COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

Chair: Dr. Julie Helm, Columbia, SC
Vice Chair: Dr Marion Garcia, Lewisburg, WV

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The Committee met on October 3, 2011 from 1:00 to 4:30 p.m and October 4, 2011 from 1:00 to 5:15 p.m. at the Buffalo Adam's Mark Hotel in Buffalo, New York. There were 50 Committee members and 35 guests in attendance, for a total of 85. Chair Julie Helm presided, assisted by Vice-Chair Marion Garcia. The Chair welcomed the Committee, summarized the 2010 meeting, and reported on the responses to the 2010 Resolutions:

Resolution 6 - UNITED STATES NATIONAL LIST OF REPORTABLE ANIMAL DISEASES (NLRAD); **Response:** The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) recognizes the concerns of the United States Animal Health Association (USAHA) and appreciates the opportunity to respond. USDA, APHIS, VS and the National Animal Health Reporting System (NAHRS) subcommittee of the USAHA/American Association of Veterinary Laboratory Diagnosticians Joint Committee on Animal Health Surveillance and Information Systems continue to move forward with implementing a U.S. National List of Reportable Animal Diseases (NLRAD). Currently, NLRAD is under review by National Association of State Animal Health Officials and VS Area Veterinarians in Charge with comments requested by September 23, 2011. The NLRAD has also been distributed to USAHA animal disease commodity committees with a request for discussion in Buffalo at the USAHA meeting and comments by October 30. After considering the current round of stakeholder comments with concurrence of the NAHRS subcommittee and final approval by VS management, it will be published as a cooperative State-Federal set of guidelines for reportable disease. In addition, once the NLRAD is finalized, VS will initiate the regulatory process to establish and maintain the NLRAD and associated reporting requirements.

Resolution 44: URBAN CHICKENS/POULTRY – NEED FOR TARGETED EDUCATION AND FUNDING FOR PEOPLE IN METROPOLITAN AREAS RAISING POULTRY; **Response:** The U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), Veterinary Services

recognizes the concerns of the United States Animal Health Association regarding the need for targeted education for people who raise poultry in metropolitan areas. APHIS continues to maintain the Biosecurity for the Birds campaign, as it is regarded as a highly successful outreach campaign both by States and industry. Additionally, the Live Bird Market Technical Working Group recommended at its February 2011 meeting that APHIS continue to support the Biosecurity for the Birds campaign. The campaign already includes creative ways to reach its target audience, including urban poultry owners. For example, it works with hatcheries and feed distributors to place messages on their product packaging (chicks and chicken feed). One of the most recognized and widely used publications is the annual biosecurity calendar. The campaign has begun Bird Health Awareness Week (the first week in November) as an additional way to focus attention on biosecurity and disease awareness. In addition, more than 350 people participated in an educational webinar held in November 2010; many of them were urban poultry owners. VS recently completed a study on poultry ownership in four metropolitan areas: Denver, Colorado; Los Angeles, California; Miami, Florida; and New York City, New York. This study is posted online at www.aphis.usda.gov/animal_health/nahms/poultry/downloads/poultry10/Poultry10_is_Biosecurity.pdf. The study provides valuable information about urban poultry owners that will further help the Biosecurity for the Birds campaign target this audience. Regarding funding, the President's fiscal year 2012 budget requested $43.6 million for the avian health line item. This request is intended to support our avian influenza domestic poultry programs as well as the Biosecurity for the Birds campaign.

Resolution 42: SECURE EGG SUPPLY PLAN FOR WHOLE SHELL EGGS, EGG PRODUCTS, AND DAY-OLD CHICKS WITHIN, OUT OF, AND INTO HIGHLY PATHOGENIC AVIAN INFLUENZA DISEASE CONTROL AREAS; **Response:** Favorable State responses were received from: Georgia, Hawaii, Maryland, Massachusetts, New York, South Dakota, Tennessee, Washington, West Virginia. Comments from the floor included: Dr. Helm (Chair, Clemson University Livestock Poultry Health, Columbia, SC) noted that she believed that the lack of State responses may have been due to the States did not realizing they should have responded back to USAHA; and Dr. Zach (National Center Animal Health Emergency Management, USDA-APHIS-VS, Riverdale, MD) noted that a few other states not listed above had signed agreements.

Resolution 45: INVOLVEMENT OF VETERINARIANS IN THE IMPLEMENTATION OF THE FOOD AND DRUG ADMINISTRATION SALMONELLA ENTERITIDIS RULE; **Response:** No response received from FDA to USAHA. The Committee made a recommendation to request that the USAHA President and Executive Committee submit a letter to the responsible person(s) at FDA involved in implementing the FDA Egg Safety Rule of 2009 in order to respond to Resolution 45 and that this issue is brought forth to the Government Relations Committee.

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

Dr. Julie Helm, Chair, Clemson University Livestock Poultry Health, Columbia, SC, gave the Infectious Laryngotracheitis (ILT) Subcommittee report. The report was approved by the Committee and is included in these proceedings.

Dr. Don Ritter, Mountaire Farms Inc., Millsboro, DE, presented the annual industry report for the broiler industry. The report was approved by the Committee and is included in these proceedings.

Dr. Eric N. Gingerich, Diamond V, Zionsville, IN, delivered the annual industry report for the table egg industry. The report was approved by the Committee and is included in these proceedings. Dr. Annette Whiteford, CA Department of Food & Agriculture, was asked to give an update on the status of very virulent Infectious Bursal Disease (vvIBD) in California. More information on the California vvIBD situation can be found at http://www.cdfa.ca.gov/ahfss/. More information on the California outreach to backyard and 4-H flock owners can be found at http://www.cdfa.ca.gov/ahfss/Animal_Health/.

Dr. Eric Gonder, Butterball Turkeys, Goldsboro, NC, in lieu of Dr. Steven Clark, Alpharma Animal Health, West Jefferson, NC, gave the annual industry report for the turkey industry. The report was approved by the Committee and is included in these proceedings.

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

Dr. Shauna Voss, Center for Animal Health and Food Safety, University of Minnesota, St. Paul, MN, gave a presentation on HPAI: Collaborative Planning to Maximize Market Continuity which is included in these proceedings.

Dr. Fidelis Hegngi, USDA-APHIS-VS, National Center for Animal Health Programs, Riverdale, MD, presented the annual status report for the National Poultry Improvement Plan (NPIP) for the Senior Coordinator, Dr. Steve Roney, USDA/APHIS/VS, Conyers, GA. The report was approved by the Committee and is included in these proceedings.

Ms. Jan Pederson, USDA-APHIS-VS, National Veterinary Services Laboratory (NVSL), Ames, IA, delivered the annual status report for NVSL Avian Influenza and Newcastle Disease Diagnostics and Avian Import Activities. The report was approved by the Committee and is included in these proceedings.

Dr. Beth Harris, USDA-APHIS-VS, NVSL, Ames, IA, delivered the annual NVSL Diagnostic Bacteriology report. The report was approved by the committee and is included in these proceedings.

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

The Monday session adjourned at this point, at approximately 4:30 PM. The meeting reconvened at 1:00 PM on Tuesday, October 4, 2011.

Dr. Jonathan Zack, National Center Animal Health Emergency Management, USDA-APHIS-VS, Riverdale, MD, gave an update on USDA Emergency Management. His update is included in these proceedings.

Dr David Suarez, USDA-ARS-SEPRL, Athens, GA, in lieu of Dr. David Swayne, 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.

Drs. David Suarez and Michael Day, USDA-ARS-SEPRL, Athens, GA, gave the Southeastern Poultry Research Laboratory Research (SEPRL) Update. The report is included in these proceedings.

Dr. Aly Fadly, Avian Diseases & Oncology Laboratory (USDA-ARS), Lansing, MI, presented an update on current research activities at the laboratory. The report is included in these proceedings.

Dr. Aly Fadly, Avian Diseases & Oncology Laboratory (USDA-ARS), Lansing, MI, in lieu of Dr. Justin Brown, Southeastern Cooperative Wildlife Disease Study College of Veterinary Medicine University of Georgia, presented a report on Lymphoproliferative Disease Virus in Wild Turkeys in the Southeastern United States. The report is included in these proceedings.

Dr. Michael David, Director of Sanitary International Standards, National Center for Import and Export, USDA-APHIS-VS, Riverdale, MD, presented an update on the World Organization for Animal Health (OIE) poultry activities.

Dr Eric Gingrich, Diamond V, Zionsville, IN, presented an overview of the USAHA Committee on Salmonella meeting. See the Report of the Committee on Salmonella in these proceedings for more information.

Committee Business

The Committee approved a Resolution entitled "APHIS' ROLE IN PRE-HARVEST FOOD SAFETY" urging the Secretary of Agriculture to designate the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) as the lead agency for federal Pre-Harvest Food Safety (PHFS) efforts for chicken and turkey meat-type birds.

REPORT OF THE SUBCOMMITTEE ON MYCOPLASMA

Eric L. Jensen, Chair

The Subcommittee met at the Adam's Mark Hotel, Buffalo New York on October 2, 2011 with 30 attendees. Dr. Gregory Rosales presented the report in the absence of chair Dr. Jensen.

A review of percent condemnations/year due to airsacculitis in broilers (by Dr. F. Hegngi USDA-APHIS-VS) showed a correlation between the implementation of *Mycoplasma gallisepticum* (MG) and *Mycoplasma synoviae* (MS) programs and the continuous decline over the years of mycoplasma infection in the industry. The number of cases of MG and, in particular, MS has decreased significantly in broiler breeders since the previous year resulting in a corresponding decline in the number of broiler cases.

The NPIP continues to support the production of a panel of convalescent sera (by Dr. N. Ferguson-Noel, PDRC, U. of GA) used by NPIP-authorized laboratories, and to organize annual mycoplasma diagnostic workshops to meet the plan's training requirements. These services are invaluable to maintain standard diagnostic methods, promote the proficiency of NPIP-authorized laboratories, and support domestic and international trade of breeding stock and poultry products.

Fewer MG and MS cases were documented in NPIP-participating breeder flocks belonging to the egg-type chickens, meat-type chickens, exhibition and game bird categories in 2010-11 compared to 2009-10; however, there were a few more of MS cases in turkey breeders.

During 2010 *Mycoplasma synoviae* (MS) was identified on eight turkey breeder flock premises in a previously clean region. MS positive serology (ELISA) identified these flocks and results were confirmed at the Poultry Diagnostic and Research Center (PDRC), Athens, GA. These positive breeder flocks were quarantined and State and industry stakeholders developed a containment plan. The plan consisted of increased surveillance to identify positive flocks, treatment and quarantine of positive breeder flocks, hatchery management to minimize spread, grower notification, depopulation of positive flocks and the supervised cleaning and disinfection of affected premises. Within seven months all positive flocks were depopulated with no further MS spread. A small flock of layer chickens was identified as the source of the infection. These cases highlight the importance of a diagnostic laboratory for PCR/culture confirmation diagnostics, the need for a thorough epidemiological investigation, re-evaluation of MS diagnostics in turkeys (SPA vs. ELISA vs. PCR) and the review of the biosecurity program within a turkey breeder operation system.

During 2010-2011 the broiler industry experienced less MG and MS field outbreaks than the previous year. MG or MS live vaccines used is some regions were discontinued after one cycle. Besides vaccination, improved biosecurity practices have contributed to the decline in the number of field outbreaks. Several states reported infections in backyard chickens accentuating the risk posed by these birds to commercial and NPIP participating flocks. The prompt intervention by State health officials by quarantining and/or persuading owners to voluntarily eliminate infected birds has provided and invaluable service to prevent further spread to other backyard and commercial operations. There is a need for mycoplasma-clean bird producers that could supply backyard bird owners.

Many of the reports and comments by committee members emphasized the importance of continuous surveillance and access to laboratories with specialized mycoplasma diagnostic capabilities.

REPORT OF THE SUBCOMMITTEE ON INFECTIOUS LARYNGOTRACHEITIS (ILT)

Julie Helm, Chair
Clemson University Livestock Poultry Health

The Subcommittee met at the Adam's Mark Hotel, Buffalo NY on October 2, 2011 following the Subcommittee on Mycoplasma with 33 attendees.

Introduction: Vaccinal Laryngotracheitis (VLT) is an acute viral respiratory disease primarily of chickens. Economic losses attributable to VLT have been important in many poultry producing areas throughout the United States and the world. Despite efforts to control the disease through vaccination and implementation of biosecurity measures, outbreaks of VLT are still a threat to the poultry industry.

Research Update: Dr. Maricarmen Garcia (PDRC, GA) presented research evaluating protection of commercial broilers using Fowl Pox (FP) and Herpes Virus (HV) vectored vaccine when compared to live vaccines in a challenge model. Broilers were vaccinated by in-ovo and subcutaneous methods of administration compared the vectored vaccines to live vaccines in a challenge model. The birds were challenged at 35 or 57 days post-vaccination and evaluated for clinical signs and viral replication in the trachea. Both vectored vaccines mitigated the disease, but neither reduced the viral load in the trachea to the level of the live attenuated vaccine, which was used to determine a baseline protection. HV vectored vaccine induced better protection compared to FP vectored vaccine in both the in-ovo and subcutaneous administration methods. FP vectored vaccine administered subcutaneously at one day of age in broilers was more effective in reducing clinical signs and eliciting antibody response compared to the in-ovo administration. The protection induced by vectored vaccines in broilers was better attained when the birds were challenged at 57 days post-vaccination versus 35 days post-vaccination. In summary: the recombinant vaccines do mitigate disease and reduce the amount of challenge virus in the trachea in the face of a strong challenge; preliminary data demonstrates that recombinant vaccinated birds can shed virus and can disseminate disease to naïve birds; and in endemic disease areas with recombinant vaccinated birds, biosecurity measures need to be implemented during the movement of birds and poultry by-products (litter). References: Johnson, D. I., A. Vagnozzi, F. Dorea, S. M. Riblet, A. Mundt, G. Zavala, and M. García. Protection against infectious laryngotracheitis virus (ILTV) by in ovo vaccination with commercially available viral vector recombinant vaccines. Avian Dis. 54:1251–1259. 2010; Vagnozzi, A., G. Zavala, S. M. Riblet, A. Mundt, and M. García. Protection induced by Infectious laryngotracheits virus (ILTV) Live-attenuated and Recombinant Viral Vector Vaccines in Broilers. In Press Avian Pathology.

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

Northeast – In one region, 75% of the broiler companies had discontinued the use of CEO last winter. When VLT cases started in September, CEO vaccination was initiated again.

Southeast – States which had higher number of cases in broilers from several years ago reported fewer and more sporadic cases last year. These states are using a combination of no vaccination, CEO and/or vectored vaccines and varied other types of control methods in their broiler industries. A few other southern states reported having cases for the first time in several years; one such state had not seen cases since 2003.

Midwest – In layers, one complex had changed to vaccinating pullets with a recombinant vaccine instead of CEO. The birds exhibited clinical signs after moving into the lay house. They are currently using recombinant and TCO vaccines, and no CEO. No reports in broilers.

West, Southwest – No reports.

SUBCOMMITTEE ON AVIAN INFLUENZA AND NEWCASTLE DISEASE

David E. Swayne, Chair
USDA-ARS

High Pathogenicity Avian Influenza. H5N1 HPIA are endemic in five countries: 1) self-declared endemic (Egypt and Indonesia), 2) continue to report occurrences of outbreaks over multiple years (Vietnam and Bangladesh), or 3) have published data in the literature of continuous reports of infection and molecular evidence of virus continual presence in country (China).

For 2010, 19 countries reported outbreaks of H5N1 in domestic poultry (P; n=11), wild birds (WB; n=4) or both (n=4): Bangladesh (endemic in P), Bhutan (P), Bulgaria (WB), Cambodia (P), China (WB, endemic in P), Egypt (endemic in P), Hong Kong (WB), India (P), Indonesia (endemic in P), Israel (P, WB), Japan (P, WB), South Korea (P, WB), Laos (P), Mongolia (WB), Myanmar (P), Nepal (P), Romania (P), Russia (WB), and Vietnam (endemic in P), The majority of the outbreaks occurring in Indonesia, Egypt, Vietnam, and Bangladesh, in decreasing order. Domestic poultry had 540 outbreaks involving 87,343cases and wild birds had 12 outbreaks and 601 cases.

For 2011 (through August 2011), 13 countries reported outbreaks of H5N1 domestic poultry (P; n=7), wild birds (WB; n=2) or both (n=4): Bangladesh (endemic in P), Cambodia (P, WB), Egypt (endemic in P), Hong Kong (WB), India (P), Indonesia (endemic in P), Israel (P, WB), Japan (P, WB), South Korea (P, WB), Mongolia (WB), Myanmar (P), Palestine (P), and Vietnam (endemic in P). There were 559 outbreaks involving 205,130 cases in poultry and 50 outbreaks involving 97 wild birds. There was also an ongoing H5N2 HPAI outbreak in South African ostriches with minimal to no clinical disease.

For 2010, H5N1 HPAI viruses from Egypt and Israel were in clade 2.2.1. One group contained all the human isolates which clustered with 2009 backyard poultry sequences, while the H5N1 viruses from commercial poultry clustered out separately. Epidemiologically the outbreaks are scattered all throughout the Nile delta, corresponding with human and poultry density maps. For Bhutan, West Bengal (India), Nepal and Bangladesh, the H5N1 viruses were in clade 2.2. Vietnam, China, Romania, Bulgaria (buzzard), Mongolia, and Nepal had H5N1 viruses in clade 2.3.2. Epidemiologically, this clade 2.3.2 was spread from Mongolia, over China, to Vietnam, Myanmar and Nepal. Viruses of 2.3.2 were also detected in Hong Kong (sparrow), Japan, Myanmar, Russia (grebe), and S. Korea. Vietnam, Lao, and Myanmar had H5N1 clade 2.3.4 viruses. The Vietnam viruses subclustered into two groups: 1) subgroup A present in northern Vietnam and South Myanmar, and 2) subgroup B which was present in North, Central, and South Vietnam, and in Lao. In Indonesia, based on 2007-2008 data, the clade 2.1 virus lineage has continued to genetically diversify from the initial introduction in 2003 with ~80% of the isolates in subclade 2.1.3. Some subclade 2.1.1 viruses exit along with an undefined subclade lineage but 2.1.2 is no longer detected. The majority of isolates are from village poultry with minimal evidence of antigenic drift. In 2006, an outlying antigenic variant group was identified in West Java isolates that was resistant to existing AI vaccine seed strains, but these vaccine variant viruses are no longer present in commercial poultry. Clade 1 was found in southern Vietnam.

For 2011 H5N1 viruses, the maintenance of distinct clades and subclades continues: 1) subclade 2.3.2 viruses were found in northern and central Vietnam, eastern India, Japan, S. Korea, Bulgaria and Myanmar; 2) subclade 2.2.1 viruses in Egypt and Israel; 3) subclade 2.2 lineage in Bulgaria; 4) subclade 2.3.4 lineage viruses in Bangladesh, Myanmar and Bulgaria; and 5) clade 1 lineage viruses in southern Vietnam.

Newcastle Disease. In 2010, 81 countries had Newcastle disease in poultry or wild birds, either as suspect cases, infections without clinical disease, infections with clinical disease or limited infections of poultry. In 2011 (January to July), 23 countries had Newcastle disease in poultry or wild birds.

Broiler Industry Annual Report

G. Donald Ritter, Mountaire Farms Inc.

Mortality versus Bird Size: Mortality for all bird sizes (small = 3.6-4.4 lbs, middle = 5.2 – 6.0 lbs, large = >7.5 lbs) remains low and in line with historical trends.

Ranking of Disease Concerns: The disease concerns of nine broiler industry veterinarians from the Association of Veterinarians in Broiler Production (AVBP) are ranked below.

Bacterial disease issues clustered at the top of the disease list. The top three disease concerns involved intestinal health of bacterial origin caused by *Clostridia*. *E. coli*-associated inflammatory process was next, followed with *S. aureus* arthritis in broiler breeder males. Spinal abscesses caused by *E. cecorum* also made the top disease list, along with *M. synoviae*. Viral conditions of Infectious Laryngotracheitis, Runting Stunting Syndrome and Infectious Bronchitis completed the list.

Ranking of Non-Disease Concerns: Non-disease issues of concern to the broiler industry were ranked by nine broiler industry veterinarians as above.

The unprecedented and sustained rise in feed grain prices, especially corn, was a top concern of many respondents. The current U. S. energy policy virtually mandates that 40% of U.S.-produced corn be used to produce ethanol instead of being used for animal feeds. The Salmonella Initiative Program (SIP) being implemented by USDA/FSIS in November 2011 is also a global concern. This voluntary program reduces the allowable incidence of Salmonella in FSIS carcass rinse tests and also establishes the first standards for Campylobacter testing of carcasses. After grain prices and SIP, miscellaneous issues populated the remainder of the survey, including coccidiostat availability, animal welfare, breeder feathering and production, ground chicken USDA/FSIS standards and export documentation.

Ranking of Research Needs: Research needs of the broiler industry were ranked by nine broiler industry veterinarians as above.

Food safety interventions for Salmonella/Campylobacter and gut health including intestinal microflora management were listed as top research needs in the broiler industry. Vaccine research involving vector vaccines (efficacy?) and Infectious Bronchitis (pan-serotype vaccine) was listed next. Miscellaneous research topics of alternative feed ingredients, practical animal welfare, Staphylococcal arthritis in male breeders and development of new protozoal control products rounded out the list.

Economic Crisis in the Broiler Industry: Current high feed prices primarily due to U.S. energy policies related to domestic ethanol production coupled with the overall downturn in poultry meat prices due to oversupply have created a “perfect storm” of sustained economic losses in the broiler industry. Losses have been large enough to force two of the top twenty broiler companies to declare bankruptcy in the past twelve months. Due to poor domestic industry conditions both companies found foreign buyers (Ukraine and South Korea) for all or part of their assets. Unfortunately half of one company was completely shut down only six months after being sold to a Ukrainian investor. Tough economic times continue to make survival in the broiler industry extremely challenging in 2011.

US Table Egg Industry Update

Eric Gingerich, Diamond V

Overall health of the national table egg layer flock continues to be very good. There are no major clinical disease problems occurring. This is due to the several resources and practices available to the industry:

- Continued availability of high quality vaccines
- Flock supervision from professional, well-trained flock supervisors
- Readily available veterinary technical assistance from primary breeder, vaccine company, diagnostic laboratory, feed additive suppliers, and consulting veterinarians
- High quality nutrition provided by professional nutritionists
- Housing of a majority of layers in environmentally controlled facilities in cages without exposure to litter
- Use of sound biosecurity practices.

A poll of the Association of Veterinarians in Egg Production (AVEP) was conducted within the last month. The members were asked to rate a list of common diseases of pullets (21 conditions listed) and layers (30 conditions listed) as to their prevalence in their area of service on a scale of 1 to 4 with 1 = not seen, 2 = seen but not common, 3 = commonly seen, and 4 = widely seen. The survey revealed the following diseases of concern occurring in US:

Ranking	Caged Pullets	Caged Layers	Cage-free Pullets	Cage-free Layers
1	Chick starveouts – 2.28	Calcium Depletion – 2.54	Coccidiosis – 2.55	Cannibalism – 3.00
2	Chick yolk infections – 2.08	Colibacillosis – 2.50	Chick starveouts – 2.25	Colibacillosis – 2.63
3	Marek's – 2.00 Coccidiosis – 2.00	*Mycoplasma synoviae(Ms)* – 2.42 Mites – 2.42 Cannibalism – 2.42	Yolk infections – 2.20 Ascarids – 2.20	Ascarids – 2.42
4				Coccidiosis – 2.37
5	E. coli – 1.76		E. coli – 1.95	Mites – 2.26
# of Responses	25	24	20	19

Chick mortality problems are normally associated with small chicks, poor sanitation in the hatchery, or a lack of proper brooding management on the grow farm. As this problem continues high on the prevalence list, the emphasis on solving this issue is apparently not being addressed successfully.

Calcium depletion is normally associated with low intake of calcium, phosphorus, and/or vitamin D3 especially early in production with low feed intakes. This condition will be an ongoing issue with increasingly higher egg production rates through improvements in management and genetics.

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 continues on the downward trend. A post-molt colibacillosis syndrome is also seen in some flocks due to declining immune system function, an ascending infection of the reproductive tract, upper respiratory infections, etc. The live E. coli vaccine, introduced in mid to late 2006, has been increasingly used successfully as both a preventative and as a treatment in the face of an outbreak.

An external parasite, the Northern Fowl Mite, has risen to prominence in cage layers in past years' surveys. The difficulty in treating this condition, in cages and in cage-free flocks, has likely led to this increase. Spray treatment of caged layers is difficult due to the configuration of equipment. Elemental

sulfur in dust baths is being used successfully in cage-free flocks. Feeding of elemental sulfur will aid in reducing numbers of mites on birds as well. Decontamination of pullet moving trucks and equipment may also be lacking especially if the equipment was used previously for mite-infested spent fowl movement.

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. As this is a major problem for cage-free flocks, genetics companies are placing more emphasis on reducing this trait.

Focal duodenal necrosis (FDN), believed to be due to *Clostridium colinum,* is a widespread subclinical disease with lesions in the duodenum, and results in losses of egg weight gain and/or egg production depending on the severity of the infection. The use either of the antibiotics chlortetracycline or bacitracin is used successfully for treatment and/or prevention. Fermentation, probiotic, prebiotic, and botanical products are being evaluated for their usefulness in prevention of FDN.

MS is a very prevalent disease in multi-age complexes but has little significance in most cases due to its low pathogenicity. MG continues as an issue in multi-aged facilities and is successfully controlled in most cases through vaccination. Each complex must customize its vaccination program to control the strain on the farm. Ts-11 and 6/85 live vaccines are used for controlling mild strains of MG while F-strain live vaccine is being used to control more pathogenic strains. The live pox-vectored recombinant MG vaccine is being used in a variety of situations and appears to be useful in low challenge situations. Vaccine failures with all vaccines are somewhat common and the unit must resort to medication programs using tylosin or tetracycline antibiotics. Some operators are now applying the F-strain vaccine by eyedrop in an effort to increase its efficacy.

Coccidiosis and necrotic enteritis continues as a problem in caged pullets and layers due to contamination of houses with coccidial oocysts from past outbreaks and delivery of these oocysts to the chickens in cages by flies or beetles. Coccidiosis vaccination of caged or cage-free pullets has met with challenges of high mortality due to poor uniformity of vaccine application and high litter moisture in cage-free housing.

Marek's Disease was mentioned in the survey as being a minor problem. A handful of outbreaks have been seen in Pennsylvania and the Midwest and could mean a loss of effectiveness of the presently used HVT + Rispens vaccine. Improper vaccination administration and/or inadequate grow house cleaning and disinfection may also be the culprits. One outbreak this year in the Midwest led to 50% mortality by 30 weeks of age. Cage-free pullets tend to have more Marek's Disease than caged pullets due to the inability to satisfactorily clean and disinfect some of the cage-free growing facilities.

Diseases under control and of low incidence are as follows: vaccinal infectious laryngotracheitis (vILT), IB, fowl coryza, and urolithiasis/gout. These diseases tend to be localized to a region or a farm. The pox-vectored recombinant ILT vaccine has been determined to not be a replacement for chick embryo origin (CEO) vaccines in high challenge areas. The HVT-vectored ILT vaccine continues to show good results in high challenge regions and should reduce the amount of CEO vaccine used in layer flocks that may spread to broilers. Fowl coryza is a regional disease (Maine, southern California, Florida, and south Texas) and is controlled well by the use of commercial bacterin.

Diseases that are very rarely a problem for table egg layers are pox, Newcastle, infectious bursal disease, chick anemia virus, erysipelas, and fowl cholera. The area where the very virulent IBD outbreaks (vvIBD) are seen in northern California in Dec 2008 and May 2009 have not shown a recurrence of the disease.

The survey also asked about other issues and diseases of concern on a scale of 1 to 4 with 1 = low concern, 2 = some concern, 3 = moderately concerned, and 4 = very high concern. In the opinions of the 23 respondents, a high to very high level of concern (an average of 3 or more) was expressed for 1) banning of cages (3.71), 2) *Salmonella enteritidis* (SE) (3.42), 3) the lack of effective treatments (3.33), and 4) welfare issues overall (3.30). A level of some concern to high concern (average score of 2 to 3) was expressed for 1) on-farm euthanasia of spent fowl (2.70), 2) avian influenza (AI) (2.61), 3) beak trimming (2.35), 4) male chick disposal (2.22), 5) lack of effective vaccines (2.17), and 6) molting (2.09).

Poultry welfare concerns continue to be of high to very high concern due to continued activities by activist groups. A surprising event occurred this year as the United Egg Producers (UEP) and the Humane Society of the United States (HSUS) agreed to work together to establish federal legislation to require an eventual switch from conventional cage systems to enriched cage systems by 2029. This should lead to the use of enriched cages in CA where the issue of which type of system would be

approved according to the Prop 2 ballot initiative was undecided. This agreement also negated the ballot initiatives that were planned by HSUS in WA and OR.

The lack of effective treatments for diseases such as colibacillosis, necrotic enteritis, ascarids, *Capillaria spp*., fowl cholera, etc. is a very high concern and a welfare issue for the diseases that can cause much suffering due to illness. The list of antibiotics that can be used in egg layers is quite short – bacitracin, tylosin, and chlortetracycline. The lack of an anti-parasitic product for used in controlling ascarids during lay, or other nematodes, is especially troublesome as these conditions are becoming increasingly common in cage-free production. Amprolium continues to be available to prevent and treat coccidiosis. Also, there is an increase in usage of non-antibiotic, preventative feed and water additives containing probiotics, prebiotics, and fermentation metabolites.

Concern for SE and its consequences continues due to the ongoing possibility of human outbreaks as occurred with the egg recall of 2010 involving two Iowa operations in August 2010. The Egg Safety Rule was implemented on July 9, 2010 for flocks over 50,000 layers. Flocks of between 3,000 and 50,000 have until July 2012 to comply. Many of the smaller operations are unprepared for the requirements of the program.

The FDA Egg Safety 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 have managed to gear up to handle the increased testing load this requires. Producers with a manure positive swab test are holding eggs from the market until after the test results of eggs are obtained. The use of DNA based tests are now being used that minimize the time of testing from the formerly required 10 days for culture to as low as 27 hours with the new tests. There is no provision in the program for compensating a producer who has an egg-positive flock and does not have a pasteurization or hard-cooking plant that will take their eggs. Producers are greatly ramping up measures to reduce risk of SE infection by increased use of vaccines, intestinal health feed additives, rodent and fly control measures, and biosecurity practices as was intended by the plan

AI has fallen from very high concern to a high concern. Active and passive surveillance programs continue across the US in response to the threat of high pathogenic H5N1 AI (HPAI) from Asia. As there is great concern in the layer industry in regard to the amount of time before egg movement can take place once quarantine is placed on a premise in a control zone, the industry and USDA have developed the Secure Egg Supply (SES) Plan that would allow movement of product within 48 hours after quarantine. This is done by assuring that a farm 1) has good biosecurity practices by being pre-approved, and 2) is negative for AI by a) testing five dead birds per house by AI real time 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 in the egg layer industry second to biosecurity. The supply of useful vaccines continues to be quite adequate and appears to be keeping up with the layer industry needs. It will be interesting to see if this good supply of vaccines continues with the consolidations now occurring in the poultry vaccine business.

The egg industry has experienced lower profits this year compared to last year. Feed price increases due to increases in corn, fat, and soymeal prices have hurt profits significantly. Some price increase was seen this summer due to heat losses involving both production and mortality. Iowa (52 million) continues to be the lead state in egg production followed by Ohio (27 million), Pennsylvania (24 million), Indiana (22 million), and California (19 million).

Turkey Industry Annual Report -- Current Health and Industry Issues Facing the Turkey Industry

Steven Clark, Chair Pfizer Animal Health Global Poultry
Contributing authors: Charles Corsiglia, Foster Farms, Andrew Bailey, National Turkey Federation (NTF)

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 colleagues, Dr. Corsiglia and Mr. Bailey, surveyed turkey industry professionals and veterinarians representing a majority of the US turkey production regarding the health status of turkeys produced in August 2010 through August 2011. The turkey industry reports several disease challenges for this 12-month period varying by geographic regions within a state and across the United States. This report will list (Table 1) the challenges by disease and issues. Of particular interest in 2011 are lack of efficacious drugs and issues with cellulitis, turkey coronavirus, blackhead and reovirus. Turkey Reovirus Digital Flexor Tendon Rupture is recognized as a new emerging disease.

The "**lack of approved efficacious drugs**" continues to be the top disease issue (Table 1). The withdrawal of the NADA (New Animal Drug Application) for enrofloxacin in 2005 for use in poultry leaves the industry with no adequate therapeutic response to **colibacillosis** (ranked #3, unchanged from prior year), or **fowl cholera** (ranked #20 from #15). The controversy over the use of antibiotics in animal agriculture remains a major concern for the turkey industry and for all of animal agriculture.

Clostridial Dermatitis (CD), previously referred to as **Cellulitis**, remains a major disease issue across all geographic regions; as the survey average decreased slightly to a score of 3.8 (from 4.0 in prior year) and ranked #2 (no change), from 3.8 (#2), 3.3 (#3) and 3.1 (#5) in 2009, 2008 and 2007, respectively. Analysis indicates range of concern; 71% of respondents score CD a 4 or 5 (severe), 12% score it a 2 or 1 (mild). CD is most commonly seen in, but not limited to, commercial male turkeys nearing market age. *Clostridium septicum, C. perfringens* type A, or *C. sordelli* is isolated from fluid or affected tissue samples of affected or dead birds. Affected turkeys present with two or more of the following signs: subcutaneous emphysema (crepitus); serous or serosanguineous subcutaneous fluid; vesicles on the skin, especially on the breast/inguinal area; moist, dark, wrinkled skin, especially breast/inguinal area; cellular necrosis (microscopic); organ involvement (spleen/liver); vesicles on the skin, and/or moist, dark, wrinkled skin, on the tail area. The affected flock will have mortality greater than or equal to 0.5 dead per 1,000-birds, fitting the individual bird definition, for two consecutive 24-hour periods. 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 #6 from #7, with a score of 3.1 (from 2.9). **Turkey Coronavirus** (TCV), as a defined cause of enteritis, was ranked #34 (Table 1), decreasing from #25, with 70 reported cases (Table 2).

Late mortality ranked eighth (#8) health issue and decreased from #4 the prior year. Late Mortality may be defined as mortality, in excess of 1.5% per week, in toms (males) 17-weeks and older; mortality is not diagnosed to a specific disease or cause. Excess cumulative mortality of 5% – 10% in toms prior to slaughter has been reported. Late mortality may be associated with physiologic or biomechanical deficiencies following early rapid growth in heavy toms achieving genetic potential; aggressive behavior noted in mature toms; cannibalism; leg problems and/or hypertension.

Leg problems (#7, prior year was #5) are ranked among the top concerns of the turkey industry. Leg problems are a common complaint, such as spiral fractures of the tibia or femur. Leg Problems may be defined as lameness, particularly in toms, several weeks prior to slaughter. Leg problems are attributed to various conditions (refer to Table 1), including pododermatitis, fractured femurs, fractured tibia, osteomyelitis (OM), tibial dyschondroplasia (TDC), spondylolisthesis, "Shaky Leg", etc.

Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR) was recognized as a newly emerging disease. A reovirus has been isolated and identified as the cause of tenosynovitis and digital flexor tendon rupture in commercial turkeys. Clinical signs in young flocks are reportedly mild to nonexistent, but can develop into lameness and/or abnormal gait in older flocks, starting at about 12 weeks of age. Affected flocks may also report an increased incidence of aortic ruptures and poor flock performance (weight gain, uniformity). Research is on-going into pathogenesis, virus characterization, diagnostics and epidemiology. TR-DFTR was added to the survey this year and ranked #11 (Table 1) with 106 "confirmed"

cases or flocks (Table 2). One respondent noted that their operation processed over 300 flocks with varying degrees of severity of this condition.

Blackhead, also known as Histomoniasis, decreased to position #14 in 2011 (#13, 2010; #11, 2009; #16, 2008; #22, 2007). It is one disease with no efficacious drug approved for use in turkeys. There were 89 reported cases of blackhead (Table 2) representing a 17% decrease from 2010. Losses to blackhead have been severe and sporadic cases are occurring in North America. The disease can be devastating in the individual flocks affected. Dimetridazole was extremely efficacious and previously approved for use in turkeys for the prevention and treatment of blackhead; it was banned in 1987. The lack of any legal treatment for histomoniasis is of concern, especially in the case of valuable turkey breeder candidate flocks. Losses to blackhead have been severe in several areas of Europe, and sporadic cases are occurring in North America. It seems unconscionable that we are unable to prevent the suffering and death in flocks affected by histomoniasis when effective treatments exist.

Heat stress ranked #4 following a hot summer, compared to #6 the prior year. Poult Enteritis Mortality Syndrome (**PEMS** ranked #33 versus #33 previously), *Ornithobacterium rhinotracheale* (**ORT**, ranked #12 versus #16 previously) and **protozoal enteritis** (#28 versus #22) and Avian Metapneumovirus (**AmPV**) ranked #31.

Mycoplasma synoviae (**MS**, infectious synovitis) infections ranked #27 (#28, prior year), and is one cause of synovitis. It may be present in flocks 10-12 weeks of age with typically low mortality and low morbidity. There were 39 cases of MS reported (Table 2) representing a 30% decrease from the prior year. The primary breeders have remained free of *M. gallisepticum* (**MG**), *M. meleagridis* (**MM**) and *M. synovia* (**MS**). Sporadic, but increasingly frequent infections with Mycoplasma, both MG and MS, often in association with backyard poultry and broiler breeder flocks is an ongoing concern, having the greatest impact when a breeder flock is infected and has to be destroyed.

Over the past 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 [112th Congress] Preservation of Antibiotics for Medical Treatment Act of 2011, introduced into both the House and Senate [H.R.965.IH; S.1211.IS], otherwise known as PAMTA 2011. The turkey industry opposes PAMTA 2011, 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 that our use of these vital, safe and effective production tools is professional, judicious and does not jeopardize these products' effectiveness in human medicine.

The industry's primary focus in 2011 continues to be the protection of the few drugs approved for use in turkeys. In 2010, the Food and Drug Administration Center for Veterinary Medicine published an advance notice of proposed rulemaking for the Veterinary Feed Directive, and a solicitation of public comments on a broad policy statement for industry entitled Draft Guidance #209, "The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals." The agency's intent is to evaluate judicious use and veterinary oversight of antimicrobial drugs in food-producing animals, particularly those deemed medically important in human medicine. Following up on comments related to these documents, NTF evaluated a list of antimicrobial drugs that could be affected by any changes in FDA policy, and there are some key products that are at risk due to lack of therapeutic claims. A final version of the guidance document is expected in 2011. The industry has also been approached by the National Antimicrobial Resistance Monitoring System (NARMS) with requests to conduct on-farm sampling of turkeys for the purpose of gathering additional data, but the logistics of such a program have yet to be sufficiently detailed, and the industry has not moved forward on such an initiative.

The industry also worked to help develop the Federal and State Transport (FAST) Plan for Movement of Commercial Turkeys in a High Pathogenicity Avian Influenza Control Area. The goal of the plan is to facilitate business continuity and economic survival of participating non-infected turkey operations in a Control Area after an outbreak of HPAI, and to help assure the continuous availability of safe turkey meat to consumers.

In 2010, the turkey industry continued to have frequent problems with green livers and suspect osteomyelitis (TOC, Turkey Osteomyelitis Complex) in processing plants. Given that the identification and removal of Turkey Osteomyelitis Complex (TOC) has been a concern for the industry for many years, in early 2011 NTF submitted a letter to FSIS requesting that the agency revisit the current policies on

TOC identification, and to propose some potential solutions that might be more beneficial to the industry as well as to FSIS in-plant personnel. Although the agency has followed-up on the letter, they have not yet given a formal response.

In 2010, turkey production decreased to 7,107.28 from 7,149.46 million pounds (live weight) in 2009. This was the lowest production level since 2005. Overall domestic per capita consumption for turkey products decreased to 16.40 lbs in 2010 from 16.90 lbs in 2009. The preliminary number for 2011 is 16.10 lbs turkey consumption per capita, which is the lowest level since 1989. Production in 2010 decreased to 244.188 million head with an average live weight of 29.11 lbs. In 2009, 247.359 million head were produced with an average live weight of 28.90 lbs. In general, in addition to decreases in flock sizes, birds were marketed at a younger age on average. (Reference: National Turkey Federation Sourcebook, June 2011).

Table 1. Turkey health survey (August) of professionals in US turkey production ranking current disease issues (1= no issue to 5 = severe problem). Survey response (reply) is 100% (n=26).

Issue	Score Average (1-5)	Score Mode (1-5)
Lack of approved, efficacious drugs	4.3	5.0
Clostridial Dermatitis (Cellulitis)	3.9	5.0
Colibacillosis	3.5	4.0
Heat stress	3.3	2.0
Salmonella	3.1	2.0
Poult Enteritis of unknown etiologies	3.1	3.0
Leg Problems	2.8	3.0
Late Mortality	2.8	3.0
Bordetella avium	2.6	3.0
Breast Blisters and Breast Buttons	2.6	2.0
Turkey Reovirus Digital Flexor Tendon Rupture	2.5	1.0
Ornithobacterium rhinotracheale (ORT)	2.4	2.0
Newcastle Disease Virus (NDV)	2.2	1.0
Blackhead (Histomoniasis)	2.2	3.0
Cannibalism	2.2	2.0
Coccidiosis	2.2	2.0
Tibial Dyschondroplasia (TDC, Osteochondrosis)	2.2	2.0
Osteomyelitis (OM)	2.1	2.0
Round Worms (Ascaridia dissimilis)	2.1	2.0
Cholera	2.1	1.0
Fractures	2.0	2.0
H3N2 Swine influenza	2.0	1.0
Shaky Leg Syndrome	1.9	1.0
Avian Influenza	1.8	1.0
Mycoplasma iowae (MI)	1.8	1.0
Bleeders	1.8	1.0
Mycoplasma synoviae (MS)	1.7	1.0
Protozoal Enteritis	1.7	1.0
Erysipelas	1.7	1.0
Mycoplasma gallisepticum (MG)	1.6	1.0
Avian Metapneumovirus	1.5	1.0
Necrotic enteritis	1.5	1.0
PEMS (Poult Enteritis Mortality Syndrome)	1.4	1.0
Turkey Coronavirus	1.4	1.0

Spondylolisthesis (Kinky-Back)	1.3	1.0

Table 2. Turkey health survey (August) of professionals in US turkey production. Survey response (reply) is 100% (n=26).

Cases (##) of	2011	2010	2009	2008	2007
Blackhead (Histomoniasis)	89	108	67	63	68
Mycoplasma synoviae (MS)	39	56	38	47	52
Turkey Coronavirus (TCV)	70	91	3	10	n/a
Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR)	106	n/a	n/a	n/a	n/a

Table 3. Turkey research priorities (August) of industry professionals in turkey production (1= low to 5 = high). Survey response (reply) is 100% (n=26).

Issue	Score Average (1-5)	Score Mode (1-5)
Food Safety	3.7	5.0
Disease	3.5	4.0
Welfare	2.9	2.0
Nutrition	2.7	3.0
Poultry Management	2.5	3.0
Environmental	2.5	3.0
Processing	2.5	2.0
Waste Disposal	2.3	2.0

Update on the US Poultry & Egg Association Research Grants Program

Henry Marks and Valerie Isaacs
U.S. Poultry Foundation Research Advisory Committee

Funding for research project proposals was limited to a single competition in 2010 as a result of a decline in the income of the USPOULTRY Foundation investments. However, in the current year (2011), two funding rounds were conducted (Spring and Fall). The Foundation Research Advisory Committee (FRAC) reviewed ~70 research proposals with 14 of those research proposals receiving approval by the Foundation Board of Directors. A total of $640,014 was granted in support of these research proposals. Plans are to return to having two competitions in 2012 (Spring and Fall).

Pre-proposals for the 2012 funding consideration are due November 1, 2011 (Spring competition) and May 1, 2012 (Fall competition). The FRAC will request full proposals after reviewing submitted pre-proposals. May 1 and November 1 have been established as permanent research project pre-proposal due dates. Plans are underway to develop additional funding to support research efforts of the USPOULTRY Foundation.

The following is an overview/summary of the U.S. Poultry & Egg Association Research Grants Program:

Table 1: USPOULTRY Research Grant Payments by Fiscal Year

1968	0	1990	591,905.00
1969	16,000.00	1991	571,935.00
1970	9,500.00	1992	759,002.00
1971	18,042.50	1993	791,879.00
1972	14,577.28	1994	889,116.00
1973	10,500.00	1995	948,187.00
1974	9,590.00	1996	1,072,950.00
1975	18,077.50	1997	1,045,102.00
1976	15,590.00	1998	1,180,070.00
1977	6,600.00	1999	1,078,901.00
1978	16,500.00	2000	1,049,219.00
1979	29,500.00	2001	1,302,824.00
1980	48,982.00	2002	1,159,493.00
1981	40,871.00	2003	1,069,800.14
1982	79,395.00	2004	1,046,438.50
1983	109,132.00	2005	1,024,974.00
1984	488,040.00	2006	819,811.05
1985	311,186.00	2007	851,938.20
1986	224,226.00	2008	1,015,338.00
1987	432,530.00	2009	318,535
1988	1,455,775.00	2010	339,560
1989	706,802.00	2011	693,662.77

Table 2: Institutions Receiving USPOULTRY Grants

ABC Research	New York University	University of Connecticut
Auburn University	North Carolina State University	University of Delaware
Clemson University	North Dakota State University	University of Florida
Colorado Quality	Ohio State University	University of Georgia

Rsch		
Cornell University	Pennsylvania State University	University of Illinois
Drew University	Praxis Biologics	University of Kentucky
Georgia Poultry Lab	Protein Sciences Corporation	University of Maine
Georgia Tech	Purdue University	University of Maryland
Illinois Inst. of Technology	Russell Research Lab	University of Minnesota
Iowa State University	Southeast Poultry Research Lab	University of Missouri
Johns Hopkins University	Southern Illinois University	University of Nebraska
Kansas State University	Texas A&M University	University of Pennsylvania
Louisiana State University	Texas Tech University	University of Saskatchewan
Loyola College of MD	University of Arizona	University of Wisconsin
Michigan State University	University of Arkansas	USDA-ARS
Mississippi State University	University of California, Davis	Virginia Tech
Montana State University		Washington State University

Table 3: USPOULTRY Research Grants by General Subject

Diseases	$9,040,927
Food Safety	$3,591,995
Poultry Production	$4,190,687
Litter/Waste Management	$3,028,619
Further Processing	$1,011,000
Processing	$875,198
Poultry Nutrition	$655,000
Egg-related	$866,100
Miscellaneous	$455,000
Egg Cholesterol	$155,000
Worker Health	$62,000
Total Approximately	$23,931,526

HPAI: Collaborative Planning to Maximize Market Continuity

Shauna Voss, University of Minnesota, Center for Animal Health and Food Safety, St. Paul, MN

The U.S. animal agriculture and food systems are composed of extensive networks that supply wholesome, inexpensive food to people across the nation, whether they live in urban or rural settings. As food production and processing becomes separated geographically from the population centers, these complex systems become highly vulnerable to social, economic, and political disruptions. Introduction of a foreign animal disease has significant potential for disrupting the food supply chain and severely damaging the food system.

Many industries currently function using a Just-In-Time business model meaning that food products are processed and delivered to the consumer within hours or days of production. As a result, modern production and processing premises often have limited storage capacity designed to accommodate no more than 48 hours worth of production typically with product moving on a daily basis.

In the event of a foreign animal disease outbreak, "stop movement" orders are likely to be the initial regulatory response used to prevent the spread of disease. These "stop movement" orders potentially have wide geographic coverage resulting in serious unintended economic and social damage. It now has been widely accepted that emergency preparedness serves not only to control disease, but also to prevent or minimize unintended negative consequences to the food and agricultural systems. Called 'business continuity' or 'secure food system' planning, processes are employed to assess the relative risk of specific movements (proactive risk assessments) and establish a system to grant movements for non-susceptible species and commodities representing negligible risk of disease spread (permitting guidelines).

Currently, Public, Private, and Academic partners are working together to develop robust and resilient solutions that address the challenges associated with maintaining market continuity during foreign or emerging animal disease outbreaks. These partnerships are synergistic as no single sector can address these challenges alone. Understanding industry practices and movement is critical for accurate assessment of disease exposure pathways that contribute to risk. The development of permitting guidelines also requires state and national data systems for sharing of critical information that supports the needs of the disease control efforts and the Incident Command System. Active engagement of both industry and regulatory authorities is imperative in the development of market continuity plans. All stakeholders benefit in the development of these plans and the relationships that form as a result of the collaborations.

Benefits to market continuity planning: Market continuity planning has many benefits. It develops a common understanding between industry and regulatory authorities with regards to animal agriculture and disease response; it identifies risks associated with the movement of product *before* the time of an outbreak; it supports National and State outbreak preparedness and response plans; and most importantly, it supports the security of the nation's food supply.

I. Benefits to *INDUSTRY (private)*
   - Enhances market continuity within and between States during an outbreak
   - Supports regionalization, compartmentalization, and international trade
   - Increases biosecurity and promotes flock health by understanding risk before an outbreak
   - Facilitates early detection of disease and prevents spread

II. Benefits to *REGULATORY AGENCIES (public)*
   - Guides decision makers on criteria needed to move product – permitting
   - Supports the National Response Framework and Incident Command System
   - Utilizes an internationally recognized approach for assessing risk
   - Provides information on biosecurity levels and diagnostic tests
   - Creates opportunity for regulatory authorities to understand needs of industry

III. Benefits to *CONSUMERS*
   - Ensures a continuous supply of product
   - Reduces work disruption and negative economic impacts for rural communities
   - Promotes food security

National Poultry Improvement Plan Annual Report

Steve Roney, USDA-APHIS-VS

National Poultry Improvement Plan is a Federal-State-Industry cooperative program. There are 49 Official State Agencies and 130 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 FY 2011 (July 2010-June 2011) there were 2 isolations of Salmonella pullorum in the US. These were single bird isolations in backyard flocks only. There were no isolation/outbreaks of Salmonella pullorum (standard strain) reported during FY 2010. There have been no isolations of Salmonella gallinarum since 1988 in any type poultry. U.S. Pullorum-Typhoid Clean participating hatcheries include: 262 egg and meat-type chicken hatcheries, 37 turkey hatcheries, and 768 waterfowl, exhibition poultry and game bird hatcheries. NPIP U.S. Pullorum-Typhoid Clean Participating Breeding Flocks and Number of Birds are:

- **Egg-Type Chickens** 331 Flocks with 4,323,042 birds
- **Meat-Type Chickens** 6,471 Flocks with 215,155,414 birds
- **Turkeys** 634 Flocks with 5,395,467 birds
- **Waterfowl, Exhibition Poultry, and Game Birds** 2667 Flocks with 976,000 birds

Avian Influenza Status: In FY 2011 (July 1, 2010-June 30, 2011), there was an H7N9 isolated in turkeys in MN, an H7N3 from commercial turkeys in MO and an H5N2 and an H7N9 from backyard birds in NE.

Table 1: NPIP U.S. Avian Influenza Clean and U.S. H5/H7 Clean Participating Breeding Flocks; and U.S. H5/H7 Avian Influenza Monitored Participating Commercial Flocks:

Subpart	Flocks	Birds	Tests
Egg-Type Chicken Breeders	331	4,323,042	31,866
Table-Egg Layers	2,134	132,359,664	42,950
Meat-Type Chicken Breeders	6,471	86,334,569	235,550
Meat-Type Chickens Commercial	73,856	6,277,760,221	1,929,622
Turkey Breeders	634	5,395,467	18,422
Meat-Type Turkeys	13,955	96,356,888	153,940
Waterfowl, Upland Gamebirds, Ex. Poultry	4,869	28,538,680	106,165
Total	102,250	6,631,068,531	2,518,515

Authorized Laboratories Activities: The University of GA Poultry Diagnostic & Research Center provides a 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 Labs of the NPIP. Laboratory training provided to the Authorized Labs included two Salmonella Isolation and Identification Workshops, two Mycoplasma Diagnostic Workshops and one Avian Influenza Diagnostic Workshop for FY 2011.

NVSL Avian Influenza and Newcastle Disease Activities Report FY 2011

Jan Pederson
National Veterinary Services Laboratory

AVIAN INFLUENZA

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 4,397 specimens in 761 submissions from 12 states (CT, FL, MA, MD, NE, NH, NJ, NY, OH, PA, RI, and WA) by virus isolation in embryonated chicken eggs and, when appropriate, by real-time RT-PCR (rRT-PCR). The surveillance is a collaborative effort between individual States and the United States Department of Agriculture (USDA). Presumptive positive specimens from rRT-PCR testing at state laboratories and specimens requiring virus isolation (environmental and cloacal swabs) were submitted to the NVSL for testing. All remaining LBMS surveillance specimens were tested at the State level.

In fiscal year (FY) 2011, AIV or APMV was isolated from 8.8% (67 of 761) of submissions and 2.6% (116 of 4,397) of specimens tested. AIV subtype H3N1 (NY, n=8), H3N8 (NJ, n=2) and H4 (PA, n=1) were the subtypes of AI found in the LBMS this year. The remaining 105 viruses isolated were identified as APMV; 102 were APMV-1 from 8 states (CT, FL, MA, NJ, NY, PA, RI, and WA), one was APMV-4 from OH, and 2 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=29) test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site (n=62). All but 2 isolates were characterized as low virulent (lentogenic pathotype) strains; the 2 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 duck specimen from OH.

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 and identification testing of positive specimens. During FY 11, two detections of notifiable LPAI in commercial poultry were reported to the World Organization for Animal Health (OIE). 1) Pre-harvest sampling from 2 Wright County, MN commercial turkey flocks tested positive for H7N9 antibodies. An AIV subtype H7N9 was isolated from 2 specimens received from premises 1, out of 18 week old turkeys. A specimen from premises 2, from 20 week old turkeys, tested suspect positive by rRT-PCR for H7 viral RNA. The H7 AIV was pathotyped as LPAI virus by the chicken pathogenicity test and amino acid sequence analysis of the hemagglutinin (H) cleavage site. Birds were depopulated by controlled marketing and euthanasia (foam application). 2) H7N3 antibodies were detected in a commercial turkey meat flock in Polk County, MO as a result of routine pre-slaughter surveillance. Suspect positive H7 rRT-PCR specimens were detected in one house. Turkeys were depopulated by control marketing and euthanasia (foam application). Pandemic H1N1 (pH1N1) viral RNA was detected by rRT-PCR in commercial turkeys in CA. The specimen was positive for pandemic H1N1 virus by the modified matrix and pandemic N1 rRT-PCR assays, however no virus was isolated. For backyard (BY) poultry, routine surveillance at a consignment sale in Seward County, NE in March detected AI H7 by rRT-PCR. The index flock was positive for H7 antibodies and AI H7 viral RNA but negative for virus isolation. Follow-up surveillance identified 2 infected flocks, one from which an H7N9 LPAI virus was isolated from guineas and one BY flock that was positive for H7 antibodies. The 3 infected flocks were depopulated. Additional antibody surveillance conducted within a 2 mile radius identified an additional 2 infected flocks which were depopulated. Both PCR and virus isolation tests were negative on samples tested from the H7 antibody positive flocks.

The NVSL received 578 submissions from commercial and backyard poultry for AI antibody confirmation and subtyping in FY11. NVSL detected influenza H1, H3, N1, and/or N2 antibodies in 397 commercial turkey submissions from 14 states (CA, IA, IN, MI, MN, NE, NC, NH, OH, PA, TX, WA, WI, and WV) in FY11. Detection data of additional LPAI AIV or AIV-specific antibodies in poultry/birds are shown in Table 1.

AI Diagnostic Reagents Supplied by the NVSL. During FY 2011, a total of 12,049 units of agar gel immunodiffusion (AGID) reagents (antigen and enhancement serum) were shipped to 64 state, university, and private laboratories in 37 states. The quantity is sufficient for approximately 1,445,880 AGID tests. An

additional 773 units (92,760 tests) were shipped to 10 foreign laboratories. Proficiency panels for the AGID were shipped to 79 laboratories in 36 states to support the surveillance of AI by AGID.

rRT-PCR Proficiency Test Panels. The NAHLN laboratories conducting surveillance testing for AI and/or ND are required to have one or more diagnosticians pass an annual proficiency test (PT) to perform official rRT-PCR tests. In FY 2011, PTs were distributed to 278 diagnosticians in 55 laboratories for AI and to 273 diagnosticians in 55 laboratories for APMV-1 (Newcastle disease) rRT-PCR. The AI rRT-PCR proficiency panel included specimens for the detection of swine influenza, specifically pH1N1. In addition to NAHLN laboratories AI and ND rRT-PCR proficiency panels were distributed to Brazil (3 AI/ND panels), Chile (2 AI/ND panels) and to 2 federal and 20 regional Mexican laboratories (22 AI/ND panels).

AIV Surveillance in Wild Waterfowl. The National Wild Bird Surveillance Program which was a cooperative USDA Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) and Department of Interior's United States Geological Survey (USGS) was curtailed in March of 2011 due to lack of funding. Approximately 420 wild bird specimens were received in 2011 from 30 different states for confirmation, subtyping and characterization. No HPNAI H5N1 was detected; however, LPAI H5N1 virus was detected in specimens submitted from 4 states (ID, MN, OH and WA). A total of 62 H5 viruses (various N subtypes) and 49 H7 viruses (various N subtypes) were isolated and subtyped. Predominant H5 and H7 subtypes were H5N2 and H7N3. All H5 and H7 AIVs were characterized as LPAI viruses of North American lineage. Other AIV subtypes identified included H1, H2, H3, H4, H6, H8, H9, H10, H11, H12, H13 and H14.

NEWCASTLE DISEASE

Isolations of Virulent Newcastle Disease Virus (vNDV). In FY 2011, no vNDV was isolated from domestic poultry. Pigeon paramyxovirus type-1 (PPMV-1) was isolated from pigeons in PA and from pigeons from one import submission. Virulent NDV was isolated from wild cormorant specimens from FL (4 submissions), MI (1 submission) and OR (1 submission). All vND and PPMV-1 isolates were characterized by the intracerebral pathogenicity index (ICPI) and/or amino acid sequence analysis of the fusion protein cleavage site. In addition, all PPMV-1 isolates were identified by the HI test with monoclonal antibodies specific for PPMV-1.

Isolations of Low Virulent Newcastle Disease Virus (LoNDV). During FY 2011, 20 isolates of APMV-1 were received for characterization at the NVSL or were isolated at the NVSL from diagnostic submissions. The specimens originated from 6 states (AL, DE, MD, MN, MO, and NC). All of the isolates were characterized as LoNDV by the ICPI and/or by deduced amino acid motif at the fusion protein cleavage site.

NDV Diagnostic Reagents Supplied by the NVSL. During FY 2011, a total of 79 vials of LaSota APMV-1inactivated antigen (2.0 ml per vial) and 14 vials of antiserum (2.0 ml per vial) for the hemagglutination-inhibition test were shipped to 6 and 4 state, university, and private laboratories, respectively. An additional 4 vials of each were shipped to 4 foreign laboratories.

Table 1. Subtypes of non H5 or H7 low pathogenicity avian influenza virus (AIV) or specific antibodies detected in poultry/birds, FY 2011.

State	Species	Subtype of AIV* (number)	Antibody Subtypes (number)
California	Pekin Ducks	H6N1,2,4* (1)	
Florida	Ostrich		H11 (1) and N2 (2)
Iowa	Turkey		H11N9 (1)
Indiana	Turkey	H3N2* (1)	
Michigan	Turkey		H1,3,411N1,2 (1)
Minnesota	Turkey		H11N9 (48)
Minnesota	Turkey		H6N8 (3), H6N9 (1)
Minnesota	Pheasants		H6N1,8 (1)
Missouri	Turkey		H7N3 (1)
North Carolina	Turkey		H1,3,5N1,2
Nebraska	Turkey/chicken		H7N9 (11)
Nebraska	Geese/guineas	H7N9** (3)	

Oklahoma	Chicken		H10N7,9 (1)
Virginia	Show ducks	H4N6* (3)	

*Low pathogenicity AIV by the chicken pathogenicity test.

**Low pathogenicity AIV by the chicken pathogenicity test and amino acid analysis of the hemagglutinin protein cleavage site.

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

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Salmonella serotyping

The Diagnostic Bacteriology Laboratory within the National Veterinary Services Laboratories (NVSL) routinely serotypes Salmonella isolates submitted by private, state, and federal laboratories as well as veterinarians, researchers and other animal health officials. This report summarizes Salmonella serotyping submissions to NVSL from January 1 through December 31, 2010 originating from poultry. The Salmonella isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (herd and flock monitoring programs, environmental sources, food). Serotyping data from isolates submitted for research purposes are not included in the summary. Salmonella serotyping at the NVSL is an ISO 17025 accredited test. Sera used for typing Salmonella isolates consists of polyvalent sera against the O serogroups and single factor sera against the individual O and H antigens. Approximately 50% of the sera used at the NVSL is produced in house as previously described (Ewing), and the rest is purchased from commercial vendors. All sera are subjected to quality control testing prior to use. Salmonella antigenic formulae are determined essentially as previously described (Ewing) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I. Those serotypes previously reported as "Arizona" are now listed with "III" (both monophasic and diphasic) followed by the antigenic formula. Those serotypes belonging to subspecies II or IV that had been previously named are now listed with their antigenic formula preceded by II or IV.

From January 1 to December 31, 2010 there were 4987 isolates from chicken sources and 1226 isolates from turkey sources submitted to NVSL for Salmonella serotyping. The most common isolates from chickens and turkeys, are listed in Tables 1 and 2 respectively.

The NVSL provided a Salmonella proficiency test in order for laboratories to assess their ability to isolate Salmonella from environmental samples and determine the serogroup of any Salmonella isolated. The samples consisted of drag swabs spiked with Salmonella and/or common contaminants. The 2011 test included Salmonella serotypes Enteritidis, Kentucky, Berta, Heidelberg, 9, 12:non-motile, Escherichia coli, E. coli (H_2S+), Citrobacter freundii, Pseudomonas aeruginosa, and Proteus mirabilis. The test consisted of 7 samples which were shipped to laboratories overnight on ice packs. Laboratories were instructed to use whatever protocol they choose and to report the results within 3 weeks. The NVSL randomly retained 10% of the test kits and tested them blindly for QA purposes. The results of the proficiency test are shown in Table 4.

Table 1: Most common serotypes in 2010: Chicken

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**
Enteriditis	105	Enteritidis	1395
Typhimurium	35	Kentucky	866
Kentucky	20	Senftenberg	374
Heidelberg	13	Heidelberg	261
Senftenberg	7	Typhimurium	150
All others	64	Mbandaka	132
		Tennessee	99
		Infantis	97
		Typhimurium var 5-	72
		Montevideo	55
		All others	1242
Total	**244**	**Total**	**4743**

Table 2: Most common serotypes in 2010: Turkeys

Clinical		Non-Clinical	
Serotype	**No. Isolates**	**Serotype**	**No. Isolates**

Senftenberg	45	Senftenberg	223
Heidelberg	23	Hadar	100
Typhimurium	17	Ouakam	60
Albany	17	Orion	55
Ouakam	17	Muenster	51
All others	126	Montevideo	50
		Kentucky	46
		Worthington	43
		Agona	34
		Saintpaul	34
		All others	285
Total	**245**	**Total**	**981**

Table 3: Summary of the NVSL *Salmonella* proficiency test

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

***Salmonella* Enteritidis**

The number of *Salmonella* Enteritidis (SE) isolates submitted from chickens in 2010 is shown in Table 4. The most common SE phage types are shown in Table 5.

In July 2010, the NVSL implemented a rapid SE Rule Out test in order to help customers comply with the FDA Egg Rule. The test indicates if a submitted isolate is SE or not, and the results are typically reported within two business days. 174 isolates were submitted for SE rule out testing; 163 were SE positive.

Table 4: Number of chickens *Salmonella* Enteritidis isolates per calendar year at the NVSLuxcerza

	2006	**2007**	**2008**	**2009**	**2010**
No. chicken isolates	4579	4971	6164	4761	4987
No. chicken SE isolates	437	580	876	993	1500
SE percent of all isolates	9.5%	11.7%	14.2%	20.9%	30.1%

Table 5: Most common *Salmonella* Enteritidis phage types from chicken sources per calendar year

Rank	**2006**	**2007**	**2008**	**2009**	**2010**
1	8 (156)	8 (103)	8 (240)	8 (131)	8 (182)
2	13 (96)	13 (29)	13 (82)	13 (54)	13 (90)
3	23 (16)	23(16)	23 (58)	13a (19)	13a (65)
4	4 (12)	13a (15)	13a (43)	23 (10)	RDNC (27)
5	13a (8)	22 (1)	RDNC (10)	RDNC (4)	23 (11)
Total typed	297	167	444	228	408

( ) = number of isolates for each phage type

RDNC = reacts, does not conform

Salmonella Pullorum

The NVSL provided 2,120 ml of *S*. Pullorum tube antigen, 1,775 ml of *S*. Pullorum stained microtiter antigen, and 247 ml of antisera to testing laboratories. The NVSL conducted 139 *S.* Pullorum microtiter tests. The NVSL did not identify any isolates of *S*. Pullorum via serotyping in 2010.

Pasteurella and Mycoplasma

NVSL received 106 isolates for somatic typing in 2011, a decrease from 2010 (Table 6). NVSL also supplied 85 ml of *P. multocida* typing sera, an increase from 40 ml in 2010. The amount of *Mycoplasma* reagents are shown in Tables 7 and 8.

Table 6: *Pasteurella multocida* somatic typing. Table shows number of isolates per fiscal year for each type.

	2008	**2009**	**2010**	**2011**
Type 3	46	54	38	25
Type 3,4	39	33	27	12
Type 1	33	14	25	17
All other	80	62	70	52
Total	198	163	160	106

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

Antisera	**2007**	**2008**	**2009**	**2010**	**2011**
M. gallisepticum	374	340	266	256	306
M. meleagridis	74	120	54	32	54
M. synoviae	342	346	222	256	326
Negative	136	252	162	222	150
Total	926	1058	704	766	836

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

Antigen	**2007**	**2008**	**2009**	**2010**	**2011**
M. gallisepticum	515	390	190	150	195
M. meleagridis	120	150	75	75	95
M. synoviae	610	510	200	215	220
Total	1245	1050	465	440	510

Ewing, WH. 1986. Edward and Ewing's Identification of Enterobacteriaceae. 4th edition. Elsevier Science Publishing Co., Inc., New York, U.S.

Grimont, PAD, Weill, FX. 2007. Antigenic Formulae of the *Salmonella* Serovars. 9th edition. WHO Collaborating Centre for Reference and Research on *Salmonella*. Paris, France.

National Animal Health Monitoring System Poultry 2010 Study Update

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The Poultry 2010 study is the fourth poultry study conducted by the National Animal Health Monitoring System (NAHMS). The study objectives were:

- 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 ILT).
- Estimate the prevalence and identify risk factors associated with Clostridial dermatitis (cellulitis/ gangrenous dermatitis) on turkey grower farms.
- Estimate the size of the urban chicken population in Los Angeles County. Describe bird health, movement and biosecurity practices of urban chicken flocks in 4 U.S. cities – Los Angeles, Miami, Denver, and New York.

Breeder farm study: Companies having table egg layer breeder farms or broiler breeder farms participated in the breeder farm study. Questionnaires addressing biosecurity and management practices were completed for 482 breeder farms. All primary breeder farms required the producer and employees to change clothing, change shoes or use shoe covers, to not have been around poultry at least 24 hours, and to not own poultry or birds, and nearly all required showers before entering the poultry houses. Over 8 of 10 multiplier farms required the producer and employees to use footwear protection, not be around other poultry, and to not own poultry or birds. Very few disease problems were reported for breeder farms, the most common being *E. coli* peritonitis; 22.7 percent of farms reported at least a slight problem with *E. coli* peritonitis in the last completed flock.

Clostridial dermatitis study: Clostridial dermatitis was reported on approximately one in 4 broiler farms, with less than 1% of farms having severe problems. Turkey farms in the Central region had the highest percentage of farms with some degree of clostridial dermatitis problems during the previous 12 months: about half had some degree of disease, and 17.6% had severe disease. No turkey farms in the West region had clostridial dermatitis problems. Analysis of risk factors via a case-control study is on-going. A subset of case and control farms provided weekly biologic samples for culture as well as intestinal histopathology, in order to study the relationship between intestinal pathology and disease pathogenesis. Laboratory analysis is on-going.

Urban chicken study: A mail/phone survey of residents of Los Angeles County was conducted to estimate the size of the urban chicken population. Approximately 1% of residences on less than one acre had chickens present.

A survey of urban chicken owners was conducted in Los Angeles, Denver, New York City, and Miami to describe management practices of urban chicken flocks. Customers purchasing chicken feed at feed stores in Los Angeles, Denver, and Miami completed a short questionnaire. In New York City, the survey was administered to members of a chicken club via the club's web site.

Chicken owners in Los Angeles and Miami were more likely to complete the study questionnaire in Spanish, have a longer history of raising chickens, and have larger flock sizes than owners in Denver and New York City. They were also more likely to have chicken breeds other than table egg breeds and to have birds other than chickens. Family tradition was a more important reason to raise chickens for owners in Los Angeles and Miami compared with owners in Denver and New York City, while food source and food quality were more important to owners in Denver and New York City. Overall, 46% of urban chicken owners were aware of a connection between contact with live poultry and Salmonella, and 29.4% had heard of "Biosecurity for Birds."

Future plans: The size of the urban chicken population will be estimated in Denver, New York City, and Miami in 2012. A study of table egg layer farms focusing on practices related to Salmonella Enteritidis will be conducted in 2013.

USDA APHIS HPAI Response Plan – The Red Book

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The Highly Pathogenic Avian Influenza (HPAI) Response Plan: The Red Book (2011) incorporates comments received on the HPAI Response Plan: The Red Book (2010), to update the Summary of the National HPAI Response Plan (2007).

The objectives of this plan are to identify (1) the capabilities needed to respond to an HPAI outbreak and (2) the critical activities that are involved in responding to that outbreak, and time-frames for these activities. These critical activities are the responsibility of Incident Command in an outbreak situation.

This plan protects public health, promotes agricultural security, secures the food supply, and guards animal health by providing strategic guidance on responding to an HPAI outbreak. Developed by the National Center for Animal Health Emergency Management of the Animal and Plant Health Inspection Service (APHIS), the plan gives direction to emergency responders at the local, State, Tribal, and Federal levels to facilitate HPAI control and eradication efforts in poultry in the United States. This plan complements, not replaces, existing regional, State, Tribal, local, and industry plans.

HPAI is zoonotic, and while it appears to have a relatively high species-specific transmission barrier, it also can be fatal for humans. Less than 1,500 cases of avian influenza infection in humans have been documented in the last 50 years. Animal health officials will coordinate with public health officials in the event that HPAI is identified in the United States.

HPAI virus causes extremely high morbidity and mortality rates in poultry, and is highly contagious. Currently, there is no evidence that HPAI exists in the United States in domestic poultry. HPAI subtype H5N1 does exist in much of Asia and in parts of Europe and Africa. HPAI is easily spread through direct contact with sick or infected poultry, as well as via fomites, such as equipment and vehicles. An HPAI outbreak in the United States could have a major economic impact. In addition to the potential public health threat, there may also be a significant social and psychological impact on flock owners.

The goals of an HPAI response are to (1) detect, control, and contain HPAI in poultry as quickly as possible; (2) eradicate HPAI using strategies that seek to protect public health and stabilize animal agriculture, the food supply, and the economy; and (3) provide science- and risk-based approaches and systems to facilitate continuity of business for non-infected animals and non-contaminated animal products.

Achieving these three goals will allow individual poultry facilities, States, Tribes, regions, and industries to resume normal production as rapidly as possible. They will also allow the United States to regain disease-free status without the response effort causing more disruption and damage than the disease outbreak itself.

During an HPAI outbreak response effort, many activities—such as epidemiology, surveillance, biosecurity, quarantine and movement control, and depopulation—must occur in a deliberate, coordinated fashion. In addition to providing strategic direction on these various activities, this plan explains the underlying Incident Command System structure, applying the National Response Framework (NRF) and National Incident Management System (NIMS) principles and systems to control and eradicate an outbreak of HPAI in the domestic poultry population.

The United States' primary control and eradication strategy for HPAI in domestic poultry, as recommended by the World Organization for Animal Health (OIE), is "stamping-out."

Incorporating current scientific knowledge and policy guidance about HPAI, the *HPAI Response Plan:*

- identifies the audience for and purpose of the document;
- provides technical information on HPAI and the impact an HPAI outbreak could have in the United States;
- explains the integration of the NRF, NIMS, and the other Foreign Animal Disease Preparedness and Response Plan (FAD PReP) documents; describes U.S. Department of Agriculture preparedness and response activities, both domestic and international, including collaboration with public health agencies and the APHIS Incident Management Structure;
- presents 23 specific response critical activities and tools, such as surveillance, diagnostics, cleaning and disinfection, health and safety, personal protective equipment, and depopulation;
- details OIE standards for HPAI surveillance, virus inactivation, and disease freedom; and
- supplies information on proof-of-freedom procedures and restocking after an HPAI outbreak.

This response plan is carefully integrated with other FAD PReP documents, including the HPAI Standard Operating Procedures and National Animal Health Emergency Management System Guidelines.

Together, these documents provide a comprehensive preparedness and response framework for an HPAI outbreak.

Public health information about avian influenza and humans can be found at http://www.cdc.gov/flu/avian.

Please visit the FAD PReP collaboration website, which promotes preparedness relationships and advances response capabilities. The website is at: https://fadprep.lmi.org.

This plan is a dynamic document that will be updated and revised based on future knowledge and further stakeholder input. Your comments and recommendations on this document are invited. Send them to the following e-mail address: FAD.PReP.Comments@aphis.usda.gov.

Southeast Poultry Research Laboratory (SEPRL) Update

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Antigenic variation has become a major concern with the proper application of vaccination for highly pathogenic H5N1 avian influenza. Vaccine experiments were performed to evaluate the efficacy of killed oil adjuvanted vaccines against highly pathogenic H5N1 from Egypt. The data compared a homologous strain, a reverse genetics produced vaccine with a H5 gene from a Vietnam isolate, and a vaccine using a low pathogenic H5N2 Mexican strain. The results showed the Mexican strain vaccine, although producing the highest titers, had poor protection with high mortality. The vaccine with the Vietnam insert, although having lower antibody titers, had intermediate protection. The homologous vaccine, although with the lowest antibody titers had the best protection. The data clearly shows that the antigenic drift of at least some viruses from Egypt was so great that several commonly used vaccines no longer provided sufficient protection. For acceptable vaccine protection, the vaccine needs to be closely matched to the field strain.

The overwhelming majority of AI vaccines produced and sold are inactivated whole virus formulated into an oil emulsion. However, recombinant vectored vaccines are gaining popularity. In this study, we compared protection of chickens provided by a recombinant turkey herpesvirus (rHVT) vaccine expressing the HA gene from a clade 2.2 H5N1 strain (A/swan/Hungary/4999/2006) against homologous H5N1 and heterologous H5N1 and H5N2 HPAI challenge. For homologous challenge, groups of birds were vaccinated at day of age subcutaneously and challenged four weeks later with A/whooper swan/Mongolia/L245/2005. The results demonstrated all vaccinated birds were protected from clinical signs of disease and mortality following homologous H5N1 challenge. In addition, oral and cloacal swabs taken from challenged birds demonstrated that vaccinated birds had lower titers of viral shedding compared to sham-vaccinated birds. To examine protection against a genetically distant HPAI, birds were challenged with either a H5N1 of Indonesian origin or a H5N2 HPAI Mexican isolate. In these studies, at least 80% of vaccinated birds survived challenge, with few birds shedding virus after challenge. Taken together, these studies provide support for the use of rHVT vaccines expressing HA to protect poultry against multiple lineages of HPAI.

The pathogenicity of H5N1 highly pathogenic avian influenza (HPAI) viruses in domestic ducks has increased over time. These changes in virulence have been reported with viruses from countries with high population of domestic ducks including Vietnam and Egypt. In order to understand which viral genes are contributing to the increase in virulence of H5N1 HPAI viruses in ducks, reverse genetics was used to generate single-gene reassortant viruses with genes from H5N1 HPAI viruses of different pathogenicity. Intranasal inoculation of two-week-old domestic Pekin ducks with these reassortant viruses demonstrated that more than one viral gene is involved in the increased pathogenicity of H5N1 HPAI viruses in ducks.

The relative sensitivity of different swab types was compared by collecting cloacal and oropharyngeal swabs from chickens experimentally infected with a low pathogenicity H7N2 AIV isolate at multiple time points post infection (PI). Three swab material types were compared including: nylon (dacron) (the current type recommended by APHIS), flocked nylon, and urethane foam, as each has different absorbance and release properties. Samples have been processed for real-time RT-PCR (rRT-PCR) for samples collected 1-4 days PI. Initial analysis of the rRT-PCR results shows that there may be improved detection of AIV with flocked swabs for oral samples and foam swabs with cloacal samples. Real-time PCR results show that 100% of oral samples collected were positive, however the cycle threshold values, which indicates the amount of virus recovered in the specimen, showed statistically significant higher amounts of virus recovery on days 1 and 3 PI with flocked swabs versus either foam or non-flocked swabs. With cloacal swabs collected 1-4 days PI there was a trend for cycle threshold values to be lower with foam swabs. This difference was only statistically significant among swab types at 1, 3 and 4 days PI. Importantly the proportion of positive birds by cloacal swabs was similar among all three swabs types.

The biggest controversy in Newcastle disease virus research is whether traditional NDV vaccines, such as B1 and LaSota, are able to protect against the newer virulent NDVs. There are genetic differences among NDV isolates, even though they are all one serotype, but we have shown that you can reduce the amount of virulent NDV shed from vaccinated birds by having the vaccine be more genetically similar to the outbreak virus. In our laboratory, under experimental conditions using SPF chickens, LaSota vaccines protected birds from death and disease against 3 diverse virulent viruses.

Two unusual viruses were isolated by NVSL. One from an unknown avian species at a live bird market in FL in 2007 and a few others from MN turkeys in 2009. While they both only have 2 basic amino acids

between positions 113-116, oddly they both have an “F” at position 117. One is most similar to genotype I viruses from wild birds and the other is most similar to genotype II NDV isolates from wild birds. The ICPI in chickens is very low. The viruses seem to grow better in turkey eggs (ETE) than in chicken eggs. Only one other known naturally occurring lentogenic NDV has an F at position 117 and that is isolate PR 32 (Peats Ridge, Australia) that was an intermediate virus during the virulent outbreak of 1998.

In order to characterize the un-described viruses present in the turkey gut, we utilized the Roche/454 Life Sciences GS-FLX pyrosequencing platform to compile an RNA virus metagenome from turkeys experiencing enteric disease. This approach yielded numerous sequences homologous to viruses in the nr protein database (GenBank), many of which have not been described in turkeys, including sequences from the dsRNA viruses (*Reoviridae* and Picobirnaviruses), and the ssRNA viruses (*Caliciviridae*, *Leviviridae*, *Picornavirales*, and *Astroviridae*). The majority of the assigned viral contigs showed similarity to database sequences from the *Picornavirales* order. These results validate this metagenomic approach to identifying known and novel RNA viruses in the poultry gut.

In order to directly confirm the presence of these novel picobirnaviruses (PBVs) in the poultry gut, an RT-PCR based assay targeting the PBV RNA-dependent RNA-polymerase (RdRp) was developed. Serial dilution of the dsRNA was used to determine the sensitivity of the assay and RT-PCR with isolated RNA from known enteric viruses (avian revovirus, rotavirus and astrovirus) was used to determine potential cross-reactivity. No cross-reactivity was seen with isolated enteric virus RNA or with total RNA extracted from control turkey intestinal homogenates. The sequence data generated via this approach will prove useful in a continuing, in-depth molecular characterization of the viral constituency of the poultry gut. This will facilitate the development of updated molecular diagnostic tests, plus a more thorough knowledge of the viral constituency in the poultry gut has the potential to provide the tools necessary to lead to a better understanding of the role viruses play in enteric disease and in the performance of poultry in general.

Avian metapneumovirus (aPMV) is a poultry virus that is the causative agent of turkey rhinotracheitis in turkeys and swollen head syndrome (SHS) in chickens. Though the virus causes low mortality in poultry, the high morbidity can lead to significant economic impact in the industry. The aMPV cell attachment glycoprotein is an envelope protein that is immunogenic and a good vaccine candidate. Using an infectious clone derived from the LaSota strain of Newcastle Disease (NDV) virus, a reverse genetics approach was used to insert the aMPV cell attachment glycoprotein (G) into the LaSota pFLC backbone. This infectious clone was used to generate recombinant virus that could be used as a bivalent vaccine (rVaccine) to potentially protect against NDV and aMPV. It was determined that the recombinant vaccines wit the G protein insert grew to the same titers as the NDV LaSota vaccine strain. Versions of this recombinant vaccine expressing the G protein from the different aMPV subtypes were used to inoculate one week old SPF turkeys with the NDV LaSota strain used as a control. The recombinant vaccines all protected the turkeys from a challenge with a velogenic (CA02) strain of NDV. The turkeys that were vaccinated with the recombinant vaccine expressing the G protein from the aMPV C subtype were challenged as well with wild-type aMPV-C (Colorado). The recombinant vaccine did not fully protect the birds from aMPV-C infection, although clinical signs were reduced in vaccinated birds. These recombinant vaccines replicate well in birds, and have been shown to express the G-glycoprotein; however, while they provide full protection to velogenic NDV, they provide only partial protection against homologous aMPV challenge.

Current research indicates that meleagrid herpesvirus type 1 (MeHV-1, now known as turkey herpesvirus, HVT) is an excellent vector for the expression of avian immunogens. Classical methods using marker rescue approaches are often time consuming and require the inclusion of undesirable additional genetic material (antibiotic resistant, green fluorescent protein, etc). Generation of vaccine candidates using the recombination machinery of *E. coli* would minimize these problems. The object of this study was to clone a chicken codon-optimized gene encoding VP-2 of chicken parvovirus into an HVT-based transfer plasmid. The VP-2 gene of chicken parvovirus was codon-optimized to ensure strong expression of the protein in the chicken; this approach improved expression of VP-2 in this system. This transfer plasmid was used to inoculate chickens intramuscularly, resulting in a measurable antibody response measured via a VP-2 specific ELISA assay.

Research Update: Avian Disease and Oncology Laboratory Avian Tumor Viruses

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Genomics and Immunogenetics

Marek's disease (MD), a lymphoproliferative disease caused by the highly oncogenic herpesvirus Marek's disease virus (MDV), continues to be a major disease concern to the poultry industry. The fear of MD is further enhanced by unpredictable vaccine breaks that result in devastating losses. The field of genomics offers one of the more exciting avenues for enhancing control of MD. By identifying genes that confer genetic resistance, it should become possible to select for birds with superior disease resistance. Genetic resistance to MD is a complex trait controlled by many genes. Identification of these genes is a major challenge despite the existence of the chicken genome sequence and ever increasing number of tools, especially next generation sequencing. Thus, we have been implementing and integrating genomic approaches that identify QTL, genes, and proteins that are associated with resistance to MD. The rationale for using more than one approach is that the strengths of each system can be combined to yield results of higher confidence. Another justification is that given the large volume of data produced by genomics, each method provides an additional screen to limit the number of targets to verify and characterize in future experiments. Our combined approaches of (1) sequencing of MD resistant and susceptible chicken lines to identify genomic regions under selection for MD incidence, (2) chromatin immunoprecipitation followed by sequencing (ChIP seq) to identify MDV Meq and chicken c-Jun binding sites, (3) gene expression profiling between cell lines to identify genes and pathways regulated by MDV Meq, and (4) allele-specific expression screens by RNA sequencing to identify genes with differential allele response to MDV infection have identified 97 high-confidence candidate genes that are directly regulated by MDV Meq and help explain differences in genetic resistance to MD. If confirmed, these genes and their associated genetic markers would be ideal candidate for genomic selection.

Genetics Effect on Vaccine Efficacy. Since their invention, vaccines have proven to be the most effective and economical method to combat infectious diseases in humans as well as in livestock. Efforts to improve vaccine protective efficiency have continued and expanded. Host genetics differences were investigated for the influence on MD vaccine efficacy using unique genetic lines of chickens. Our data suggests that host genetics play an important role influencing MD vaccine protection efficiency. Continuous analyses of our research data further suggested that different genetic lines of chickens respond to the same one vaccine with different protective efficiency.

Marek's Disease Virus Evolves to Higher Virulence in Birds with Limited Genetic Variation. MD is still a major concern as MDV continues to evolve to higher virulence. Most studies addressing the evolution of MDV virulence have concentrated on the virus while largely ignoring the hosts' influence. The host system called the major histocompatibility complex (MHC) represents a highly polymorphic system designed to defend the species from extinction by the fast paced evolution of a parasite. In natural chicken populations, there are hundreds of different MHC haplotypes that oscillate in response to pathogen evolution, but commercial poultry breeding has limited the number of MHC haplotypes to six or less. Our current work has shown that MDV can evolve to higher virulence in birds with a single MHC haplotype. Thus, we predict the best way to reduce the chronic problem of MD incidence in commercial chickens is to rotate the placement of MHC haplotypes similar to the simple method of crop rotation used to control pests in the field. Incorporation of this method into modern poultry production may greatly reduce future virus evolution resulting in substantial savings to the poultry industry.

Marek's Disease

Transient Paralysis (TP). A neurological disorder associated with MDV infection. Highly pathogenic strains of MDV are capable of inducing TP even in the resistant line 6-3. This year, we investigated the mechanism of TP in both resistant and susceptible chicken lines inoculated with a vv+ strain of MDV. Gene expression profiling indicated that IL-1β, Il 4, and IL-8 were down regulated in the brain tissues of birds from line 7-2 exhibiting TP symptom. Vaccination prior to challenge prevented the suppression of these cytokines. IL-10, an anti-inflammatory cytokine was significantly up-regulated in the infected line 7-2 birds with or without TP. This strong activity of IL-10 had resulted in severe suppression of MHCII transcripts. Over all immunity measured in the brain tissues of birds from both resistant and susceptible lines with and without TP indicated that the immune response to MDV infection is much more vigorous in line 6-3 than line 7-2. Differential expression of immune-related gene provides insight into possible

modulation of the immune system toward an effective T cell mediated immune response against MDV infection using cytokine and chemokines as genetic adjuvant. This information is important for understanding the pathogenesis of TP.

Surveys and Pathotyping. In our attempts to survey field flocks for MDV of unusual pathogenicity, we have received blood samples from Rispens-vaccinated layer and broiler breeder flocks experiencing high Marek's disease mortality in Pennsylvania and Iowa. Two Pennsylvania virus isolates from 2010 pathotyped as v and vv+MDV and interestingly shared a specific mutation in the MDV pp38 gene similar to Pennsylvania isolates from 2007 and 2009. Although the pathotyped strains were not unusually virulent, this unique mutation in combination with problems in several surrounding flocks indicate there may be a mutated MDV strain circulating in Pennsylvania. MD remains a problem in this area and we have recently isolated virus from additional layer flocks in this same area of Pennsylvania in 2011. In addition we have received samples in 2011 from a broiler breeder flock in Pennsylvania as well as from a layer flock in Iowa experiencing high mortality. Pathotyping experiments are currently ongoing for selected 2011 isolates. This study will determine if the mortality in the affected flocks can be attributed to virus evolution and the presence of the virus mutation in the pp38 gene may be useful for understanding the epidemiology of mutated virus strains.

Vaccines. Although deletion of Meq gene of MDV rendered the virus non oncogenic and was shown through experimental and field trials to be an efficacious vaccine, it still induces lymphoid organ atrophy like that of the parental virus, rMd5, in maternal antibody negative chickens. This year, we developed a method to rid this most effective vaccine against MD from a serious side effect, namely immunosuppression. We have generated 80 cell culture passages of rMd5Δ *meq* viruses and found no significant lymphoid organ atrophy beginning at 35th passage onward when compared with un-inoculated control chickens; this development will assist vaccine manufacturers to proceed with their plans for commercializing the vaccine. In other experiments, we also found that the ability of a virus to induce thymic atrophy directly correlated with the virus's capacity to replicate to high titers in the thymus, suggesting that ability of MDV to induce tumors and disease is separate from its ability to induce atrophy.

Avian Leukosis. Chickens from Avian Disease and Oncology Laboratory (ADOL) line alv6 that is known to be resistant to infection with subgroups A and E avian leukosis virus (ALV) were vaccinated at hatch with a trivalent MD vaccine containing serotypes 1, 2 and 3 MD viruses, and were maintained under specific-pathogen free (SPF) conditions from the day of hatch until 56 weeks of age. Lymphoid leukosis tumors were detected in several chickens that died after 20 weeks of age. Chickens tested negative for all subgroups of exogenous ALV and for antibodies against ALV of subgroup of A, B and J. Also, tumor tissues tested negative by PCR for the presence of infectious ALV of subgroups A, E, and J. Results suggest the development of spontaneous LL in SPF white leghorn chickens that are resistant to subgroup A and E ALV. The role of using MD vaccines containing all serotypes of MD virus in the development of these tumors remains to be determined.

Lymphoproliferative Disease Virus in Wild Turkeys in the Southeast US

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Previously, retroviral neoplasms reported in wild upland game birds in the United States of America have typically been associated with reticuloendotheliosis virus (REV) infection. The information presented herein described the first reports of lymphoproliferative disease virus (LPDV) infection in wild turkeys (*Meleagris gallopavo*) and the first identification of LPDV in North America. Since 2009, LPDV has been identified in eight wild turkeys from four southeastern states; West Virginia (n=5), North Carolina (n=1), Georgia (n=1), and Arkansas (n=1). Systemic lymphoproliferative disease was determined to be the cause of morbidity and/or mortality in five of the eight turkeys. The remaining three turkeys had other primary causes of disease and it is currently not known whether LPDV infection in these birds contributed to the observed disease syndromes or if infection was silent. Gross lesions were variable and nonspecific; however, the observed microscopic lesions were consistent with LPDV infection in domestic turkeys. Proviral sequences of LPDV were detected in samples of spleen, lung, heart, and/or liver from each turkey by PCR using primers developed based on an Israeli strain of LPDV, which amplified a 413nt portion of the *gag* gene. The maximum likelihood phylogeny of these North American viruses demonstrated that they formed a monophyletic clade with Old World LPDV, distinct from other avian retroviruses, such as REV. Additional studies are currently underway to genetically characterize these wild turkey LPDV strains, determine the in vitro and in vivo host range, and develop rapid diagnostic assays.

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

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The World Organization for Animal Health (OIE) has either updated or drafted new animal disease Code chapters for 2011. At its May 2011 General Session, the World Assembly of Delegates adopted new text to several existing chapters. In addition, in September of 2011 the OIE's Terrestrial Animal Health Standards (Code) Commission met to propose further modifications to several chapters for consideration at the May 2012 General Session. Of interest to the poultry industry, the following chapters were updated in 2011 or are being proposed for further modification in 2012:

Newcastle disease (ND). The OIE adopted the US-recommended changes to the time/temperature parameters for inactivating the ND virus in poultry meat. This will facilitate trade in poultry meat and related products.

Biosecurity Procedures in Poultry Production. A new chapter addressing basic biosecurity and hygiene procedures during poultry production was presented for adoption. The draft chapter was distributed for comment in September of 2009 and again in October of 2010. The United States submitted comments many of which were incorporated into the chapter. This new chapter was adopted by the Members in May 2011.

Prevention, Detection and Control of Salmonella in Poultry. Some minor changes were proposed to this Code Chapter which the United States supported. In addition, some minor suggestions were made by the United States to clarify certain points in the chapter. The recommendations of this chapter are in line with the practices followed by the US poultry industry.

Zoning and Compartmentalization. The existing Code chapter on Zoning and Compartmentalization only received minor changes which the United States supported. The OIE also drafted an accompanying guideline on the application of zoning and compartmentalization to assist Members in implementing the concept.

Animal Welfare. Although the OIE presented a new draft chapter on Broiler Chicken Production Systems, the chapter was not adopted for various reasons. Some countries of the world felt that the chapter was too prescriptive, while other countries felt that it did not provide sufficient detail. The recommendations of the draft chapter by-in-large are consistent with the practices followed by the US chicken industry and, therefore, the United States was prepared to support its adoption. Since the chapter was not adopted, it will be re-written and re-presented for adoption again in 2012.