# REPORT OF THE COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

Chair: Dr. Julie D. Helm, Columbia, SC
Vice Chair: Dr. Marion Garcia, Tbilisi, Republic of Georgia

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The Committee met on October 12, 2009 from 1:00 to 4:30 p.m. and October 13, 2009 from 12:30 to 5:30 p.m. at the Town and Country Resort in San Diego, Calif. There were 37 Committee members and 42 guests in attendance, for a total of 79. Chair Julie Helm presided, assisted by Vice-Chair Marion Garcia. The Chair welcomed the Committee, summarized the 2008 meeting, and reported on the responses to the 2008 Resolution.

2008 Resolution 33, "Additional resources for validation of genomics-based pathogen detection technologies" was approved. The United States Department of Agriculture (USDA), Animal & Plant Health Inspection Service (APHIS) supports cooperation with other government entities to meet pathogen detection needs, will develop and evaluate genomic-based pathogen detection & sequencing technologies with support from the Department of Homeland Security.

Dr. Eric Jensen, Aviagen, Inc, and Chair of the Mycoplasma Subcommittee, gave the subcommittee report. The report was approved by the Committee and is included in these proceedings.

Dr. Eric N. Gingerich, University of Pennsylvania, gave the Infectious Laryngotracheitis (ILT) Subcommittee report. The report was approved by the Committee and is included in these proceedings.

Dr. David Swayne, USDA, Agricultural Research Service (ARS), Southeastern Poultry Research Laboratory (SEPRL), Chair of the Avian Influenza and Newcastle Disease Subcommittee, gave the subcommittee report. The report was approved by the Committee and is included in these proceedings.

Dr. Bob O'Connor, Foster Farms, presented the annual disease status report for the broiler industry. The report was approved by the Committee and is included in these proceedings.

Dr. Eric N. Gingerich, University of Pennsylvania, delivered the annual disease status report for the table egg industry. The report was approved by the Committee and is included in these proceedings.

Dr. Marion Garcia, Veterinary Consultant, Tbilisi, Republic of Georgia gave the annual disease status report for the turkey industry. The report was approved by the Committee and is included in these proceedings.

Dr. John Smith, Chair, USPOULTRY Research Advisory Committee, presented the U.S. Poultry & Egg Association Research Report. The report was approved by the Committee and is included in these proceedings.

Dr. Julie Helm, Clemson University Livestock Poultry Health, presented the annual status report for the National Poultry Improvement Plan (NPIP) for the Senior Coordinator, Mr. Andrew H. Rhorer, USDA-APHIS-VS. The report was approved by the Committee and is included in these proceedings.

Ms. Mary Lea Killian, USDA-APHIS-VS, National Veterinary Services Laboratory (NVSL), delivered the annual status report for NVSL Avian Influenza and Newcastle Disease diagnostics. The report was approved by the Committee and is included in these proceedings.

Dr. Matthew Erdman, USDA-APHIS-VS, NVSL, delivered the annual NVSL Diagnostic Bacteriology, Mycoplasma, Pasteurella, and Salmonella report. His report was approved by the committee and is included in these proceedings.

Dr. Gregorio Rosales, Aviagen North America, Huntsville, AL presented the Avian Diseases & Oncology Laboratory (USDA-ARS) Contributions to the U.S. Poultry Industry and Future and is included in these proceedings.

Drs. Eileen Thacker and Steven Kappes, USDA-ARS, gave a presentation on Research Funding for Avian Diagnostic & Oncology Laboratory & SE Poultry Research Laboratory. Funding for ARS laboratories is managed on a national level. This is an important premise to understand when considering the potential for future funding of the ADOL. Priorities for research funding are considered on a 5-year cycle in order to support long-term, high-risk issues in support of animal industry. When priorities are being set, all animal production species in the entire country are considered. ARS is currently at the beginning of a new 5-year cycle and is actively poling the various animal agriculture stakeholders to identify diseases and priorities most important to industries at this time. In March, stakeholders will be able to voice their priorities at a workshop. The research scientist will then have the opportunity to express the direction they would like their research to go by submitting a research plan. Financial constraints and the size of ARS preclude doing everything. Additionally, under Congressional mandate Congress, through their stakeholders, may decide what research should be conducted.

ARS recognizes fine work of ADOL and how it supports the industry. However, the Government budget process does impose some limitations. The budget process usually starts in March timeframe and culminates in February with the President's Budget. Along the way, direction from the Administrator, Financial Management, Office of Program Policy Analysis and Government Accountability (OPPAGA), the Under-Secretary, and Office of Management and Budget (OMB) each make modifications. The President's budget is presented to Congress which can also make modifications. Due to budget constraints, ARS has had to put programs up for cut even though they do not want to. The Omnibus should protect ADOL for now. The current administration has undertaken an effort to cut down on earmarks. ARS recognize the value of ADOL scientists to the industry and would like to see it continue. There is a modernization plan for Southeastern Poultry Research Laboratory (SEPRL). As part of this plan, Congress has asked if ADOL could be moved to SEPRL. This is the current plan: as SEPRL modernization takes place, ADOL will be moved to co-locate with them.

The Monday session adjourned at this point, at approximately 4:30 p.m. The meeting reconvened at 12:40 p.m. on Tuesday, October 13, 2009.

Dr. David Suarez, USDA-ARS-SEPRL, gave an update on Influenza, Newcastle Disease and parvovirus research activities at SEPRL. The report is included in these proceedings.

Dr. Lindsey Garber, USDA-APHIS-VS Centers for Epidemiology and Animal Health (CEAH), Fort Collins, CO reported on the National Animal Health Monitoring System (NAHMS) Poultry 2010 Needs Assessment. Dr. Garber's report is included in these proceedings.

Dr. Kristy Pabilonia, College of Veterinary Medicine & Biomedical Sciences, Colorado State University, gave a presentation on Urban Chicken & Game Bird Surveys which is included in these proceedings.

Dr. Gabriel Sentíes-Cué, California Animal Health and Food Safety Laboratory System, Turlock-Branch University of California, Davis and Dr. Nancy Reimers, Gregg Cutler Associates, International, gave presentations on the California Infectious Bursal Disease Virus (IBDV) in Pullets – Laboratory & Field Perspectives. Dr. Sentíes-Cué reviewed the pathogenesis and clinical presentation of IBD virus (Birnavirus) with emphasis on immune suppression and secondary complications from this. He then reviewed the characteristics of Birnaviruses diagnostic pathotypes which are differentiated by looking at the VP2 protein (antigenic variation) and VP1 protein. Strains of IBDV which emerged in the late 1980s included a very virulent strain. The primary feature of virulent strains of IBDV is its ability to induce higher mortality than classical strains. In Dec 2008 in a confined area of California, 2 layer pullet farms became infected with IBDV. Birds had been vaccinated 3 times against IBDV with intermediate strains. Gross pathological lesions were numerous and characterized by necrosis of lymphoid tissue in various organ systems. Serological titers were very low, mostly in group 0. Direct electron microscopy showed viral particles consistent with Birnavirus. Challenge studies were conducted on Specific Pathogen Free (SPF) chickens with high mortality (91 to 100%) and in broilers with no mortality but disease and lower body weight. Total of 5 farms have been involved in this outbreak, all in a very confined area of California. Dr. Reimers reviewed the field presentation of the flocks. The detection of this virus was unexpected, in that it was not here before, and investigation on its distribution in susceptible populations is ongoing. Private, state and federal veterinary leaders are working in cooperation with the poultry industry on control and surveillance efforts. Extensive ongoing research is on going to help refine prevention and control measures.

Dr. Brendan Lee, Center for Animal Health and Food Safety, University of Minnesota, St. Paul, MN updated the Committee on the continuing work related to the 2007 Resolution 54, “Movement protocols for eggs, egg products, and day-old chicks within, out of, and into disease control areas”. His report is included in these proceedings.

Dr. Bruce Stewart-Brown, Perdue Farms and representing poultry in the National Animal Health Reporting System (NAHRS) Steering Group presented NAHRS and the National List of Reportable Animal Diseases (NLRAD). The intent of the NAHRS is to help the US and consequently the industry represent our national statistics when reporting. The NLRAD is one of the products of the NAHRS process. This list should help eliminate the differences between States in their reporting requirements. The list is broken down into two categories: Notifiable Diseases (emergency) and Monitored Diseases (important). Each category is characterized by different timing, response and reporting associated with it. The draft list for avian species has 7 Notifiable Diseases (Duck Viral hepatitis, Highly pathogenic avian influenza, Low pathogenic avian influenza (in poultry as per Chapter 2.7.12.of the Terrestrial Animal Health Code), Exotic (Virulent) Newcastle disease as per OIE definition, Fowl typhoid (Salmonella gallinarum), Pullorum disease (Salmonella pullorum, and Turkey rhinotracheitis) and 8 Monitored diseases (Avian chlamydiosis, Avian infectious bronchitis, Avian infectious laryngotracheitis, Avian mycoplasmosis (M. gallisepticum), Avian mycoplasmosis (M. synoviae), Fowl cholera (Pasteurella multocida), Infectious bursal disease (Gumboro disease), Marek’s disease), all of which are on the World Organization for Animal Health (OIE) list. Each disease has a definition associated with it. Presenting the lists at USAHA this year initiated a review and comment period which will result in a final list to be presented at the USAHA next year. If this system is adopted, it will make for consistency across the States and define roles for labs, private vets, etc.

Dr. Jonathan Zack, National Center Animal Health Emergency Management, USDA-APHIS-VS, gave an update on the novel H1N1 2009 virus, National Veterinary Stockpile (NVS) activities, Foreign Animal Disease Preparedness & Response Plan (FAD PReP), and the Secure Egg Supply (SES) Activities – Continuity of Business Plan. His update is included in these proceedings.

Dr. Pat Klein, Poultry Program, USDA-APHIS-VS, gave an update on the VS 2015 – One Health Overview.

Dr. Michael David, Director of Sanitary International Standards, National Center for Import and Export, USDA-APHIS-VS, was unable to attend, but did supply the annual update on the World Organization for Animal Health (OIE) poultry activities through email to the Committee members. His comments are included in these proceedings.

**Committee Business:**

The Committee approved a Resolution entitled “The USDA-ARS Avian Diseases and Oncology Laboratory (ADOL) -- Proposal to Maintain and Enhance Poultry Tumor Virus and Genetic Disease Resistance Research Programs urging that the USDA-ARS continue to place a high priority on ADOL’s tumor virus and genetic resistance to disease programs. Further, urging the House and Senate Agriculture Appropriation committees to

secure funding to ensure that the ARS-ADOL poultry research capabilities are preserved and enhanced to maintain their ability to continue research in these important areas.

The Committee approved a Resolution entitled “Notifiable Avian Influenza Surveillance Cooperative Agreement Funding” urging the USDA-APHIS-VS to maintain adequate funding and risk based allocation to states to fully support the national notifiable avian influenza (NAI) domestic poultry program. Further, the USAHA urges Congress to continue to appropriate these monies to USDA-APHIS-VS for the NAI program.

The Committee approved a Resolution entitled “Failure of importing countries to follow OIE guidelines for importations of animals” urging USDA-APHIS-VS to initiate all trade negotiations with reference to compliance with OIE guidelines and Sanitary and PhytoSanitary rules for trade.

The Committee approved a Resolution entitled “Containment of very virulent Infectious Bursal Disease Virus (vvIBDV) in California urging USDA-APHIS-VS to apply all necessary resources to assist the State of California in eliminating vvIBDV from California and urging USDA-APHIS-VS to support the validation and distribution of a real-time RT-PCR for the detection and differention of vvIBDV for use in a national surveillance program.

These Resolutions were forwarded to the Committee on Nominations and Resolutions for review.

The meeting adjourned at 5:30 PM on October 13, 2009.

## USAHA TDP Committee Mycoplasma Subcommittee Report

Eric L. Jensen, Chair

The Subcommittee met at the Town and Country Resort in San Diego, California on October 11, 2009 with 29 attendees.

Dr. Eric Jensen (AL) presented the report of the Mycoplasma subcommittee. Dr. Scott Gustin (AR) presented on the *Mycoplasma synoviae* (MS) situation and vaccination with Vaxsafe® MS in Northwest Arkansas, and Dr. Naola Ferguson-Noel (GA) presented on MS diagnostic challenges. Both presentations are summarized below.

Andrew Rhorer (National Poultry Improvement Plan, NPIP) submitted a report showing that there was a significant increase in the number of reported cases of MS in meat-type chickens in 2008-09 and that a conditional license was approved for a live MS vaccine at the request of the Arkansas State Veterinarian and poultry industry in Arkansas. The NPIP sponsored mycoplasma diagnostic workshop for training laboratory technicians and the panel of convalescent chicken sera against MS and *Mycoplasma gallisepticum* (MG) produced by Dr. Ferguson-Noel, University of Georgia continue to be essential tools to support NPIP authorized laboratories. The turkey industry has shown significant interest in the addition of a "U.S. Mycoplasma Iowae Clean" classification to the NPIP.

Participants reported that the incidence of MS in meat-type chickens, outside of the Arkansas area, has been relatively low over the past year but continues to be quite common in commercial egg layers. Only sporadic cases of MG have been reported in meat-type chickens and turkeys. As both MS and MG continue to be frequently detected in backyard flocks (chickens, turkeys and other types) they serve as a reservoir for these diseases.

*Mycoplasma synoviae* Situation and Vaccination with Vaxsafe® MS in Northwest Arkansas (Scott J. Gustin,

Cobb-Vantress, Inc.).

In the past 5 years, the incidence of infections with Mycoplasma synoviae (MS) has risen significantly in the northwest Arkansas poultry producing region. This region would also encompass northeastern Oklahoma and southwestern Missouri as several complexes expand into these neighboring areas. This is due to a number of factors, but those cited by the local production companies would include an increase in non-traditional commercial layer operations (cage-free and free-range), a shift in the demographics and cultural practices of contract growers, and poorer methods of control in flocks. In the past MS cases would be infrequent, isolated, and often controlled within companies by quarantine of farms and improved biosecurity practices on affected farms and complexes. However, what has changed recently is that more integrators have had widespread outbreaks in broiler breeding flocks and with dramatic multiplying of the organism through vertical transmission to broilers and subsequent horizontal transmission to nearby flocks and between integrator complexes.

Whereas in the past MS infections were fairly innocuous in breeding stock and also in broilers (unless exacerbated by IBV/NDV field infection or vaccination), the current MS strains in the area appear to have greater transmissibility and pathogenicity in both broilers and breeding stock. (Studies are currently underway at universities to determine if this is truly the case.) Respiratory disease has been evident in broiler breeders with increases in mortality and egg production drops fairly common. In broilers, lesions have primarily been respiratory in nature with some severe cases of airsacculitis and condemnation.

Surveillance of cases has been performed through a variety of serological and antigen tests including plate testing, enzyme linked immunosorbent assay (ELISA), Hemaglutinin Inhibition (HI), and conventional and real-time polymerase chain reaction (PCR). Sequencing of the isolates has demonstrated that the isolates are well conserved within the industry and are of 2-3 subtypes. Control of the disease has been focused around segregation of MS positive eggs within complexes to minimize exposure, medication of affected breeder flocks to reduce shed (tetracyclines, tylosin through feed/water), controlled slaughter of affected breeders (when possible), and enhanced biosecurity. Nonetheless, the degree of infection within some complexes and the need to reduce the susceptible population of hen flocks has necessitated an additional strategy, vaccination.

At the present time, there exists no licensed live MS vaccine for use in the US. It was decided in this scenario a live MS vaccine would have several advantages over a killed MS bacterin. The decision of some complexes to vaccinate first required the consensus of all poultry stakeholders in the area. A conditional license to import and apply a live MS vaccine (Vaxsafe® MS, Bioproperties) was approved by USDA National Center for Import and Export and the respective state veterinarians. Complexes choosing to vaccinate had to identify the specific farms to be vaccinated as well as a defined start and end to the vaccination. At this juncture, it appears that the decision to vaccinate has been beneficial but the process is still underway.

*Mycoplasma Synoviae* Diagnostic Challenges (Naola Ferguson-Noel, Dept. of Population Health, Poultry Diagnostic and Research Center, College of Veterinary Medicine, University of Georgia, Athens, GA):

The disease problems caused by *Mycoplasma synoviae* (MS) include synovitis and respiratory disease. MS has not been traditionally a serious problem in poultry production in the US. However, MS has been responsible for serious respiratory disease and/or synovitis in several areas of the world, including Eastern Europe, Holland, Mexico, Brazil and Argentina. More recently MS infection has resulted in severe respiratory disease in the Southeastern US. A major factor in the type and severity of the disease problem caused by MS is the virulence and pathotype of the strain involved.

The diagnosis of MS is usually made by:

- Serology – serum plate agglutination (SPA), HI and ELISA
- PCR – conventional and real-time
- Culture
- Bioassay

The SPA test is fast and inexpensive. Birds generally react in 5-10 days and flocks remain positive indefinitely. However, false positive reactions are common and the quality of antigen varies. This test is usually very sensitive (positive flocks are seldom missed), the exception has been MS in turkeys. In recent reports the SPA test has also missed MS infections in broiler breeders. This is a serious concern as the SPA test is often the primary means of screening for MS infection.

PCR is becoming a popular approach to screening for pathogenic avian mycoplasmas. It is rapid and sensitive (theoretically 1 organism) – generally real-time is more sensitive than conventional PCR. Birds are often positive by PCR before seroconversion. The sensitivity of PCR is affected by the quality of the sample. The specificity of the PCR depends on the primers and probes. Lab contamination during sample preparation can be a major problem. Flocks should not be destroyed on the basis of PCR positives without other evidence of infection. There is little consistency between labs with respect to protocols, controls and validation of diagnostic PCRs. There have been recent incidents in which false positive PCR reactions have resulted in extensive and costly testing to confirm these false positives.

The introduction of a live MS vaccine will complicate the diagnosis of MS infection. There are many advantages to vaccination but the live MS-H vaccine will result in seroconversion as well as positive PCR and culture results. The vaccine is also capable of transmitting to in contact poultry. The MS-H strain can be differentiated from wild type MS by *vlhA* sequencing.

All of the current diagnostic techniques have their drawbacks; e.g. lack of specificity (SPA), a lag in response (HI), expense (bioassay), susceptibility to contamination and false positives (PCR). Also, different MS strains may result in atypical responses. It is important to understand the limitations of the tests and prudent not to rely on any one test to heavily.

We may need to re-evaluate our expectations with respect to the sensitivity of the screening tests in the face of current MS situation in the US. MS PCR appears to be a more sensitive test than SPA, although it is more expensive and there are few established standards.

**Infectious Laryngotracheitis Subcommittee Report -- Vaccinal Laryngotracheitis – Update 2009**

Contributing authors: Brandon Doss, Sherrill Davison, Louise Dufour-Zavala, Maricarmen Garcia, Eric Gingerich, Frederic Hoerr, Julie Helm, Ray Hilburn, Sarah Mason, and John Smith

**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.

**Prior suggested action items – 2008:** The committee believes that:

- Evaluations (field and laboratory) of currently available vectored vaccines by the *in ovo* route in broilers should be continued.
- Research should be conducted to develop newer molecular vaccines to control and prevent VLT.
- Future research with the vectored products should include quantitative evaluation of viral shed and evaluation of the potential development of a carrier state after challenge.
- Economics must be considered with the development of newer vectored products.
- In the future, an effort to collect detailed data on mortality, duration of clinical signs, weight gain, vaccine usage and other epidemiological parameters is essential to have a more comprehensive evaluation of the currently available vaccines and control measures.
- Further research studies on innate immunity to ILT (infectious laryngotracheitis) should be conducted.
- States should adopt the Model State Program –VLT (USAHA – 2005).

**Update – 2009**

**Observations – VLT outbreaks**

Outbreaks of VLT in broilers continued to be of significance this year in several states. The morbidity and mortality associated with these breaks ranged from minimal to significant. Clinical signs observed in some of the reported breaks included conjunctivitis, tracheitis, hemoptysis, and secondary airsacculitis. All of the reported VLT cases were epidemiologically linked to the use of ILT vaccine, primarily CEO (chick embryo origin) vaccine. It appears the reason for failure to control VLT in broilers is widespread use of HVT-LT (herpes virus of turkeys) and Fowl poxvirus (FP-LT) vectored vaccines in these flocks.

A recent research project at the University of Georgia demonstrated that birds vaccinated with these vaccines *in ovo* and then challenged shed as much virus as unvaccinated birds. These vaccines appear to mitigate clinical signs and mortality, but do not prevent infection and shed. Growers appear to be lulled into a false sense of security and become less concerned about biosecurity. An economical ILT vaccine suitable for mass application in broilers that provides good protection against infection and shed without harsh vaccine reactions is sorely needed.

It was noted that the Model State Program – VLT (USAHA 2005) has not been adopted in total by any states but the information contained in it has been very useful to serve as guidelines for developing a states' control program.

**Regional Updates – VLT incidence, vaccination strategies, and control measures**

**Northeast** – One region has smoldering problems in broilers and the use of vectored and CEO vaccines are used for control. Other broiler production areas did not report any significant activity. No major problems were reported in layers. A variety of the different vaccines are used depending on the risk of challenge.

**Southeast** – Most states reported a much lower number of cases in broilers from last year. No problems were noted in the state that only allows the use of tissue culture (TC) vaccine. One state continues to experience a high incidence rate. This state is using a zone method for control whereas the infected zone uses CEO vaccine, the buffer zone a vectored vaccine, and the free zone no vaccine. Cleanout of litter is not allowed after an outbreak, a 21-day minimum downtime is required, and houses are heated to 100F for 100 hours prior to placement of chicks. If litter is spread, it is only spread within their respective zone. Layers flocks showed good control of VLT using CEO or vectored HVT vaccines.

**Midwest** – No problems with VLT was reported in broilers. In layers, VLT has been controlled in a historically high incidence area using the HVT vectored vaccine. Outbreaks in two layer complexes were reported. One contained all non-vaccinated birds and 10% mortality was experienced. The other complex that broke contained ½ of flocks that had received the HVT vectored vaccine. Those flocks showed very little problem whereas the non-vaccinates had significant mortality.

**Southwest** – Minimal problems with VLT in broilers was seen in the state that only allows TC vaccine to be used. Significant problems were seen in one state where the Poultry Improvement Committee and the Poultry Federation collaborated on the development of a revised VLT Control plan. This plan includes a revised case definition, new testing/typing protocol, and biosecurity recommendations for known positive flocks. According to

this plan, the region is divided into 5 zones based on geographic boundaries and poultry production schedules. Isolates from each of the 5 zones will be typed to ensure that the ILT is vaccine associated. No problems with VLT were reported in commercial layers.

**West** – Sporadic VLT activity was reported in one state in broilers and no problems were reported in egg layers.

**Research Update**

Recently funded projects by the US Poultry and Egg Association include 1) University of Georgia – preliminary studies on the genome of ILT for eventual use in developing a gene-deleted vaccine, and 2) North Carolina State University – ILT vaccine efficacy studies.

**Vaccine Company Updates**

CEVA-Biomune – Auburn University is conducting research on the effect of using the FP-LT inovo followed by CEO vaccine at 14 days of age administered in the water on production parameters compared to only using CEO vaccine.

Intervet/Schering Plough – Investigations of outbreaks of VLT in egg layers where the HVT vectored vaccine was used showed that either a different HVT vaccine was added to the mixture or misadministration of vaccine where a significant number of chicks were missed was involved.

Current suggested action items – 2009

- Research should be conducted to develop newer vaccines to control and prevent VLT in broilers.
- States should adopt the Model State Program –VLT (USAHA – 2005).
- Promote studies on the epidemiology of VLT outbreaks in broilers to determine the significant routes of spread

## Report of Avian Influenza and Newcastle Disease Subcommittee

David E. Swayne and Patti Miller
USDA-ARS-SEPRL

The 7th International Symposium on Avian Influenza (ISAI) was held at the Continuing Education Center, University of Georgia, Athens, Georgia, USA, 5-8 April, 2009. The co-chairs of the meeting were Ian H. Brown (United Kingdom), David Stallknecht (USA) and David E. Swayne (USA) and an international committee developed the scientific program. The symposium was organized by Mary Pantin-Jackwood, Erica Spackman and Darrell Kapczynski. The symposium had 411 participants from 54 countries who presented 79 oral talks and 122 posters on various aspects of avian influenza research, diagnosis and epidemiology in poultry. With the 7th ISAI, a wild bird ecology and epidemiology component was added as were poster awards for students and young scientists. The symposium hosted two satellite meetings: 1) ½ day OFFLU meeting for World Organization for Animal Health (OIE) and Food and Agricultural Organization, and 2) a luncheon meeting to begin organizing an international paramyxovirus conference. The 8th ISAI will be held in 2012 in the United Kingdom. The proceedings of the 7th ISAI will be published as a Supplemental Issue of *Avian Diseases*. Proceedings from the 1st-6th ISAI are available from AAAP for a nominal fee (AAAP@uga.edu, http://www.aaap.info/educmat/). Proceedings of the 1st to 4th symposia are available as a CD. The proceedings of the 5th and 6th ISAI are available on the *Avian Diseases* website (http://avdi.allenpress.com/avdionline/?request=index-html), by CD or by hardcopy.

Additionally, the subcommittee gives the following summary on exotic diseases of poultry as provided by OIE. For the period July 2008 to June 2009, 80 countries reported virulent Newcastle disease either as outbreaks, clinical disease or are considered endemic countries. Eighteen countries in Asia, Africa and Europe (Bangladesh, Cambodia, China, Egypt, Germany, Hong Kong, India, Indonesia, Iran, Japan, Laos, Mongolia, Nepal, Nigeria, Russia, Thailand, Togo and Vietnam) reported outbreaks of high pathogenicity avian influenza; all as H5N1 subtype of the A/chicken/Guangdong/1996 lineage. Eleven countries reported incidences of H5 or H7 low pathogenicity avian influenza: 1) Belgium – H5 serology in breeding geese & ornamentals, 2) Canada – H5N2 associated with respiratory disease in meat turkeys, 3) Czech Republic – H7N9 in breeding geese, 4) Dominican Republic – H5N2 in village poultry, 5) France – H5N3 in breeding ducks, 6) Germany – H5N3 and H7N7 zoo birds and poultry, 7) Haiti – H5N2 in village poultry, 8) Japan – H7N6 in commercial Japanese quail, 9) Romania – H5N3 in ducks and geese, 10) Spain – H5 in ducks, and 11) USA with H7N9 in broiler breeders Kentucky and H7N9 in commercial turkeys (Minnesota). A survey for avian influenza vaccine use in the USA for the 1 year period indicated usage of only H1 and N3 inactivated vaccine in breeder turkeys against classical swine influenza strains. A total of 7,965,000 doses were used in VA (64,000 pending), MI (131,000), AR (470,000), OH (1,150,000), MN (1,329,000), MO (1,660,000), and NC (3,161,000).

A limited survey was conducted on Newcastle disease virus (NDV) vaccine usage in the USA. For coverage of 20 million meat turkeys, HVT vectored product was used in 5.5M birds, fowl poxvirus vectored product in 5.5M birds and no NDV vaccine was used in 9M birds. In breeder turkeys, B1 killed was used in 200,000 birds and LaSota live and killed in 650, 000 birds. In 31M egg layers, all used live vaccine (B1, Clone 30, or LaSota), usually 2 or 3 doses, with some boosting 1 or 2 doses with killed B1 or LaSota. In broilers, 2B birds used 1 or 2 doses of B1, C2, or LaSota, and 500M used 1 dose of HVT vectored product. For 26M broiler breeders, 3 to 5 doses of live B1 or LaSota with 1-2 boosts of killed B1 or LaSota were typical.

With the global pandemic of H1N1 influenza A in humans, only a single outbreak has been reported in 2 turkey breeder flocks in Chile.

**Broiler Industry Annual Report**

Robert O'Connor, Foster Farms,

Mortality versus Bird Size: of the 3 bird sizes surveyed (light, mid-, heavy), the 5 – 6 lb category has increased in mortality, whereas the other two have decreased. No explanation for this trend was offered by the Veterinarians in Broiler Production group surveyed for this report.

7 Day Mortality: of the 3 bird sizes reporting, an increase in early mortality was noted in the light and middle categories. No explanation for this trend was offered by the Veterinarians in Broiler Production group surveyed for this report.

Condemnation: the lowest condemnation, Whole Bird (WB), as well as Parts occurs in the small bird category. This trend continued in 2009, thus far. And, as in years past, the mid-sized broiler condemnation (WB, as well as Parts) is the highest, followed closely by the largest category of broilers.

Ranking of Disease Issues: Coccidiosis and larygnotracheitis rank the highest (and equally) among the concerns of ten Veterinarians in Broiler Production responding to the survey. This is similar to 2008, except that Runting/Stunting Syndrome dropped considerably from a high ranking to only 1 response in 2009. Mycoplasma and Infectious Bronchitis ranked similarly to 2008, but leg issues increased to equal levels of concern in 2009. "Breeder Flushing/mortality" appears to be a new disease issue facing the industry this year versus last.

Ranking of NON-Disease Issues: Exports was once again a #1 issue, but it was ranked equally with concerns related to Antibiotic legislation. Also, Food Safety, was listed as the 2$^{nd}$ highest concern behind the aforementioned. This is a considerable increase from 2008, where it appeared as a nominal concern from those surveyed. Also, of note, Animal Welfare is still a concern to Veterinarians in Broiler Production as an issue not relating to disease.

## US Table Egg Industry Annual Report

Eric Gingerich, University of Pennsylvania School of Veterinary Medicine, Kennett Square PA

Overall health of the national table egg layer flock is very good. This is due to the continued availability of high quality vaccines, flock supervision from professional, well-trained flock supervisors, readily available veterinary technical assistance from primary breeder, vaccine company, diagnostic laboratory, and consulting veterinarians, high quality nutrition provided by professional nutritionists, housing of a majority of layers in environmentally controlled facilities in cages off litter, and the use of sound biosecurity practices. An increase in the finding of diseases thought once to be eradicated has been seen on the rise in cage-free production.

A recent poll of the Association of Veterinarians in Egg Production (AVEP) was conducted. The members were asked to rate a long list of common diseases as to their prevalence and severity in their area of service on a scale of 1 to 4 with 1 = no problems, 2 = scattered problems, 3 = a common problem, and 4 = serious, widespread problems. The survey revealed the following diseases of concern occurring in US:

| Ranking | Caged Pullets | Caged Layers | Cage-free Pullets | Cage-free Layers |
|---|---|---|---|---|
| No. of Respondents | 14 | 14 | 6 | 8 |
| 1 | Starveouts (chicks) – 2.43 | Colibacillosis – 2.64 | Coccidiosis – 2.4 | Cannibalism – 2.6 |
| 2 | Yolk infections – 2.29 | Cannibalism – 2.57 | Yolk infections – 2.3 | Colibacillosis – 2.6 |
| 3 | Peripheral neuropathy – 2.07 | *M. gallisepticum* – 2.50 | Ascarids – 2.2 | Mites – 2.3 |
| 4 | Coccidiosis – 1.93 | Calcium depletion – 2.32 | Marek's – 2.0 | Ascarids – 2.3 |
| 5 | Laryngotracheitis – 1.86 | Coccidiosis and Focal duodenal necrosis – tie 2.25 | Starveouts – 2.0 | Coccidiosis and hysteria – tie 2.1 |

The survey also asked about other issues and diseases of concern on a scale of 1 to 4 with 1 = low concern and 4 = very high concern. In the opinions of the 15 respondents, a very high level of concern was expressed for 1) welfare issues (3.60), 2) the lack of effective treatments (3.29), and 3) *Salmonella enteritidis* (SE) (3.00). A high level of concern was expressed for avian influenza (2.93). A moderate level of concern was shown for the availability of helpful vaccines (2.40).

Colibacillosis is a problem mainly of young flocks with mortality rates of 0.5 to 4% per week starting shortly after housing. It is felt that this condition is most often secondary to upper respiratory challenges with 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 is down from recent years. 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. A new tool to use against *E. coli*, a live *E. coli* vaccine, was introduced in mid to late 2006 and has been increasingly used successfully as both a preventative and as a treatment in the face of an outbreak.

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 but still continues to be evaluated in high challenge facilities. 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.

Calcium depletion is normally associated with low intake of calcium, phosphorus, and/or vitamin D3 especially early in production with low feed intakes. Peripheral neuropathy of pullets is an autoimmune diseases resembling Marek's paralysis and seen in two of the major egg laying strains typically between 5 and 8 weeks of age. Focal duodenal necrosis is felt to be due to *Clostridium colinum* and results in losses of egg weight gain and/or egg production depending on the severity of the infection. The use of the antibiotic bacitracin and/or probiotics, prebiotics, and botanical products are used successfully for prevention.

Cannibalism continues to be seen especially in high light intensity situation both caged and cage-free. In these cases, the 10-day rule for beak trimming result in longer beaks than desired compared to a beak trim at 4 to 8 weeks and results in an increase in incidence and severity of cannibalism.

Coccidiosis and necrotic enteritis continues as a problem in caged pullets and layers due to contamination of houses with coccidial oocysts from past outbreaks and recycling of these oocysts by flies or beetles. Vaccination of pullets is being used successfully as control.

Diseases under control and of low incidence are as follows: infectious laryngotracheitis (ILT), Marek's Disease of cage-free pullets, mites in cage-free layers, infectious bronchitis, 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. 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 facilities. Mites are of concern in cage-free layers as treatment is very difficult as spraying insecticides onto the vent area of the layer is much more difficult with layers on the floor. Fowl coryza is a regional disease (southern California, Florida, and south Texas) and is controlled well by the use of bacterin.

Diseases that are very rarely a problem for table egg layers are pox, Marek's, Newcastle, infectious bursal disease, chick anemia virus, erysipelas, and fowl cholera.

An outbreak of very virulent Infectious Bursal Disease (vvIBD) was seen in a confined area of California in Dec08 and May09 associated with high mortality (15 to 35%) of 11 and 14 week-old pullets (Dec08) and 28-day-old pullets (May09). A company/consulting veterinarian directed quarantine was put in place as this is not a reportable disease so state and federal authorities did not get involved. The company restricted movement of layers to within the region, established strict biosecurity, is using cleaning and disinfection techniques designed to kill the virus, and is using sentinel birds to establish success of the program.

Poultry welfare concerns are increasing as activist groups continue their activities against the caged egg industry. After winning the ballot initiative in California, the Humane Society of the United States (HSUS) is now focusing on Ohio and Michigan, two other states with ballot initiatives. Ohio is placing its own ballot initiative on the ballot for this fall proposing to establish a Livestock Care Board that would be responsible for any and all issues dealing with animal welfare in the state. The response to this ballot initiative by HSUS has not been revealed as yet. Michigan bent to HSUS threats to place a ballot initiative similar to California Prop 2 on this fall's ballot by agreeing to a plan to ban presently used cages by 2020, a longer time frame in which to comply than would have occurred if HSUS ballot initiative would have passed.

The lack of effective treatments for diseases such as colibacillosis, 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, oxytetracycline, neomycin, and chlortetracycline. Erythromycin can be used but there is no supply. The lack of an anti-parasitic product for used in controlling ascarids, or other nematodes, is especially troublesome as these conditions are becoming increasingly common in cage-free production.

SE is apparently more of a concern now due to the unknown effect of the Food & Drug Administration (FDA) Egg Safety Rule. The need for an FDA program for controlling SE in eggs was not felt to be needed by the industry as it was being addressed adequately by state and industry egg quality assurance programs until the announcement on July 7, 2009 that the FDA Final Egg Safety Rule is to become enforced beginning in July 2010. At this time, several questions still remain as to the workings of the program. The program entails obtaining chicks from 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 6 weeks after molt. If any of the manure tests are positive for SE, egg testing must take place. All testing and compliance efforts are funded by the producer. Laboratories available for testing may be difficult to find. The procedures required by FDA for testing are more sensitive and tedious than used presently and will require expenditures by the laboratories for equipment not required presently. Producers who have a flock that tests egg positive and do not have a pasteurization or hard-cooking plant that will take their eggs are in a dilemma as to what to do with that flock.

Avian Influenza (AI) continues to be a very high concern across the country. Active and passive surveillance programs are increasing across the US in response to the threat of high pathogenic H5N1 Highly Pathogenic AI (HPAI) from Asia. There is great concern in the layer industry in regard to the amount of time before egg movement can take place once a quarantine is placed on a premise in a control zone. Egg storage on large farms is often not capable of storing more than 72 hours worth of production. The United Egg Producers, Iowa State University, and the US Egg Association have proposed a FAST (Federal and State Transport) Plan for Movement of Egg Products for the table and breaking egg industries to 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 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 0 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 National Poultry Improvement Plan (NPIP) low pathogenic AI (LPAI) program for commercial layers.

Vaccine use continues to be the mainstay of disease prevention 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.

The egg industry has experienced good egg prices and profits for the last year. Feed prices have stabilized and are lower than in 2008. Reduced numbers of layers due the UEP required reduction in layers per cage and fewer layer houses being built due to uncertainty about the future of caged layer production are felt to be the reasons.

**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 & Other Avian Species, the subcommittee chairman, Dr. Clark, and turkey industry colleague, Dr. Pyle, a majority of the US turkey industry professionals and veterinarians involved in turkey production, responded to a survey about the health status of turkeys produced in August 2008 through August 2009. The turkey industry reports several disease challenges for this 12 months varying by geographical regions within a state and across the United States. This report will list, Table 1, the challenges by disease and issues.

The “lack of approved efficacious drugs” continues to be the top disease issue ranked in 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 from #4), or fowl cholera (ranked #9 from #8). The controversy over the use of antibiotics in animal agriculture remains a major concern for the turkey industry and for all of animal agriculture.

Cellulitis remains a major disease issue across all geographic regions; as the survey average increased to a score of 3.8 (from 3.3 in 2008) and ranked #2 (from #3), from 3.1 and #5 in 2007, respectively. Analysis indicates range of concern; 69% of respondents score cellulitis a 4 or 5 (severe), 13% score it a 2 or 1 (mild). Cellulitis is most commonly seen in, but not limited to, commercial male turkeys nearing market age. The prevalence and severity of cellulitis continues to increase. Veterinarians reply that the occurrence is confirmed at younger ages and in both toms and hens. 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. Research on the pathogenesis and control is on-going. Opinions vary as to risk factors and potential causes of the problem.

Poult enteritis of unknown etiologies has increased in importance, to position #4 from #5, with a score of 3.3 (from 3.0). Some of the recent poult enteritis concerns have been characterized as Poult Immunosuppression Pancreatic Enteritis Syndrome (PIPES); controlled studies with astrovirus and rotavirus isolates have reproduced PIPES. The immunosuppression persists for the life of the bird. PIPES does not have excess mortality as associated with PEMS. Turkey Coronavirus (TCV), as a defined cause of enteritis, was ranked #32 (Table 1) with 3 reported cases (Table 2).

Late mortality continues to rank as the fifth (#5) health issue. 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) 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.

Blackhead, also known as Histomoniasis, increased to position #11 in 2009 (#16, 2008; #22, 2007). It is one disease with no efficacious drug approved for use in turkeys. There were 67 reported cases of blackhead (Table 2). 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, but were taken away from the poultry industry due to misuse in another industry.

Heat stress ranked #16 following another mild summer. Poult Enteritis Mortality Syndrome (PEMS ranked #25 versus #33 previously), Ornithobacterium rhinotracheale (ORT, ranked #10 versus #13 previously) and protozoal enteritis (#15 versus #24) all increased in ranking on this year's survey. Avian Metapneumovirus (AmPV ranked #34 compared to #32) dropped in importance in the latest survey.

Mycoplasma synoviae (MS, infectious synovitis) infections, ranked #27, 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 38 cases of MS reported (Table 2). The primary breeders have remained free of MG, MM and MS. Sporadic, but increasingly frequent infections with Mycoplasma, both M. gallisepticum (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 10 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 [111th Congress] Preservation of Antibiotics for Medical Treatment Act of 2009, introduced into both the House and Senate [H.R.1549.IH; S.619.IS], otherwise known as PAMTA 2009. The turkey industry opposes PAMTA 2009, 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.

In October 2008, the Association of Veterinarians in Turkey Production sent a letter to FDA in protest of Docket No. FDA-2008N-0326 comprehensive cephalosporin extra-label drug use (ELDU) proposed ban. The ban was later dropped by the Food and Drug Administration (FDA). The FDA intent was to prohibit the extra-label use of cephalosporin antimicrobial drugs in food-producing animals, based on data that extra-label use of these drugs in food-producing animals will likely cause an adverse event in humans and, as such, presents a risk to the public health. The data was called into question and an extensive risk assessment was requested by the industry.

Turkey Production in 2008 increased to 7922.09 from 7561.58 million pounds (live weight). Overall domestic per capita consumption for turkey products decreased from 17.60 (2008) to 16.90 (2009, preliminary) pounds. Exports decreased from 676 (2008) to 547 (2009, preliminary) million pounds. Production in 2008 increased to 273.1 million head slaughtered with an average live weight (lbs) of 28.97, compared to prior year of 266.7 and 28.34, respectively (reference: Turkey Sourcebook, NTF).

**Table 1. Turkey health survey (September) of US veterinarians in turkey production ranking current disease issues**

(1= no issue to 5 = severe problem). Survey response (reply) is 100% (n=23).

| Issue | Score Average (1-5) | Score Mode (1-5) |
|---|---|---|
| Lack of approved, efficacious drugs | 4.7 | 5.0 |
| Cellulitis | 3.8 | 4.0 |
| Colibacillosis | 3.4 | 3.0 |
| Poult Enteritis of unknown etiologies | 3.3 | 3.0 |
| Late Mortality | 3.1 | 4.0 |
| Leg Problems | 3.0 | 3.0 |
| *Bordetella avium* | 2.7 | 3.0 |
| Breast Blisters and Breast Buttons | 2.6 | 2.0 |
| Cholera | 2.5 | 3.0 |
| *Ornithobacterium rhinotracheale* (ORT) | 2.5 | 3.0 |
| Blackhead (Histomoniasis) | 2.5 | 1.0 |
| Salmonella | 2.5 | 1.0 |
| Cannibalism | 2.3 | 2.0 |
| H3N2 Swine influenza | 2.3 | 2.0 |
| Protozoal Enteritis | 2.1 | 1.0 |
| Heat stress | 2.1 | 2.0 |
| Osteomyelitis (OM) | 2.1 | 2.0 |
| Tibial Dyschondroplasia (TDC, Osteochondrosis) | 2.1 | 2.0 |
| Avian Influenza | 2.1 | 1.0 |

| | | |
|---|---|---|
| Bleeders | 2.1 | 1.0 |
| Coccidiosis | 2.0 | 3.0 |
| Fractures | 2.0 | 2.0 |
| Round Worms (Ascaridia dissimilis) | 2.0 | 2.0 |
| Shaky Leg Syndrome | 1.9 | 2.0 |
| *Mycoplasma iowae* (MI) | 1.9 | 1.0 |
| Newcastle Disease Virus (NDV) | 1.8 | 1.0 |
| *Mycoplasma synoviae* (MS) | 1.7 | 1.0 |
| Erysipelas | 1.6 | 2.0 |
| PEMS (Poult Enteritis Mortality Syndrome) | 1.5 | 1.0 |
| Necrotic enteritis | 1.5 | 1.0 |
| *Mycoplasma gallisepticum* (MG) | 1.4 | 1.0 |
| Turkey Coronavirus | 1.4 | 1.0 |
| Spondylolisthesis (Kinky-Back) | 1.3 | 1.0 |
| Avian Metapneumovirus | 1.1 | 1.0 |

**Table 2. Turkey health survey (September) of US veterinarians in turkey production.** Survey response (reply) is 100% (n=23).

| | **2009** | **2008** | **2007** |
|---|---|---|---|
| Cases (##) of Blackhead (Histomoniasis) | 67 | 63 | 68 |
| Cases (##) of Mycoplasma synoviae (MS) | 38 | 47 | 52 |
| Cases (##) of Turkey Coronavirus (TCV) | 3 | 10 | n/a |

**Update on the US Poultry & Egg Association Research Grants Program**

John A. Smith
Chair, USPOULTRY Research Advisory Committee

Since inception of the program in 1969, almost $23 million have been distributed to researchers across the United States. Between 1994 and 2008, grants exceeded $850,000 per year, and topped $1 million in 11 of those 15 years. The recent economic downturn has impacted investment income, and grants were reduced in 2009-2010 to preserve capital. Grant proposals are reviewed twice yearly (except for annually in 2009-2010) and recommended by a Research Advisory Committee (RAC) consisting of twelve industry-employed individuals who are turkey, broiler or layer veterinarians, nutritionists, food safety experts, environmental engineers, and poultry production and processing specialists.

No consideration is given to the geographic location or institutional affiliation of the grant applicants. Over 50 universities, government agencies, and private firms have been funded over the years. The research proposals stand on their own merit and receive a thorough discussion and confidential scoring by the members of the RAC after an assigned expert in the subject area presents the proposal to the Committee as its “in-depth reviewer”. The members of the RAC are appointed by the Association and serve as uncompensated volunteers for the Association.

The greatest amount of funds has been directed toward the subject area of Diseases, which has received over $8.5 million. Poultry Production is second at almost $4 million, and Food Safety has received over $3.5 million. Waste Management has received over $2.9 million. Other areas funded include processing and further processing, poultry nutrition, egg product-related research, and worker health. There is overlap in the subject categories assigned to the projects so these numbers should not be interpreted as absolute. For example, a project could impact both production and diseases or diseases and food safety.

Grant funds are intended to assist researchers in addressing the immediate problems of the poultry industry, preferably providing information that can be put to use in the short term rather than providing basic knowledge. Basic research is funded occasionally but with the intention that it lead to the resolution or prevention of a real problem. Support for graduate students is often included in the grants, so the program also assists in training the next generation of poultry researchers. Approximately 30% of proposals have been funded.

More information on the deadlines for the submission of research proposals and the accessing of summaries of completed projects may be obtained at www.poultryegg.org by clicking on “Research”. The summaries may be retrieved by the use of keywords.

This research funding program by the US Poultry & Egg Association is a good example of how an industry can help itself by obtaining important information it needs while funding the education of graduate students and post-docs in poultry related subject areas. It is definitely a mutually beneficial relationship. Funding for the program comes from the net revenues from the International Poultry Exposition, held each January in Atlanta, which is the world’s largest trade show for the poultry, egg and feed industries.

## National Poultry Improvement Plan Annual Report

Andy Rhorer
USDA-APHIS-VS

National Poultry Improvement Plan is a Federal-State-Industry cooperative program. There are 49 Official State Agencies and 137 Authorized Laboratories. Official NPIP disease monitoring classifications include: U.S. Pullorum Typhoid Clean, U.S. Mycoplasma Gallisepticum Clean & Monitored, U.S. Mycoplasma Synoviae Clean & Monitored, U.S. Mycoplasma Meleagridis Clean, U.S. Salmonella Enteritidis Clean, U.S. Sanitation Monitored, U.S. Salmonella Monitored, U.S. Avian Influenza Clean, and U.S. H5/H7 Avian Influenza Clean for poultry breeding flocks; and U.S. H5/H7 Avian Influenza Monitored for commercial (production) poultry flocks.

Pullorum-Typhoid Status: In calendar year 2009 (Jan. 1 through October 1, 2009), there were no isolations /outbreaks of *Salmonella pullorum* reported to the Poultry Improvement Staff. There was one isolation/outbreak of *Salmonella pullorum* (standard strain) reported during calendar year 2008. There have been no isolations of *Salmonella gallinarum* since 1988 in any type poultry. U.S. Pullorum-Typhoid Clean participating hatcheries include: 283 egg and meat-type chicken hatcheries, 48 turkey hatcheries, and 775 waterfowl, exhibition poultry and game bird hatcheries.

**Table 1: NPIP U.S. Pullorum-Typhoid Clean Participating Breeding Flocks and Number of Birds in Flocks:**

| Breeding Type | Number of Flocks | Number of Birds |
|---|---|---|
| Egg-Type Chickens | 187 | 3,205,906 |
| Meat-Type Chickens | 5,140 | 75,820,652 |
| Turkeys | 518 | 4,603,212 |
| Waterfowl, Exhibition, Game Birds | 3,648 | 1,475,373 |
| Total | 9,493 | 85,105,143 |

Avian Influenza Status: In calendar year 2009 (Jan. 1 through October 10, 2009), there was 1 KY premises with H7N9 Notifiable Low Pathogenicity AI (LPNAI) in broiler breeders, 1 IL premises with H7N9 LPNAI in meat turkeys, and 3 MN premises with H7N9 LPNAI in meat turkeys.

**Table 2: 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 Type | No. Flocks | No. Birds in Flocks | No. Tests Performed |
|---|---|---|---|
| Egg-Type Chicken Breeders | 182 | 3,358,794 | 20,724 |
| Table-Egg Layers | 3,425 | 257,835,389 | 179,915 |
| Meat-Type Chicken Breeders | 5,145 | 87,287,608 | 653,540 |
| Meat-Type Chicken Breeders | 141,112 | 8,705,025,422 | 1,481,470 |
| Turkey Breeders | 631 | 5,797,789 | 57,226 |
| Meat-Type Turkeys | 14,873 | 200,688,775 | 226,477 |
| Waterfowl, Upland Gamebirds, Ex. Poultry | 1,313 | 13,532,425 | 103,751 |
| Total | 166,681 | 9,273,526,202 | 2,723,103 |

Authorized Laboratories Activities: The University of GA Poultry Diagnostic & Research Center provides quality assurance panel of convalescent contact infected chicken sera against MG and MS to Authorized Laboratories as a check test tool. The National Veterinary Services Laboratories issues a group D Salmonella check test and an avian influenza check test for the Agar Gel Immunodiffusion Test annually for Authorized Laboratories of the NPIP. Laboratory training provided to the Authorized Laboratories includes Annual Hands-on

Salmonella Isolation and Identification Workshop, Mycoplasma Diagnostic Workshop and the Avian Influenza Diagnostic Workshop.

**National Veterinary Services Laboratories Avian Influenza and Newcastle Disease Diagnostics Report**

Mary Lea Killian
National Veterinary Services Laboratories
USDA-APHIS-VS

**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 4,377 specimens in 672 submissions from 11 states (CT, FL, MA, ME, NH, NJ, NY, OH, OR, PA, RI) by virus isolation in embryonating chicken eggs. The surveillance is a collaborative effort between individual States and the United States Department of Agriculture. However, only specimens submitted to the NVSL, which include all presumptive positive specimens detected at the State level, are reported here.

In FY 2009, AIV or APMV was isolated from 7% (46 of 672) of submissions and 2% (85 of 4377) of specimens tested. AIV subtype H5N2 was the most common subtype found in the LBMS this year; it was isolated from 14 specimens in 4 submissions from NY. The H5 AIVs were low pathogenicity avian influenza (LPAI) virus by the chicken pathogenicity test and/or deduced amino acid profile at the hemagglutinin (H) cleavage site. Genetic studies showed the H5 viruses to be most closely related to recent North American H5 viruses circulating in wild ducks. Other subtypes of AIV isolated from the states where the specimens originated, and the number of isolations were: H2N2 (NY, n=6; PA, n=1), H2N3 (PA, n=1), H6N2 (FL, n=1), H10N7 (OR, n=1). The remaining 60 viruses isolated were identified as APMV; 54 were APMV-1 from 4 states (MA, NJ, NY, PA) and 4 were identified as pigeon paramyxovirus type-1 (PPMV-1) from NJ. Pathogenicity of representative APMV-1 isolates was determined by the intracerebral pathogenicity index (ICPI, n=9) test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site (n=32). All but 4 isolates were characterized as low virulent (lentogenic pathotype) strains; the 4 isolates were characterized as pigeon paramyxovirus type-1 (PPMV-1), a pigeon-adapted variant of Newcastle disease virus. In addition, an APMV-4 was identified in one specimen from NJ, and an APMV-6 in one specimen from NJ.

**Low Pathogenicity Avian Influenza (LPAI) in Commercial Poultry and Backyard 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 confirmation testing of positive specimens. During FY 09, two detections of notifiable LPAI (LPNAI) in commercial poultry were reported to the World Organization for Animal Health (OIE). The first detection occurred in April, 2009 in a single flock (two houses) of approximately 20,000 broiler breeders in Kentucky that were positive for antibodies to H7N9 during routine National Poultry Improvement Program (NPIP) monitoring. Subsequently, swabs collected from the flock were positive for H7 specific RNA but no virus was isolated. The flock was depopulated. The second detection was an outbreak of H7N9 AIV in commercial meat turkeys in Minnesota. Between May and September, 2009 more than 55 houses (approx. 500,000 birds) in 7 premises (4 counties) in Minnesota were found to be infected. Antibodies to H7N9 were detected in birds from all 7 premises and in August an H7N9 virus was isolated from the $7^{th}$ premises. The virus was shown to be LPNAI and most closely related to North American H7 viruses circulating in wild waterfowl. Premises with young turkey poults were depopulated; all other premises were depopulated by controlled marketing within the state of Minnesota. Surveillance in affected areas is continuing.

In addition to the two reports to OIE, three epidemiologically independent events occurred in commercial poultry where antibodies to AIV were detected but no virus or specific RNA was detected. Detections of specific H5 or H7 antibodies in commercial flocks without isolation of virus or detection of specific RNA are not notifiable. The first flock was detected in April when antibodies to H7N9 were detected in a flock of 10,000 meat turkeys in Illinois as a result of premarket testing. At the time of testing, no clinical disease was reported. The second and third flocks occurred in Tennessee and both involved H7N9; a grandparent flock (2 houses, 14,700 birds) of broiler breeders (April) and a flock of 14,900 17-week-old broiler breeders (May). All three farms in Illinois and Tennessee were depopulated.

Detection of additional LPAI AIV or AIV-specific antibodies in poultry/birds is shown in Table 1.

**AI Diagnostic Reagents Supplied by the NVSL.** During FY 2009, a total of 15,112 units of AGID reagents (antigen and enhancement serum) were shipped to 83 state, university, and private laboratories in 35 states and Puerto Rico. The quantity is sufficient for approximately 1,813,440 AGID tests. An additional 383 units (45,960 tests) were shipped to 10 foreign laboratories.

**Reverse real-time (rRT)-PCR Proficiency Test Panels.** The National Animal Health Laboratory Network (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 tests. In FY 2009, PTs were distributed to 280 diagnosticians in 55 laboratories for AI rRT-PCR and 277 diagnosticians in 54 laboratories for APMV-1 (Newcastle disease) rRT-PCR.

**AIV Surveillance in Wild Waterfowl.** In 2009, waterfowl surveillance for highly pathogenic notifiable H5N1 in Alaska and the lower 48 states continued. The surveillance is a cooperative effort of USDA's Animal and Plant Health Inspection Service (APHIS, NVSL), Wildlife Services (WS, National Wildlife Research Center, Fort Collins, CO) and the Department of Interior's United States Geological Survey (USGS, National Wildlife Health Center, Madison, WI). Specimens collected from wild-caught and hunter-killed waterfowl, the environment and feces were screened by rRT-PCR for AIV specific ribonucleic acid (RNA) at WS, NAHLN laboratories and at the U.S. Geological Survey (USGS) laboratory in Madison, WI. All presumptive H5 and H7 positive specimens were submitted to the NVSL for confirmation and virus isolation. Between October 2008 and September 2009, 903 presumptive positive specimens were received for confirmation testing. No HPNAI H5N1 was detected; however, LPAI H5N1 virus was detected in specimens submitted from 3 states (KY, MN, and WY). A total of 93 H5 viruses (various N subtypes) from 26 states and 71 H7 viruses (various N subtypes) from 27 states were isolated. All H5 and H7 AIVs were characterized as LPAI viruses of North American lineage. Other AIV subtypes isolated included H1, H2, H3, H4, H6, H10, and H11. Details of the wild bird surveillance will be reported separately.

**NEWCASTLE DISEASE**

**Isolations of Virulent Newcastle Disease Virus (vNDV).** In FY 2009, no vNDV was isolated from domestic poultry or birds confiscated by U.S. Customs. However, vNDV was isolated from one lot of Passerine birds imported through a quarantine facility in California, and pigeon paramyxovirus type-1 (PPMV-1) was isolated from 18 pigeons in 7 states (CA, CT, FL, IL, MN, NJ, and TX). In addition, vNDV was isolated from a wild cormorant specimen from PA (October 2008).

**Isolations of Low Virulent Newcastle Disease Virus (loNDV).** During FY 2009, 65 isolates of APMV-1 were received for characterization at the NVSL or were isolated at the NVSL from diagnostic submissions. The specimens originated from 14 states (CA, CT, FL, IA, MA, MN, NJ, NY, OR, PA, TX, WA, WI, and WY). All of the isolates were characterized as loNDV by the intracerebral pathogenicity index (ICPI) and/or by deduced amino acid motif at the fusion protein cleavage site.

**Table 1. Subtypes of non H5 or H7 low pathogenicity avian influenza virus (AIV) or specific antibodies detected in poultry/birds, FY 2009.**

| State | Species | Subtype of AIV* (number) | Antibody Subtypes (number) |
|---|---|---|---|
| California | Turkey | H2N8(2) | |
| Delaware | Guinea fowl | | H6N2 |
| Florida | Chicken<br>Swan | H6N2(2) | H6N2<br>Multiple |
| Georgia | Duck | | Multiple |
| Massachusetts | Turkey<br>Duck | | H1[a], H3N3, H5N3[a]<br>Multiple |
| Maryland | Chicken | | H6N1,4 |
| Minnesota | Turkey | H4N2 | |
| New York | Duck | | Multiple |
| Ohio | Duck | H4N2, H6N2 | |
| Pennsylvania | Chicken<br>Environment | H4N6<br>H4N8 | |
| Tennessee | Chicken | | H9N2(2) |
| Wisconsin | Swan | | Multiple |

*Low pathogenicity AIV by the chicken pathogenicity test.

[a]Zoological garden

## National Veterinary Services Laboratories Update: Salmonella, Pasteurella & Mycoplasma from Poultry

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***Salmonella***

From January 1 through Dec 31 2008, NVSL serotyped 20,735 *Salmonella* isolates recovered from animals, their environment, or feed. The most common serotypes found in chickens and turkeys this year are listed in Tables 1 and 2 respectively. Phage typing results for *Salmonella enteriditis* are shown in Table 3.

**TABLE 1: MOST COMMON SEROTYPES - CHICKENS Jan-Dec 2008**

| Clinical | | Non-Clinical | |
|---|---|---|---|
| **Serovar** | **No. Isolates** | **Serovar** | **No. Isolates** |
| Enteriditis | 35 | Kentucky | 1412 |
| Kentucky | 28 | Heidelberg | 992 |
| Heidelberg | 12 | Enteriditis | 841 |
| Typhimurium | 9 | Typhimurium | 243 |
| 4,5,12:i:- | 5 | Typhimurium 5- | 228 |
| All others | 21 | Montevideo | 173 |
| | | Senftenberg | 165 |
| | | Schwarzengrund | 144 |
| | | 4,5,12:i:- | 130 |
| | | *Salmonella* untypable | 129 |
| | | All others | 1581 |
| **Total** | **110** | **Total** | **6038** |

**TABLE 2: MOST COMMON SEROTYPES – TURKEYS Jan-Dec 2008**

| Clinical | | Non-Clinical | |
|---|---|---|---|
| **Serovar** | **No. Isolates** | **Serovar** | **No. Isolates** |
| Senftenberg | 109 | Senftenberg | 272 |
| Hadar | 34 | Hadar | 130 |
| Agona | 24 | London | 84 |
| Montevideo | 22 | Saintpaul | 76 |
| Heidelberg | 16 | Muenster | 75 |
| All others | 154 | Agona | 71 |
| | | Heidelberg | 44 |
| | | Kentucky | 42 |
| | | Newport | 41 |
| | | Anatum | 40 |
| | | All others | 442 |
| **Total** | **359** | **Total** | **1357** |

**TABLE 3: *Salmonella enteriditis* Phage Typing Results Jan-Dec 2008**

| Rank | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| 1 | 13 (76) | 13 (98) | 8 (156) | 8 (103) | 8 (240) |
| 2 | 8 (25) | 8 (80) | 13 (96) | 13 (29) | 13 (82) |
| 3 | 23 (12) | 22 (14) | 23 (16) | 23 (16) | 23 (58) |
| 4 | 13a (8) | 13a (13) | 4 (12) | 13a (15) | 13a (43) |
| 5 | 2 (2) | 23 (9) | 13a (8) | 1b (1) | RDNC (10) |
| 6 | 8a (1) | 4b (4) | 2 (2) | 2 (1) | 2 (4) |
| 7 | 28 (1) | 2 (3) | 4a (2) | 6a (1) | 22 (3) |
| 8 | | 6a (1) | RDNC (2) | 22 (1) | 6a (2) |
| 9 | | 9b (1) | 30 (1) | | 8a (1) |
| 10 | | | Others (2) | | 12 (1) |
| **Total** | **125** | **223** | **297** | **167** | **444** |

***Pasteurella* and *Mycoplasma***

NVSL received 163 isolates for somatic typing in 2009, a slight decrease from 2008 (Table 4). NVSL also supplied 40 ml of *P. multocida* typing sera, a decrease from 159 ml in 2008. The amount of *Mycoplasma* reagents are shown in Figures 1 and 2.

**TABLE 4: *Pasteurella multocida* somatic typing. Table shows number of isolates for each type.**

| Type | 2008 | 2009 |
|---|---|---|
| Type 3 | 46 | 54 |
| Type 3, 4 | 39 | 33 |
| Type 1 | 33 | 14 |
| All other | 80 | 62 |
| **Total** | **198** | **163** |

**USDA-ARS Avian Diseases and Oncology Laboratory -- Contributions to the U.S. Poultry Industry and Future**

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According to the USDA's Economic Research Service (AIS-86, December 2008) poultry meat and eggs added $36.7 billion to the U.S. economy. The poultry industry is the second largest food animal industry in the U.S. Poultry meat and eggs are one of the most popular and economic sources of protein for American consumers and trade partners around the world. In the U.S. alone, the consumption of chicken meat exceeds 80 lbs per capita (higher than any other meat product). In addition, approximately 70% of the worldwide commercial egg layers, broilers and turkey industries depend on poultry breeding stock supplied by primary breeding companies based in the U.S.

Currently, the U.S. and global poultry industries face numerous and growing challenges that could detrimentally affect production and supply of these vital products. Continued concerns about the effects of viral infections capable of causing tumoral diseases in poultry flocks are a major issue for the future of the poultry industry. The development of new and improved vaccines against evolving Marek's disease field virus (MDV) strains; new diagnostic and virus assay methods for the detection and elimination of all groups of Avian Leukosis (ALV) and Reticuloendotheliosis viruses (REV) from both primary breeding populations and live vaccines; and improved genomic/immunogenetic tools are some of the most important areas of concern to ensure the health, welfare and continued productivity of the U.S. poultry industry.

The USDA-ARS conducts highly relevant basic research on tumor virus diseases that is critical to the future well-being of the U.S. poultry industry. For over 50 years the USDA- ARS Avian Diseases and Oncology Laboratory (ADOL) in East Lansing, Michigan has been the world's leading institution on avian tumor virus research with an impressive record of accomplishments. Since 2005 ADOL has served as the World Animal Health Organization (OIE) Reference Laboratory for Marek's disease, the national and international Center of Excellence for Avian Tumor Virus Research, and is the national reference Diagnostic Laboratory for tumorous diseases of poultry. ADOL's staff is comprised of renowned scientists who have been leaders in various areas related research and diagnosis of avian tumor viruses, poultry genomics and immunogenetics and genetic resistance to disease. Further, these scientists develop and maintain unique and highly specialized poultry lines essential in distinguishing endogenous and exogenous ALVs, genetic disease resistance research, and the production and quality assurance of poultry vaccines.

Over many years the ADOL research programs and services have substantially benefited the commercial egg laying, broiler, turkey, and allied industries such as primary breeders, vaccine manufacturers and commercial diagnostics. In addition, ADOL has been a preferred center for the education and training of many USDA/APHIS scientists and other researchers working in universities and private research institutions in the U.S. and around the world. Some of the most notable achievements and contributions of ADOL are summarized below:

1. Developed HVT and other vaccines against Marek's disease. This has resulted in over $ 100 million estimated savings/year as a result of reduced bird condemnations or increased egg production.
2. Developed diagnostic reagents essential for ALV eradication programs.
3. Invented the i*n ovo* vaccination methodology which provided significant savings in labor and led to the formation of a new industry (e.g. Embrex that was recently acquired by Pfizer, Inc.).
4. Developed the first cell-culture vaccine for hemorrhagic enteritis of turkeys. The invention was patented and several U.S. poultry vaccine manufactures have been producing the vaccine under a USDA Royalty generating non-exclusive license.
5. Generated the first transgenic chicken and documented use of pathogen-derived resistance against disease.
6. Developed the first molecular genetic map of the chicken genome. This has been used as the framework for the chicken genome sequence.
7. Provided tools and knowledge for the diagnosis and control of the massive 1990s outbreaks of ALV subgroup J in broiler breeders and their progeny. Such outbreaks threatened the viability of the entire broiler breeder industry.
8. Developed unique reagents such as viruses, antibodies, PCR primer sets, deoxyribonucleic acid (DNA) probes, monoclonal antibodies, etc. These reagents are extensively used in the diagnosis and characterization of avian tumor viruses. ADOL executed numerous material transfer agreements (MTAs)

and Biological License Agreements to supply various laboratories in the USA as well as in other countries with these specific reagents.

9. Developed more effective protocols for screening live-virus vaccines for contamination with ALV. USDA-APHIS-CVB revised Supplemental Assays Methods (SAM-405) to include these tests developed by ADOL (SAM-415).
10. Provided the vaccine manufacturing industry, APHIS & OIE with protocols for detection of reticuloendotheliosis virus (REV) in live virus vaccines.
11. Developed first high density genetic marker panel. The panel is used to characterize, fingerprint, and trace back commercial chickens.
12. Developed a DNA-based technology to assess the genetic susceptibility of chicken lines to ALV. This technology is being adopted by poultry breeders.
13. Developed and maintains 41 genetically unique chicken lines; these lines have been included in the National Registry of Genetically Unique Animal Populations. These lines are essential for immunogenetics research and are being used by various research institutions.
14. Recently scientists at ADOL developed a new generation (recombinant) vaccine strain against Marek's disease using two molecular technologies named Overlapping Cosmid Clone and Bacterial Artificial Chromosome (BAC). The new experimental vaccine referred to as "Meq-deleted Marek's disease virus" has been shown in both laboratory and field trials to be superior to currently available commercial vaccines. Four vaccine manufacturers have executed Material Transfer Agreements with USDA-ARS.

**Future Needs:**

For the reasons presented above, the poultry and allied industry stakeholders across the United States are very concerned about maintaining and enhancing research to protect the industry. The threat posed by continuously evolving and/or emerging new strains of tumor viruses requires the development of new methodologies to select for genetic disease resistance.

ARS-ADOL poultry research capabilities must be preserved and enhanced to maintain their ability to continue research in these important areas. Over the past few years budget constraints have had a negative impact on the scientists' ability to conduct research as cost of supplies and equipment have increased. In particular, stakeholders request the addition of $1 million in annual appropriations to ARS to 1) add a DVM/Ph.D. pathologist to address research in Marek's disease and 2) add additional funding to maintain the highly specialized chicken genetic lines and support the integrated research needed to identify and investigate the genes directly involved in resistance to Marek's disease, all subgroups of Avian Leukosis Viruses, and general disease resistance.

**Impact:**

USDA/ARS programs are critically important for the future of animal agriculture and ADOL's research programs and services are vital for the future well-being of the US and global poultry industry. The need for continuous research related to poultry tumor virus and genetic resistance to disease is and will continue to be at the forefront for enabling the US poultry industry to be efficient, meet welfare standards, and provide a safe, economic and wholesome protein source for consumers in this country and abroad.

## Research Update on Exotic and Emerging Poultry Diseases

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**Novel H1N1 Influenza**

Beginning in April 2009, cases of acute respiratory disease were reported in humans caused by a novel H1N1 influenza A virus in Mexico. The causative agent was complex reassortant influenza A virus with gene segments from North American classic H1N1 swine viruses, North American avian viruses, human influenza A virus and Eurasian H1N1 swine viruses. To study infectivity and transmissibility of the 2009 novel H1N1 strain in poultry, turkeys, chickens, domestic ducks and Japanese quail were intranasally challenged with the virus and naïve birds put in contact. No clinical disease was produced. Detection of virus replication was infrequent, and only in the oropharyngeal swabs of intranasally inoculated Japanese quail. There was no contact transmission of the viruses for any of the species. These data suggest turkeys, chickens, and domestic duck have low risk for field infection, but Japanese quail might become infected, but because replication and shedding was limited to the respiratory tract and the virus did not transmit to quail by contact, suggested low potential for initiation and sustaining an outbreak unless the virus mutates or reasserts with an avian influenza virus.

**Avian Influenza Virus**

Sporadic cases of H5N1 have occurred in pigs and various carnivorous mammals. To understand the route of transmission that oral ingestion might play and the pathogenesis, several H5N1 HPAI viruses were studied in pig and ferret models. Intranasal inoculation produced infection, initiated in the respiratory tract in both pigs and ferrets. Feeding of infected chicken meat to pigs produced asymptomatic infection with virus present in tonsil and respiratory tract but not in the digestive tract. By comparison, 2 H5N1 viruses in infected chicken meat fed to ferrets produced only respiratory infection while the A/Vietnam/1203/04 virus produced a combined respiratory and digestive tract infection, initiated simultaneously in both sites.

The chicken's major histocompatibility complex (MHC) and non-MHC genes have a profound influence on the resistance or susceptibility to certain pathogens. Recently, 100% survival in the field by Thai indigenous chickens to H5N1 high pathogenicity avian influenza (HPAI) outbreaks was attributed to B21 MHC haplotype while the B13 MHC haplotype was associated with 100% mortality in the field, although virus infection was not determined in this study. To determine the influence of the MHC haplotype on HPAI resistance, a series of MHC congenic white leghorn chicken lines (B2, B12, B13, B19 and B21) and lines with different background genes but with the same B2 MHC haplotype (Line 63 and 71) were intranasally challenged with low dose (10 mean chicken lethal dose 50) of H5N1 HPAI virus rgA/chicken/Indonesia/7/2003. None of the lines were completely resistant to lethal effects of the challenge as evident by mortality rates ranging from 40 to 100%. This did not support the Thai field results. In addition the MX gene's affect on avian influenza virus resistance was examined. The polymorphism at position 631 of the MX gene has previously been reported to be important in antiviral resistance. Studies in chickens with and without the polymorphism were studied, and some differences in mean death time were observed but no difference in overall mortality was seen. The role of the MX gene in disease resistance to influenza remains unresolved.

A new technique to evaluate antigenic characteristics of available vaccines to circulating field strains, referred to as antigenic cartography, is being developed for poultry use. Antigenic cartography converts hemagglutination inhibition (HI) data from a tablular form to a 2D or 3 D map, similar to what phylogenetic trees do for sequence data. This information is being applied to H5N1 isolates and vaccines available in Egypt to help select vaccines that will provide the best protection. This data will be confirmed with a vaccine/challenge study.

Ducks have been implicated in the dissemination and evolution of H5N1 highly pathogenic avian influenza (HPAI) viruses. Vaccination of domestic ducks against H5N1 HPAI is being conducted as a method of control but with mixed results. One of the observations from the field is that Muscovy ducks (*Cairina moschata*) respond differently to vaccination than other common domestic duck species (*Anas sp.).* Differences in the severity of clinical signs, antibody titers, and viral shedding after vaccination were observed between these two duck species, with Muscovy ducks presenting less protection after vaccination and longer duration of virus shedding. Differences were found in the innate immune response between Pekin and Muscovy ducks which may explain the differences observed in response to vaccination. This information should be taken into account when implementing vaccine strategies for control of HPAI in different bird species.

**Newcastle disease epidemiology and diagnostics.**

Avian Paramyxoviruses of serotype-1 are detected in the U.S. with the USDA validated real-time RT-PCR (RRT-PCR) assays used by diagnostic laboratories in the National Animal Laboratory Health Network. The matrix gene (M) assay is used as a screening assay to detect all APMV-1, even those of low virulence. The fusion gene

(F) assay is tested with matrix positive samples to identify virulent isolates. The matrix test however does not detect many class I APMV-1 viruses, which include primarily low virulence wild bird isolates and live bird market isolates, because the matrix test was designed primarily for class II viruses. As part of the laboratory effort to evaluate NDV viruses from other countries, a group of class II virulent APMV-1 isolates from Pakistan from genotypes VII and VI were not detected by the M assay. Analysis of the Pakistan viruses showed mismatches in the probe that accounted for the false negative. A modified probe with degenerate bases was developed that allowed the detection of the Pakistan as well as the other class II viruses. A second issue with the RRT-PCR test was also identified with the fusion probe. Previously we have published data that virulent pigeon viruses are not detected by the F assay due to too many mismatches between the probe and virus sequences. Our current work shows that APMV-1 isolated from cormorants in some northern states in 2008 also are not detected by this fusion assay. Interestingly some of these cormorant viruses also do not hemagglutinate chicken red blood cells. Improved protocols with new primer and probe sets have been designed to correct all of these deficiencies. The APMV-1 viruses represent a widely divergent group of viruses and molecular tools like RRT-PCR to remain effective need to be evaluated for specificity and sensitivity on an ongoing basis.

**Enteric diseases of poultry**

Poultry enteric disease is marked by diarrhea, stunting, increased time to market, immune dysfunction and increased mortality. Numerous viruses have been detected in the intestinal tract of poultry, and have subsequently been implicated in enteric disease. Using a random PCR technique we successfully identified novel chicken and turkey parvoviruses in intestinal homogenates from enteric disease-affected birds. Sequence analysis of these viruses demonstrated that the chicken and turkey parvoviruses were closely related to each other and representative of a novel genus within the Parvoviridae family. Experimental infection of day-old broiler chickens with this novel chicken parvovirus caused enteric disease with characteristic signs to runting-stunting syndrome. In a nationwide survey, using a diagnostic PCR assay we demonstrated that these parvoviruses are widely distributed in commercial poultry flocks in the United States. Our in-house ELISA test to detect maternally acquired antibodies and antibodies produced following acute infection proved to be a valuable tool to study epidemiology and biology of chicken and turkey parvoviruses.

**National Animal Health Monitoring System Poultry Studies Update**

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The National Animal Health Monitoring System (NAHMS) is a nonregulatory division of the United States Department of Agriculture (USDA) designed to help meet the Nation's animal-health information needs. NAHMS is currently preparing for a national poultry study to take place in 2010. An information needs assessment was conducted. A questionnaire was distributed to broiler, layer, turkey, and primary breeder veterinarians via their respective professional organizations. The questionnaire was also distributed to federal and state veterinarians and university research/extension personnel. Additionally, discussions were held with each poultry veterinary group to further clarify their information needs as well as with the U.S. Animal Health Association (USAHA) Transmissible Diseases of Poultry & Other Avian Species committee in October 2008.

Based on the input from stakeholders, the objectives for the NAHMS 2010 poultry study are as follows:

1. Describe the structure of commercial poultry industries (broiler, layer, turkey, and primary breeder), including interactions, movements, and biosecurity practices. Describe farm level practices for layer and broiler primary breeder and multiplier flocks. Identify critical factors for exclusion of disease (such as Mycoplasma or infectious laryngotracheitis).
2. Estimate the prevalence and identify risk factors associated with Clostridial dermatitis (cellulitis/ gangrenous dermatitis) on turkey grower farms.
3. Estimate the size of the urban chicken population in 4 U.S. cities. Describe bird health, movement and biosecurity practices of urban chicken flocks.

Approximately 60 broiler, layer, turkey, and primary breeder companies, accounting for the majority of poultry production, have been invited to participate in the study. The study is planned to begin in May 2010. A company questionnaire (one survey per company) addressing industry structure may be completed either on-line or as a paper version. A sample of farms from companies having layer or broiler primary breeder or multiplier (parent) flocks, will be selected to complete a farm-level breeder questionnaire, addressing biosecurity and movement on breeder farms.

Turkey companies will select a sample of their most and least affected grower farms for the Clostridial dermatitis case-control study. A questionnaire addressing potential risk factors will be completed for each farm. Biologic sampling plans have not been finalized. Under consideration are culture to assess toxin and other organism pathogenecity markers, intestinal histopathology to determine intestinal changes that precede an outbreak, Clostridial spore counts and coccidia in the litter, and pH testing of water, soil, and/or litter.

The urban chicken study will be conducted in 4 cities (Los Angeles, Denver, New York, and Miami). A survey of residents in these cities will be conducted to estimate the size of the urban chicken population. Additionally, a survey will be conducted of customers purchasing chicken feed at feed stores and pet shops to describe practices of urban chicken owners.

## Backyard Poultry and Upland Game Bird Surveys

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Over the past two years, Colorado State University has conducted three projects focused on characterizing backyard poultry and upland game bird populations.

The Metropolitan Denver area was the focus of the first project. In order to determine the prevalence of backyard poultry flocks within this geographical area, single-family residences were randomly selected from census data in census block form. Residences were approached by a canvassing team from Colorado State University and residents were asked about poultry ownership. If the resident reported that poultry were present at the residence, a survey on general flock information was administered. Preliminary data shows that in the central Denver area, 1.64% of residents contacted owned a poultry flock while in the suburban areas at the periphery of the Denver area, 4.35% of residents contacted owned a poultry flock. Poultry flock sizes ranged from 1-130 birds, with most flocks consisting of 20 birds or less. Species represented included chickens, turkeys, upland game birds, waterfowl, peafowl and pigeons.

In order to characterize the backyard flock population in Colorado, a survey was conducted to collect information on general flock characteristics, husbandry practices, purpose of flock ownership, biosecurity practices, human-bird interactions and general health status. Surveys were sent to backyard flock owners and 317 out of 784 surveys were returned (40% response rate). Two-thirds of the flocks represented by the surveys are composed of 50 or fewer birds, while the other one-third is composed of more than 50 birds. Turnover of birds within flocks was frequent and the vast majority of flocks were multi-species flocks. The primary purpose for flock ownership was raising laying hens for family egg consumption. Approximately 46% of flock owners had moved one or more birds from the flock to another site within the past twelve months. Most of the movement was intrastate but some was interstate. There was a general lack of biosecurity practices and veterinary care associated with these flocks.

A nationwide survey was conducted to collect information on the US upland game bird industry. We received contact information for 10,081 upland game bird flock owners from 43 states. We randomly selected and interviewed 218 upland game bird flock owners by phone. Surveys addressed general flock characteristics, husbandry practices, commercial status, raised for release status, bird movement, general health status, human-bird interactions, interactions with wild birds and animals, housing and biosecurity practices. Facilities were characterized as commercial (breeding/growing) - 22%, release (hunting/wildlife repopulation) – 54%, or hobby (exhibition/companion animal) - 24%. Median flock size over 12 months was 600 birds, with commercial facilities housing the highest number of birds at a median of 2302 birds. Flocks housed a median of three different species of birds and 50% of flocks raised birds year-round. The purpose of most of the flocks was to raise birds for hunting or dog training. Overall, there was extensive bird movement recorded. In addition, there was a general lack of use of biosecurity practices and limited use of veterinary services.

## Resolution 54 Update: Move to a Secure Egg Supply during HPAI Outbreak

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In April 2006 United States Department of Agriculture – Animal & Plant Health Inspection Service (USDA-APHIS) met with all segments of the poultry industry to discuss its Animal Disease Response Preparedness Plan. While supporting the quick response to disease outbreak, the industry realized that the proposed response plan would cause significant challenges to continuing to supply customers with eggs and egg products because of the current 'just-in-time' supply chain model of the industry. A representative group of the egg sector was able to get a resolution passed at the U.S. Animal Health Association (USAHA) convention in 2007, aimed at having USDA-AHPIS-Veterinary Services (VS) include business continuity in Highly Pathogenic Avian Influenza (HPAI) outbreak response plans. The USDA-AHPIS-VS acknowledged the industry's concerns about business continuity and maintaining product supply to customers, but stated that any policies instituted while seeking to maintain the supply chain, must be based on sound science and epidemiology. Since then a very active and dedicated group of industry, government and academia representatives have met almost every two weeks with the goal of developing acceptable guidelines and programs that would ensure the safe movement of eggs and egg products within, in and out of a HPAI control zone during an outbreak. The group has had many successes and continues to work towards its goal while welcoming new input from others who have interest in the safe movement of eggs and egg products.

**Memoranda of Understanding**

The working group is working with and encouraging State Animal Health Officials to establish memoranda of understanding (MOU) with neighboring states that will help govern the response to movement of eggs and egg products based on the best science available during an HPAI outbreak. To date only one MOU has been signed between Minnesota and Iowa. But the group continues to work towards this goal, and currently a number of other states are working towards signing MOUs.

**Secure Egg Plan**

The Secure Egg Supply Plan (SES) was developed to avoid unnecessary destruction of eggs from healthy flocks in a high pathogenicity avian influenza (HPAI) Control Area. The SES plan is a science-based preparedness plan developed by The Egg Sector Working Group, which includes representatives of the egg industry, USDA-APHIS-VS, the University of Minnesota, and Iowa State University. The overall goal of the SES plan is to safely move eggs and egg products from, into or within a HPAI Control Area without endangering the health of uninfected flocks. The plan also supports a continuous supply of eggs for the US public, facilitates business continuity for the egg industry and their retail and food service customers and fosters a high level of government, industry, and consumer confidence.

Most egg production facilities do not have the capacity to store eggs or egg products for a prolonged period of time. In addition, just-in-time supply practices mean that a brief interruption in movement can result in large shortages of eggs to consumers. Historically, emergency preparedness plans for HPAI involved extensive prohibitions on movement of poultry, eggs and egg products as part of efforts to control and eradicate an outbreak. Scientific studies of HPAI transmission dynamics and risk assessments have provided additional insights on ways to effectively manage HPAI while minimizing the disruption of egg movement in the food supply chain. Risk assessments suggest that pasteurized eggs and egg products produced by healthy flocks with good biosecurity in an HPAI Control Area could be marketed without delay. Holding other low risk eggs and egg products in cold storage before entering market channels provides confidence that they present no risk for HPAI transmission.

**The SES plan has two components:**

**The Federal and State Transport (FAST) Eggs Plan** was developed by the Center for Food Security and Public Health at Iowa State University in collaboration with the egg industry, poultry veterinarians, and USDA APHIS-VS. The objective of the FAST Eggs Plan is to minimize the risk of exposure of poultry flocks to HPAI and thereby to limit the spread of HPAI during an outbreak. This is accomplished by:

- Audited minimum biosecurity standards for egg farms pre-approved by the State Animal Health Official and the Area Veterinarian-in-Charge
- Location verification of participating farms
- Epidemiology data to identify potential exposure and document flock production parameters
- Active surveillance in each layer house via daily RRT-PCR testing

- Geospatial Risk Estimate based on unmitigated risks and proximity to infected flocks
- Secure website to share information with Incident Commanders and authorized personnel
- Provides a high level of confidence that eggs are free of HPAI virus.

**The Egg Movement Control Model (EMCM) Plan** was developed by the egg industry, poultry veterinarians, and USDA APHIS' Center for Epidemiology and Animal Health (CEAH) in collaboration with the Center for Animal Health and Food Safety at the University of Minnesota. The objective of the EMC plan is to develop science-based guidelines for permitting the movement of eggs and egg products from operations in a HPAI control zone while effectively managing the risk of release of HPAI virus. The EMC plan is based on the following:

- Daily flock observation for abnormal clinical signs
- Daily RRT-PCR testing of samples from each flock on a farm
- Sanitation practices performed on a daily basis by egg producers
- Proactive product-specific risk assessments
- Application of product-specific biocontainment procedures
- Permit guidelines for specific eggs and egg products

**How do the FAST Eggs Plan and the EMCM Plan work together?**

The FAST Eggs Plan and the EMCM Plan support a rapid and effective response to HPAI outbreaks. The FAST Eggs Plan minimizes the risk of infection coming into an uninfected flock, and the EMC Plan reduces the risk of infection spreading through the movement of eggs and egg products. The FAST Eggs Plan assists Incident Commanders in effective management of HPAI outbreaks. The EMC Plan supported by the CEAH risk assessments helps Incident Commanders issue movement permits for eggs and egg products that carry negligible risk of HPAI transmission. Both plans assist APHIS, Food Safety Inspection Service (FSIS), and Food & Drug Administration (FDA) fulfill their roles with respect to eggs and egg products.

**Benefits of the Secure Egg Supply Plan**

*Consumers*

- Continuous supply of fresh egg products
- Reduced work disruption and reduced negative economic impacts for rural communities
- Continued food safety in the event of an HPAI outbreak

*Industry*

- Business continuity within and between states is enhanced during an outbreak of HPAI.
- Supports compartmentalization and international trade.
- Increased biosecurity promotes flock health by excluding many pathogens.
- Early detection of avian influenza in egg production flocks is facilitated.
- Prevents spread of HPAI from an index outbreak to other egg production flocks.

*Regulatory agencies*

- Supports the National HPAI Response Plan
- Supports the Incident Command system
- Provides information on biosecurity levels and diagnostic test results at participating egg farms
- Provides guidance on movement permitting

**Conclusion**

The working group has developed a number of science-based tools that will be very useful to both regulatory officials and the industry in a HPAI outbreak. The next steps involve completing the Secure Egg Plan but more importantly introducing these tools to State and Federal animal health officials and create buy in to the usefulness of these tools. Confidence in these tools will assist in convincing State Animal Health Officials to signing memoranda of understanding.

**USDA Emergency Management Update**

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**Novel H1N1 2009 Virus:** Some of the genes in this new virus are similar to influenza viruses that normally occur in swine in North America. Further study has shown that this new virus is very different from what normally circulates in North American pigs. It has two genes from influenza viruses that normally circulate in pigs in Europe and Asia. It is known as a "quadruple reassortant" virus because it also has genes from influenza viruses that circulate in birds and humans.

**Novel H1N1 2009 Virus Timeline:** March and April, 2009: Novel influenza A (H1N1) a new flu virus of swine origin caused illness in Mexico and the United States. April 15, 2009: The first novel H1N1 patient in the United States was confirmed by laboratory testing at CDC. May 2, 2009: Canada announced that the H1N1 2009 virus was found in pigs at a farm in Alberta, Canada. June 11, 2009: A pandemic Is declared by the World Health Organization. June 19, 2009: H1N1 2009 virus reported in all 50 states in the United States and the District of Columbia. June 25, 2009: Argentina confirmed cases of H1N1 novel strain on a commercial pig farm. July 31, 2009: Australia, reported an outbreak of influenza in swine. August 21, 2009: Chile reported an outbreak of Influenza A H1N1 in turkeys.

**Joint FAO/WHO/OIE Statement on H1N1 2009 virus and the safety of pork:** Influenza viruses are not known to be transmissible to people through eating processed pork or other food products derived from pigs. Pork and pork products, handled in accordance with good hygienic practices recommended by the World Health Organization , Codex Alimentarius Commission and the OIE, will not be a source of infection. Authorities and consumers should ensure that meat from sick pigs or pigs found dead are not processed or used for human consumption under any circumstances.

**Food Safety Key Points:** The novel H1N1 2009 virus is not spread by food. You cannot get this virus from eating pork or pork products. Because the novel H1N1 2009 virus continues to evolve, USDA continues to study the virus to provide the best protection for both public and animal health.

**SIV Surveillance Plan:** Swine influenza virus (SIV) surveillance has been in existence for many years within the swine industry. In 2008, USDA and CDC began developing a pilot program for a more integrated approach to identifying new SIVs. Implementation of the pilot program was accelerated, given the April 2009 human pandemic, and includes surveillance for the H1N1 2009 virus in swine.

**SIV Surveillance Plan Goals:** Determine if Novel H1N1 2009 Flu virus exists in US Swine. Detect new influenza strains in swine in a timely manner. If present, determine distribution of the new strains in swine. Determine genetic characteristics of new viruses necessary for vaccine and diagnostics development.

**SIV Surveillance Plan Sampling:** Swine populations associated with a human infection of H1N1 2009 virus. On farm swine showing clinical signs of influenza-like illness. Swine showing signs of clinical illness at events where there is increased exposure to people (fairs, markets, etc.).

**Should H1N1 2009 Virus be Found in U.S. Swine:** Herds identified with the Novel H1N1 2009 Virus will be **monitored** so only swine that are fully recovered are sent to other premises or to slaughter. A monitored movement is one where a group of swine is determined to be free from clinical signs of influenza-like illness by or under the supervision of a licensed veterinarian before the movement can occur.

**Preparedness: National Veterinary Stockpile (NVS) Activities:** NVS has acquired poultry depopulation equipment and placed in locations around the country, has reconfigured the emergency response packages to improve disease and species specificity, and has began implementation of an advanced electronic system for managing simultaneous deployments.

**Preparedness: FAD PReP:** FAD-PReP access is available on-line: (https://fadprep.lmi.org) or email (owen@lmi.org) to request access, and includes new National Animal Health Emergency Management System guidelines drafted for Health & Safety, Biosecurity, PPE, Cleaning and Disinfection, Others. Unified State-Federal-Tribal-Industry planning and operations; Science based approach that protects public health and animal health, and that stabilize animal agriculture, the food supply, and the economy; Direct every FAD incident or outbreak toward a clearly defined and obtainable outcome; Prepare clear and concise plans, procedures and outreach materials to ensure a thorough understanding among all stakeholders; Traceability is essential for control of contagious disease of animals. Traceability is also essential for continuity of business for non-infected animals, vaccinated animals, non-susceptible animals, and animal products.

**Preparedness: Secure Egg Supply (SES) - Continuity of Business:** The Secure Egg Supply Plan (SES) was developed to avoid unnecessary destruction of eggs from healthy flocks in a high pathogenicity avian influenza (HPAI) Control Area. The SES plan is a science-based preparedness plan developed by The Egg Sector Working Group, which includes representatives of the egg industry, USDA-APHIS-VS, the University of

Minnesota, and Iowa State University. The overall goal of the SES plan is to safely move eggs and egg products from, into or within a HPAI Control Area without endangering the health of uninfected flocks. The plan also supports a continuous supply of eggs for the US public, facilitates business continuity for the egg industry and their retail and food service customers and fosters a high level of government, industry, and consumer confidence.

**The World Organization for Animal Health (OIE) Updates – Poultry**

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The World Organization for Animal Health (OIE) has updated or drafted new animal disease Code chapters for 2009. At its May 2009 General Session Meeting, the International Committee adopted new text to several existing chapters. In addition, the OIE's Terrestrial Animal Health Standards (Code) Commission met in September of 2009 to propose further modifications to several chapters for consideration in 2010. Of interest to the poultry industry, the following chapters were updated or are being proposed for further modification:

**Avian Influenza (AI)**. For 2009, the Code chapter on AI received only minor updates, however, the United States has asked the Terrestrial Animal Health Standards Commission to consider revising a couple of the sections in the chapter as many Member countries continue to misinterpret the chapter as it pertains to the export of fresh poultry meat. For 2010, the OIE proposes to incorporate many of the comments submitted by the United States and is distributing these chapters for comment. The revised chapter will be offered for adoption in 2010.

**Newcastle disease (ND)**. The Code chapter on ND also received minor changes for 2009. However comments submitted by the United States for 2010 have been adopted. These include combining feather meal and poultry meat meal (all meals) under the same basic treatment requirements.

**Biosecurity Procedures in Poultry Production.** The OIE has drafted a new chapter addressing basic biosecurity and hygiene procedures. This chapter will be distributed for comment and offered for adoption in 2010.

**West Nile Fever.** This chapter received minor modifications in 2009 to clarify several sections. For 2010 the OIE has accepted comments from the United States, and will propose removing chicks and poults as species that are susceptible to the virus.

**Animal Welfare.** No new specific guidelines for animal welfare were adopted this past May. However, for 2010 the existing chapters on transportation and slaughter include some new text pertaining to poultry. The United States will share these chapters with its stakeholders and comment as appropriate. In addition, an OIE ad hoc group met in June of 2009 to draft guidelines on animal welfare and broiler production systems. It is expected that the OIE will distribute this first draft for Member country comment and input later in 2009 or early 2010.