<td>Definition</td>
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<td>PBS</td>
<td>Phosphate buffered saline</td>
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<td>PBV</td>
<td>Picobirnavirus</td>
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<tr>
<td>PC</td>
<td>Pre-conditioning</td>
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<td>PCR</td>
<td>Polymerase chain reaction</td>
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<td>PCV 2</td>
<td>Porcine Circovirus 2</td>
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<tr>
<td>PEC</td>
<td>Positive extraction</td>
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<td>PETS</td>
<td>Pets Evacuation and Transportation Standards Act</td>
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<td>PFGE</td>
<td>Pulsed Field gel electrophoresis</td>
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<td>PFI</td>
<td>Pet Food Institute</td>
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<td>PGHs</td>
<td>Peptidoglycan hydrolases</td>
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<td>PHLIS</td>
<td>Public Health Laboratory Information Systems</td>
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<td>PIIWG</td>
<td>Pork Industry Identification Working Group</td>
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<td>PIN</td>
<td>Premise identification number</td>
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<td>PKEMRA</td>
<td>Post Katrina Management Reform Act</td>
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<td>PMO</td>
<td>Pasteurized Milk Ordinance</td>
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<td>PNF</td>
<td>Payette National Forest</td>
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<td>PPD</td>
<td>Purified protein derivatives</td>
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<td>PPE</td>
<td>Personal protective equipment</td>
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<td>PQA</td>
<td>Pork Quality Assurance</td>
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<td>PRCA</td>
<td>Professional Rodeo Cowboys Association</td>
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<td>PReP</td>
<td>Preparedness and Response Plan</td>
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<td>PRRS(V)</td>
<td>Porcine reproductive and respiratory syndrome (virus)</td>
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<td>PRV</td>
<td>Pseudorabies virus</td>
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<td>PSAs</td>
<td>Public Security Advisors</td>
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<td>PT</td>
<td>Proficiency test</td>
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<tr>
<td>PVS</td>
<td>Performance, Vision and Strategy</td>
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<tr>
<td>QA</td>
<td>Quality assurance</td>
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<td>QCS</td>
<td>Quality Certification Services</td>
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<tr>
<td>RA/HMP</td>
<td>Risk Assessments/Herd Management Plans</td>
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<td>RAPIDD</td>
<td>The Research and Policy for Infectious Disease Dynamics</td>
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<tr>
<td>RE</td>
<td>Reticuloendotheliosis</td>
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<td>RES</td>
<td>Regionalization Evaluation Services</td>
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<td>REV</td>
<td>Reticuloendotheliosis virus</td>
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<tr>
<td>RFID</td>
<td>Radio frequency identification</td>
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<td>RFS</td>
<td>Renewable Fuel Standards</td>
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### IV. GLOSSARY OF ACRONYMS

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<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>RML</td>
<td>Rocky Mountain Laboratory</td>
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<tr>
<td>RNA</td>
<td>Ribonucleic acid</td>
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<tr>
<td>RRT-PCR</td>
<td>Reverse transcriptase polymerase chain reaction</td>
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<td>RSS</td>
<td>Runting-stunting syndrome</td>
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<td>RSSS</td>
<td>Regulatory Scrapie Slaughter Surveillance</td>
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<tr>
<td>RT-PCR</td>
<td>Real-Time Polymerase Chain Reaction</td>
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<td>RVNA</td>
<td>Rabies virus neutralizing antibody</td>
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<td>SAGARPA</td>
<td>Secretary of Agriculture, Ranching, Rural Development, Fisheries and Food Supply (Mexico)</td>
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<td>SAHA</td>
<td>Southern Animal Health Association (District)</td>
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<td>SAHO</td>
<td>State animal health official</td>
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<td>SALMS</td>
<td>State Animal Laboratory Messaging Service</td>
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<td>SAS</td>
<td>Scientific Advisory Subcommittee</td>
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<tr>
<td>SB</td>
<td><em>Brucella suis</em> (swine brucellosis)</td>
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<td>SBV</td>
<td>Schmallenberg virus</td>
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<td>SCT</td>
<td>Single cervical tuberculin test</td>
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<td>SCWDS</td>
<td>Southeastern Cooperative Wildlife Disease Study</td>
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<td>SDO</td>
<td>Standards Development Organizations</td>
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<td>SDS</td>
<td>Sodium dodecyl sulphate</td>
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<td>SE</td>
<td><em>Salmonella enteritidis</em></td>
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<td>SENASICA</td>
<td>National Services of Animal and Plant Health, Quality and Food Safety (Mexico)</td>
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<td>Southeastern Poultry Research Laboratory (ARS)</td>
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<td>SES</td>
<td>Secure Egg Supply</td>
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<td>SFCP</td>
<td>Scrapie Flock Certification Program</td>
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<tr>
<td>SH</td>
<td>Salmonella heidelberg</td>
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<td>SHI</td>
<td>Synergistic Hemolysin Inhibition</td>
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<td>SHTP</td>
<td>Slaughter Horse Transport Program</td>
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<td>SIV</td>
<td>Swine Influenza Virus</td>
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<td>SNGD</td>
<td>Scrapie National Generic Database</td>
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<td>SODA</td>
<td>Statistical Outbreak Detection Algorithm</td>
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<td>SOP</td>
<td>Standard operating procedure</td>
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<td>SOSS</td>
<td>Scrapie Ovine Slaughter Surveillance</td>
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<td>SPP</td>
<td>Security and Prosperity Partnership of North America</td>
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<td>SRM</td>
<td>Specified risk materials</td>
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<td>STA</td>
<td>Science, Technology and Analysis</td>
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<td>Acronym</td>
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<td>Science and Technology Directorate (DHS)</td>
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<td>STEC</td>
<td>Shiga toxin-producing escherichia coli</td>
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<td>Seneca valley virus</td>
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<td>SWAP</td>
<td>Swine Welfare Assurance Program</td>
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<td>TAD</td>
<td>Targeted advanced development</td>
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<td>TB SAS</td>
<td>Tuberculosis Scientific Advisory Subcommittee</td>
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<tr>
<td>TCF</td>
<td>Tissue culture fluid</td>
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<td>TCO</td>
<td>Tissue culture origin</td>
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<td>TDC</td>
<td>Tibial dyschondroplasia</td>
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<td>TLR</td>
<td>Toll-like receptor</td>
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<td>TOC</td>
<td>Turkey osteomyelitis complex</td>
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<td>TRV</td>
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<td>TSE</td>
<td>Transmissible spongiform encephalaphy</td>
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<td>UDB</td>
<td>Unified database</td>
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<td>United Egg Producers</td>
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<td>UHF</td>
<td>Ultra high frequency</td>
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<td>UM&amp;R</td>
<td>Uniform Methods &amp; Rules</td>
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<td>United States Department of Agriculture</td>
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<td>United States Equestrian Federation</td>
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<td>United States Forest Service</td>
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<td>United States Fish &amp; Wildlife Services</td>
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<td>Viral Hemorrhagic Septicemia (Virus)</td>
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<td>Virus isolation</td>
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<td>VICH</td>
<td>International Cooperation on Harmonization of Technical Requirements for Registration of Veterinary Medicinal Products</td>
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<td>vILT</td>
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<td>White-tailed deer</td>
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<td>Extensible markup language</td>
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<td>YNP</td>
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