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. 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.

REPORT OF THE SUBCOMMITTEE OF MYCOPLASMA REPORT

Eric L. Jensen, Chair
Aviagen

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 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 Geogia (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.

REPORT OF THE SUBCOMMITTEE ON AVIAN INFLUENZA AND NEWCASTLE DISEASE

David E. Swayne, Chair
USDA-ARS

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.

Broiler Industry Annual Report

G. Donald Ritter
Mountaire Farms Inc.

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, Runting 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 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.

US Table Egg Industry Update

Eric Gingerich
Diamond V

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:

Caged Pullets		**Cage-Free Pullets**	
Condition	Average	Condition	Average
1-Yolk infections	1.43	1-Yolk infections	1.47
2-Starveouts	1.33	1-Starveouts	1.47
3-Marek's	1.00	1-Cocci	1.47
4-E. coli	0.86	4-Marek's	1.27
5-Cocci	0.81	5-Roundworms	0.93
6-Inf. bronchitis	0.62	6-E. coli	0.80
7-ILT	0.60	6-NE	0.80
8-Necrotic enteritis	0.57	8-Aspergillosis	0.40
8-IBD	0.57	8-Inf. bronchitis	0.40
10-Peripheral neuropathy	0.57	8-IBD	0.40
10-Pox	0.57	8-Ms	0.40
12-Bumblefoot	0.48	8-Peripheral neuropathy	0.40
12-Synovitis	0.48	13-ILT	0.33
14-M. synoviae	0.33	13-Synovitis	0.33
15-Mycotoxins	0.29	15-Bumblefoot	0.27
15-Roundworms	0.29	15-Mg	0.27
17-Aspergillosis	0.24	15-UE	0.27
17-Gangrenous dermatitis	0.24	18-Mycotoxins	0.20
17-M. gallisepticum	0.24	19-Pox	0.13
17-Ulcerative enteritis	0.24	20-CAV	0.07
21-Newcastle	0.19	20-Gangrenous dermatitis	0.07
22-CAV	0.05	20-ND	0.07
Total responses	21	Total responses	15

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.

Caged Layers		**Cage-Free Layers**	
Condition	Average	Condition	Average
1-Cannibalism	1.52	1-Cannibalism	2.06
2-E. coli	1.52	2-E. coli	1.63
3-Ms	1.48	3-Roundworms	1.50
4-Calcium depletion	1.43	4-Mites	1.44
5-Mites	1.29	5-Cocci	1.19
6-FDN	1.20	6-Bumblefoot	1.06
7-Gout	1.10	7-Calcium depletion	1.00
7-Mg	1.10	8-Hysteria	0.88
7-Tapeworms	1.10	9-Ms	0.88
10-Fatty Liver	1.00	10-Tapeworms	0.88
11-Inf bronchitis	0.90	11-FDN	0.81
12-Cocci	0.86	12-Gout	0.75
13-NE	0.81	13-Calcium tetany	0.63
14-Pox	0.76	14-Fatty Liver	0.63
15-ILT	0.75	15-Marek's	0.63
16-Marek's	0.71	16-Mg	0.63
17-Calcium tetany	0.67	17-ILT	0.56
18-Mycotoxins	0.57	18-Mycotoxins	0.50
19-Hysteria	0.52	19-Necrotic enteritis	0.50
20-Bumblefoot	0.43	20-Pox	0.50
21-Roundworms	0.38	21- Inf bronchitis	0.44
22-Synovitis	0.33	22-Ulc enteritis	0.38
23-Ulc enteritis	0.29	23- Synovitis	0.31
24-ND	0.24	24- Fowl Cholera	0.25
24-Spirochetes	0.24	25- ND	0.19
26-Inf coryza	0.19	26- Spirochetes	0.19
26-Leukosis	0.19	27- Erysipelas	0.13
28-Fowl Cholera	0.14	28- Gang dermatitis	0.13
29-Gangrenous dermatitis	0.10	29- Leukosis	0.13
30-Erysipelas	0.05	30- ORT	0.13
30-ORT	0.05	31- Inf coryza	0.13
Total responses	21	Total responses	16

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:

Issue (20 respondents)	Average
Avian Influenza	1.55
Lack of Effective Treatments	2.15
SE and FDA Egg Safety Rule	2.55
S. heidelberg and Egg Safety Rule	2.45
Welfare in General	2.33
Beak Trimming	1.70
Disposal of male chicks	1.40
On-Farm Euthanasia	1.95
Molting of Layers	1.60
Banning of Cages	2.60
Supply of Useful Vaccines	1.20

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:

Research Need Area	Number of Respondents
1-*S. heidelberg* research	9
2-Increased supply of recombinant vaccines	4
3-Marek's Disease	4
4-Focal Duodenal Necrosis	3
5-Coccidiosis and necrotic enteritis	3
6-Calcium depletion	2
7-Comparison of cage systems/cage density	2
8-Tapeworms	1
9-*M. gallisepticum*	1

10-Colibacillosis	1
11-Significance of oral ulcers	1
12-Interference of feed additives with live *S. typhimurium* vaccines	1
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

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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. Clostridium 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).

Issue	Score Average (1-5)	Score Mode (1-5)
Lack of approved, efficacious drugs	4.8	5
Clostridial Dermatitis (Cellulitis)	3.8	4
Colibacillosis	3.6	4
Heat stress	3.6	3
Late Mortality	3.0	3
Leg Problems	3.0	3
Poult Enteritis of unknown etiologies	2.9	4
Salmonella	2.7	2
Cannibalism	2.6	2
Bordetella avium	2.6	3
Breast Blisters and Breast Buttons	2.5	2
Coccidiosis	2.4	3
Newcastle Disease Virus (NDV)	2.4	3
Blackhead (Histomoniasis)	2.3	1
Protozoal Enteritis	2.3	2
Osteomyelitis (OM)	2.3	2
Ornithobacterium rhinotracheale (ORT)	2.2	3
Round Worms (Ascaridia dissimilis)	2.1	2
Bleeders (aortic, hepatic ruptures)	2.0	2
Cholera	2.0	2
Tibial Dyschondroplasia (TDC, Osteochondrosis)	2.0	1
Mycoplasma gallisepticum (MG)	2.0	1
Fractures	1.9	1
Shaky Leg Syndrome	1.8	2
Mycoplasma synoviae (MS)	1.8	1
Avian Influenza	1.8	1
H3N2 (H1N1) Swine Influenza	1.7	1
TR-DFTR (Turkey Reovirus Digital Flexor Tendon Rupture)	1.6	1
Turkey Coronavirus	1.6	1
PEMS (Poult Enteritis Mortality Syndrome)	1.5	1
Necrotic enteritis	1.4	1
Mycoplasma iowae (MI)	1.4	1
Erysipelas	1.3	1
Avian Metapneumovirus	1.2	1
Spondylolisthesis (Kinky-Back)	1.2	1
Mycoplasma meleagridis (MM)	1.0	1

Table 2. Turkey health survey (August 2012) of professionals in US turkey production. Survey response (reply) is 100% (n=25).

Cases (##) of	2012	2011	2010	2009	2008
Blackhead (Histomoniasis)	80	89	108	67	63
Mycoplasma synoviae (MS)	49	39	56	38	47
Turkey Coronavirus (TCV)	221	70	91	3	10
Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR)	131	106	n/a	n/a	n/a

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).

Issue	Score Average (1-5)	Score Mode (1-5)
Food Safety	4.2	5
Disease	3.9	5
Welfare	3.5	4
Nutrition	3.2	3
Poultry Management	3.0	3
Environmental	2.8	3
Processing	2.4	3
Waste Disposal	2.4	2

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)	
High-pitched vocalization in the brooder house	3.2
Pacing the feed line	3.0
Loose droppings	3.7
Pasty vents	3.0
Increased water consumption	2.9
Fluid cecal droppings	3.8
Feed passage	2.6

Necropsy Lesions (Rank: 1 = Never, 5 = Always)	
Thin, transparent intestinal wall	3.5
Thickened intestinal wall	1.8
Fluid intestinal contents	3.6
Mucoid intestinal contents	2.7
Distended, fluid-filled ceca	3.8
Hyperemic intestinal tract	2.7

Causes (Rank: 1 = Never, 5 = Always)	
Poult enteritis of unknown etiologies	3.5
Turkey Coronavirus	1.5
Coccidiosis	2.5
Other Protozoa	2.4
Ascaridia dissimilis	1.8
Necrotic Enteritis	1.7
Blackhead	1.7
Bacterial enteritis	2.9

Incidence (%) of your flocks affected by enteritis	
0-4 weeks	35.1
4-8 weeks	20.6
8-12 weeks	12.0
12-16 weeks	5.0
16-20 weeks	2.5

Seasonal (Prioritize: 1 = Common, 4 = Least)	
December - February	2.0
March - May	2.6
June - August	2.8
September - November	2.3

Outcomes (Rank: 1 = Never, 5 = Always)	
Poor litter conditions	3.4
Leg problems	2.8
Lower daily gain	3.5
Higher feed conversion	3.5
Higher mortality	2.9
Poor flock uniformity	3.8

Diagnosis (Rank: 1 = Never, 5 = Always)	
Clinical signs	4.3
Intestinal scrapings	3.1
Histopathology	2.3
Virus isolation	2.0
PCR	1.8
Gross necropsy	4.1

Prevention/Control (Rank: 1 = Never, 5 = Always)	
Total Cleanout and Disinfection of Brooder House	4.7
Off-site Brooding	3.0
Single-Age Production (Brood-Growout on same site)	3.5
Probiotic/DFM/Prebiotic via feed	3.1
Probiotic/DFM/Prebiotic via water	2.7
Coccidial Vaccine	1.5
Antibiotics/Antimicrobials via water	3.9
Copper sulfate	3.0
Fenbendazole via feed	2.8
Anthelmintic via water	2.3

Update on the US Poultry and Egg Association Research Grants Program

John R. Glisson
US Poultry and Egg Association

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 & Egg Association (then called the Southeastern Poultry & 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.

National Animal Health Monitoring System Update

Lindsey Garber
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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 ½ 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.

National Poultry Improvement Plan - 2012 Annual Report

Denise L. Brinson
USDA-APHIS-VS

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.

The NPIP is a Federal-State-Industry cooperative program. There are 49 Official State Agencies and 130 Authorized Laboratories. Official NPIP disease monitoring classifications include: US Pullorum-Typhoid Clean, US Mycoplasma Gallisepticum Clean and Monitored, US Mycoplasma Synoviae Clean and Monitored, US Mycoplasma Meleagridis Clean, US Salmonella Enteritidis Clean, US Sanitation Monitored, US Salmonella Monitored, US Avian Influenza Clean, and US H5/H7 Avian Influenza Clean for poultry breeding flocks; and US H5/H7 Avian Influenza Monitored for commercial (production) poultry flocks.

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 U.S. Avian Influenza Clean and U.S. H5/H7 Clean Participating Breeding Flocks; and U.S. H5/H7 Avian Influenza Monitored Participating Commercial Flocks:

Subpart	Flocks	Birds	Tests
Egg-Type Chicken Breeders	590	4,759,359	53,878
Table-Egg Layers	2,615	171,073,920	52,849
Meat-Type Chicken Breeders	6,273	88,629,609	381,641
Meat-Type Chickens Commercial	74,654	6,844,281,421	2,039,524
Turkey Breeders	881	7,499,757	34,783
Meat-Type Turkeys	14,939	124,316,258	160,850
Waterfowl, Upland Gamebirds, Exhibition Poultry	4,093	20,817,585	70,439
Total	103,045	7,261,377,909	2,793,964

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.

NVSL Avian Influenza and Newcastle Disease Activities Report FY2011

Jan Pederson
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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 to21 states, 20 vials H5 PAC to12 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, AI (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 AI and 231 for APMV-1 in 55 and 52 laboratories, respectively. The AI 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 AI 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-1inactivated 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.

State	Species	Subtype of AIV* (number)	Antibody Subtypes (number)
California	Quail	H8N4* (1)	
California	Chicken	H9N2* (1)	
California	Chicken	H11N2* (1)	
Michigan	Turkey	H3N2* (1)	
Michigan	Turkey		H10N7 (1 sera)
Minnesota	Turkey	H8N4* (3)	H8N4 (40 submissions)
New Hampshire	Chickens		H2N8 (1 sera)
New Mexico	Goose		N3, 6, 8 and 9
New York	Chicken		H6N8 (1 sera)
Ohio	Ducks	H3N6* (1)	
Oklahoma	Goose, swan, duck		H1N1, H1N2, H11N2
Pennsylvania	Ducks	H2N3* (8)	

Pennsylvania	Quail	H3N6* (1)	
Pennsylvania	Duck	H11N9* (1)	
Texas	Chicken	H4N8*	
Washington	Duck	H4N6* (1)	

*Low pathogenicity AIV by the chicken pathogenicity test.

Poultry *Salmonella*, *Mycoplasma*, and *Pasteurella* Diagnostics at NVSL

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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

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Enteritidis	127	Enteritidis	649
Kentucky	40	Kentucky	586
Typhimurium	13	Senftenberg	316
Rough O: g,m:-	10	Mbandaka	236
Infantis	8	Heidelberg	233
All others	46	Tennessee	106
		Typhimurium	105
		Schwarzengrund	79
		Newport	61
		Braenderup	57
		All others	1,268
Total	**244**	**Total**	**3,696**

Table 2: Most common serotypes in 2010: Turkeys

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Senftenberg	37	Hadar	142
Albany	34	Heidelberg	123
Ouakam	30	Saintpaul	102
Heidelberg	23	Senftenberg	89
Montevideo	13	Muenster	80
All others	89	Orion	60
		Berta	54
		Kentucky	45
		Albany	43
		Ouakam	38
		All others	330
Total	**226**	**Total**	**1,106**

Table 3: Summary of NVSL *Salmonella* Group D proficiency test

	2009	**2010**	**2011**	**2012**
Participants	40	55	70	73
Mean Score	93%	92%	97%	92%
Score Range	100-44%	100-44%	100-85%	100%-29%
Below Passing	4	3	0	N/A*

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

	Serogrouping 2012	**Serotyping 2012**
Participants	22	13
Mean Score	98%	92%
Score Range	100%-90%	100-70%

***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

	2007	**2008**	**2009**	**2010**	**2011**
No. chicken isolates	4,971	6,164	4,761	4,987	3,940
No. chicken SE isolates	580	876	993	1500	776
SE percent of all isolates	11.7%	14.2%	20.9%	30.1%	19.7%

Table 6: Most common *Salmonella* Enteritidis phage types from chicken sources per calendar year

Rank	**2007**	**2008**	**2009**	**2010**	**2011**
1	8 (103)	8 (240)	8 (131)	8 (182)	8 (94)
2	13 (29)	13 (82)	13 (54)	13 (90)	13a (54)
3	23(16)	23 (58)	13a (19)	13a (65)	13 (37)
4	13a (15)	13a (43)	23 (10)	RDNC (27)	RDNC (6)
5	22 (1)	RDNC (10)	RDNC (4)	23 (11)	23 (6)
Total typed	167	444	228	408	212

( ) = number of isolates for each phage type
RDNC = reacts, does not conform

***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.

	2009	2010	2011	2012
Type 3	54	38	25	38
Type 3,4	33	27	12	33
Type 1	14	25	17	10
All other	62	70	52	100
TOTAL	**163**	**160**	**106**	**181**

Table 7: *Mycoplasma* antisera (ml) provided by NVSL per fiscal year

Antisera	2008	2009	2010	2011	2012
M. gallisepticum	340	266	256	306	274
M. meleagridis	120	54	32	54	40
M. synoviae	346	222	256	326	342
Negative	252	162	222	150	175
Total	1,058	704	766	836	831

Table 8: *Mycoplasma* antigen (ml) provided by NVSL per fiscal year

Antigen	2008	2009	2010	2011	2012
M. gallisepticum	390	190	150	195	175
M. meleagridis	150	75	75	95	80
M. synoviae	510	200	215	220	245
Total	1,050	465	440	510	500

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Highly Pathogenic Avian Influenza H7N3 in Jalisco, Mexico

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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 AI 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

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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

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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

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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
  - Additional Surveillance Options discussed (Aug 2012)
- 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 & Outbreak Specific measures → Biosecurity & Surveillance (hen & tom flocks)
  - Disease Transmission models →Primary(hen flock) & 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 & sanitizing survey (online) and Hatchery transmission of influenza survey (in person)

- 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

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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 Lomnicizi 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 IIa 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 rZJI-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.

Research Update: Avian Disease and Oncology Laboratory Avian Tumor Viruses

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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 (6_3) and a susceptible line (7_2) were either vaccinated or vaccinated followed by vv+MDV challenge. Chickens from both lines that were only vaccinated with either HVT or CVI988/Rispens did not develop any tumor and survived throughout the experiment. 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 challenge with PI 91.2 and 86.7 percent in line 6_3, respectively. In comparison, CVI988/Rispens conveyed 80 percent protection while HVT achieved significantly lower protection (25%) in line 7_2. 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 haploytpe. 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 & 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 leukosis-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 leukosis virus-like tumors in their flocks.

US Surveillance for Avian Influenza in Wild Birds 2006-20011

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USDA-APHIS Wildlife Services (WS)

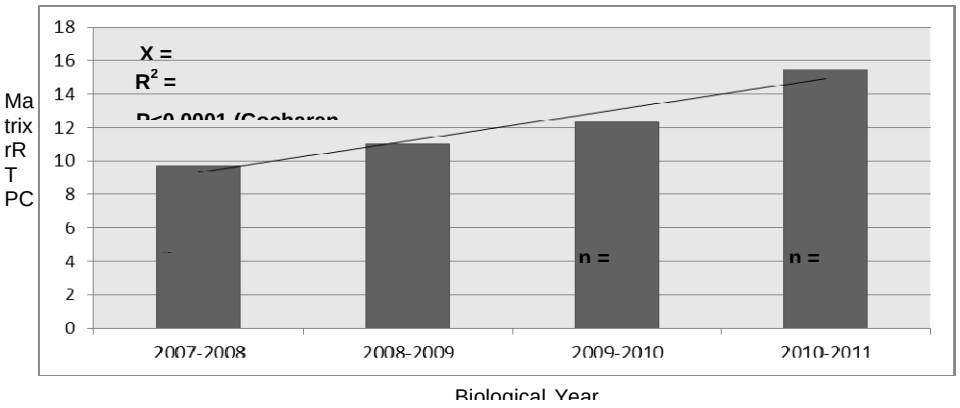
The USA successfully implemented a nationally coordinated highly pathogenic avian influenza virus (HPAIV) early detection system in wild birds that was also effective in providing valuable ecological data on low pathogenic AIVs. This strategy capitalized on existing infrastructure and expertise at state 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 disproportionally 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 U.S. 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.

Backyard and Small Commercial Flocks Disease Report

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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.

DISEASES OBSERVED	**POULTRY SPECIES AFFECTED**					**TOTAL**
	Chicken	Turkey	Game birds	Ducks	Other	
Salmonella sp.	3	2	11	0	0	**16**
E.coli infections	39	5	13	1	0	**58**
Respiratory disease						
Bacterial	25	11	5	2	0	**43**
Viral	35	6	4	0	0	**45**
Mycoplasmas	49	5	4	1	41	**100**
Avian Tumors						
Marek's disease virus	39	0	0	0	0	**39**
Lymphoid leukosis virus	5	0	0	0	0	**5**
Other	12	0	0	0	0	**12**
Parasites						
Internal parasites	104	21	49	5	16	**195**
External (lice and mites)	44	2	2	0	0	**48**

Nutritional diseases	14	3	3	1	2	**23**
Fungal diseases	13	3	4	0	1	**21**
Other	10	1	0	4	3	**18**
TOTAL	**392**	**59**	**95**	**14**	**63**	**623**

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

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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.

Report from the USAHA Committee on Salmonella

Doug Waltman, Chair
Georgia Poultry Laboratory Network

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.