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

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The Committee met on October 16, 2006 from 1:00 to 6:00 p.m. and October 17, 2006 from 12:45 to 5:30 p.m. at the Hilton Hotel in Minneapolis, Minneapolis. Chair John A. Smith presided, assisted by Vice Chair Willie M. Reed. The Chair welcomed the Committee, summarized the 2005 meeting, and reported on the responses to the 2005 Resolutions and Recommendations.

2005 Resolution 44, Importation of Raw Game Bird Carcasses from Areas Known to be Infected with Newcastle dDsease and Highly Pathogenic Avian Influenza, was approved. Resolution 44 sought to close a perceived loophole in Title 9 of the Code of Federal Regulations (9CFR) that allowed importation of game birds from areas known to be infected with Newcastle disease virus (NDV) and H5N1 highly pathogenic avian influenza (HPAI), and to clarify the language making it clear that the regulation applies to NDV and all subtypes of HPAI, not just H5N1. The United States Department of Agriculture (USDA) in its response recognized that the current language could raise concern. USDA stated that the regulation was intended to apply to hunter-harvested migratory game birds from Mexico, and that these birds regularly entered the United States on their seasonal migrations. USDA stated that the Animal and Plant Health Inspection Service (APHIS) would conduct a risk analysis to determine if the risk of the current practice justifies changing the regulation. USDA stated that they would develop an interim rule to amend the current regulation to address all subtypes of HPAI. In addition, APHIS completed a Chief Veterinary Officer to Chief Veterinary Officer agreement between Canada and the United States so that if HPAI is confirmed in wild birds, import restrictions will be applied to hunter harvested wild birds and wild bird products from affected flyways.

2005 Resolution 45, Final approval and Implementation of the National Poultry Improvement Plan (NPIP) Control Program for Low athogenicity H5/H7 Avian Influenza in Commercial Poultry, was approved. Resolution 45 urged rapid approval and implementation of this NPIP proposed program. An interim final rule establishing the program and providing for indemnity was published in the Federal Register on September 26, 2006.

2005 Resolution 46, Amendment of the National Organic Program Section 205.239, requiring access to the outdoors, to make access optional and to provide for confinement during outbreaks of highly pathogenic avian influenza, was approved as amended. USDA APHIS forwarded this resolution to the USDA Agricultural Marketing Service (AMS), which is in charge of the National Organic Program (NOP). APHIS discussed with AMS their concerns for avian health, disease transmission, disease prevention, and control regarding the NOP husbandry standards for organic poultry production and for the potential contact with wild birds for organic poultry given access to the outdoors. AMS requested that APHIS provide them with recommendations and guidance on biosecurity and avian disease prevention and control practices for non-

confinement poultry operations to include free range and organic poultry producers. APHIS worked with AMS to develop a guidance document titled *USDA-APHIS Further Guidance on Biosecurity and Disease Prevention & Control for Non-confinement Poultry Production Operations*.

The Committee also forwarded a recommendation to USDA-APHIS recommending indemnity at full market value for birds destroyed in the Live Bird Marketing System low pathogenic H5/H7 control program. USDA's response recognized the critical nature of indemnity for encouraging compliance, and pledged to address the issue through rulemaking in the very near future. A recommendation was also forwarded to the state veterinarians of the seven states not participating in the National Animal Health Reporting System (NAHRS) (Arkansas, Connecticut, Georgia, Iowa, Missouri, New Mexico, and Rhode Island), urging them to participate. No response has been received.

Dr. Frederic J. Hoerr, Alabama Department of Agriculture Veterinary Diagnostic Laboratory and Chair of the *Mycoplasma* Subcommittee, gave the Subcommittee Report. Plate antigen availability is still a problem that the manufacturers are working to resolve. There have also been recent reports of sensitivity problems with *Mycoplasma synoviae* tests. Sporadic cases of *Mycoplasma gallisepticum* are being reported in heavy breeders. Dr. Stanley Kleven's test panel remains a major benefit for diagnostic laboratories.

Dr. Sherrill Davison, University of Pennsylvania and Chair of the Infectious Laryngotracheitis (IFT) Subcommittee, gave the Subcommittee Report. The report was approved by the Committee and is included in these proceedings.

Dr. Bill W. Hewat, Tyson Foods and President of the Association of Veterinarians in Broiler Production, presented the annual disease status report for the broiler industry. The report was approved by the Committee and is included in these proceedings.

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

Dr. Steven Clark, Alpharma Animal Health, gave the annual disease status report for the turkey industry. The report was approved by the Committee and is included in these proceedings.

Dr. Fidelis Hegngi, VS-APHIS-USDA presented the Annual Status Report for the National Poultry Improvement Plan (NPIP) for the Senior Coordinator, Mr. Andrew H. Rhorer, VS-APHIS-USDA. The report was approved by the Committee and is included in these proceedings.

Ms. Brenda Morningstar-Flugrad, National Veterinary Services Laboratory (NVSL), VS-APHIS-USDA, delivered the annual NVSL Diagnostic Bacteriology, Mycoplasma, Pasteurella, and Salmonella report. The report was approved by the Committee and is included in these proceedings.

Mr. Dennis Senne, NVSL-VS-APHIS-USDA, gave the Annual NVSL Avian Import Activities, Avian Influenza, and Newcastle Disease Diagnostic report. The report was approved by the Committee and is included in these proceedings.

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

Dr. Chinta Lamichhane, Synbiotics Corporation, presented a paper on a rapid antigen capture method and a blocking Enzyme-Linked Immunosorbent Assay (ELISA) for surveillance of avian influenza. An abstract of this paper is included in these proceedings. This paper was originally scheduled as a time-specific paper, but was delivered at an earlier time because of a scheduling conflict.

Drs. David Suarez and Mary Pantin-Jackwood, SEPRL-ARS-USDA gave an update on avian influenza research at SEPRL. Their report is included in these proceedings.

Dr. Hugo Medina, Sparboe Companies, presented background information on a proposal for handling table eggs and egg products during an outbreak of highly pathogenic avian influenza. A copy of this proposal is included in these proceedings.

Dr. Andrea M. Miles, North Carolina Department of Agriculture, presented background information on a proposal ratifying the use of water-based foam for mass depopulation of loose-housed poultry. This proposal was presented as a resolution later in the meeting.

The Monday session adjourned at this point, at approximately 5:00 p.m. The meeting reconvened at 12:45 p.m. on Tuesday, October 17, 2006.

Dr. Michael David, Director of Sanitary International Standards, National Center for Import and Export, USDA-APHIS-VS presented the annual update on the World Organization for Animal Health (OIE) poultry activities. His comments are included in these proceedings. Dr. David also delivered the National Animal Health Reporting System report for Drs. Stanley Bruntz and Aaron Scott of USDA-APHIS-VS, National Surveillance Unit (NSU). That report is also included in these proceedings.

Dr. Peter Woolcock, California Animal Health and Food Safety Laboratory System, announced the upcoming meeting of the Western Poultry Disease Conference.

Dr. Darrel Styles, VS-APHIS-USDA, gave a report on current depopulation and disposal options. A number of situations may require mass depopulation of poultry, including exotic diseases such as highly pathogenic avian influenza (HPAI) or Exotic Newcastle disease (END), and structurally unsound buildings in disasters such as floods, hurricanes, and tornados. Many of the existing approved methods are not completely suitable to these situations. One of the primary existing

methods, the use of carbon dioxide gas under polyethylene tenting, is not ideal because of the amount of animal handling, labor, and materials required. These problems are especially acute in cases of potentially zoonotic diseases or highly contagious and rapidly spreading diseases. The alternative of whole-house gassing with carbon dioxide is also fraught with problems, including the need to seal the house, the huge volumes of gas required, and the dangers of handling liquid carbon dioxide. Water-based foam has many advantages over current methods. It minimizes the amount of labor required and the resulting human contact with the diseased animals and environment, it is very rapid (making it more amenable to rapidly spreading diseases), it reduces aerosols and dust (thereby reducing viral spread), it is environmentally safe, and it may enhance composting of the carcasses after the event. When compared to carbon dioxide in the actual field situation (as opposed to laboratory-scale experiments), foam demonstrates comparable time to death, and is sometimes quicker. Both methods result in death by hypoxia, the difference being that carbon dioxide is a chemical hypoxia while foam is physical. Bird responses to both methods are similar, with similar blood cortisol levels. After the June 2006 Animal and Plant Health Inspection Service meeting on Methods of Mass Depopulation of Poultry in Riverdale, MD, and a review of the comments received, a two-part policy was developed on the use of water-based foam for mass depopulation of poultry. The first part of the policy deals with performance standards for the foam. The second part deals with the conditions under which foam may be considered as an acceptable means of mass depopulation of poultry. Those considerations are:

1. Foam may be used for floor-reared poultry. Studies are currently underway to examine the use of foam for caged birds, but current methods are not thought to be suitable. Work also needs to be done with waterfowl.
2. Foam is appropriate for animals infected with a potentially zoonotic disease. The Centers for Disease Control definition of zoonotic diseases includes any H5 or H7 avian influenza.
3. Foam is appropriate for animals infected with a rapidly spreading infectious disease that, in the opinion of State of Federal regulatory officials, cannot be contained by conventional or currently accepted means of mass depopulation.
4. Foam is appropriate for animal housed in structurally unsound buildings that are hazardous for human entry, such as those damaged during a natural disaster.

APHIS is funding research into improving the welfare parameters and engineering standards for water-based foam depopulation. The current policy is interim and will be revised as new data become available.

Drs. Patrice N. Klein and Jane Rooney, VS-APHIS-USDA delivered an update on the USDA response plans for highly pathogenic Avian Influenza. Their report is included in these proceedings.

Mr. Seth Swafford, USDA, presented an update on the USDA migratory waterfowl Avian Influenza surveillance program. His presentation is included in these proceedings.

Dr. Christopher J. Brand, National Wildlife Health Center, United States Geological Survey, United States Department of the Interior (DOI) gave an update on the DOI migratory waterfowl Avian Influenza surveillance program. His presentation is included in these proceedings.

Dr. Fidelis Hegngi, VS-APHIS-USDA, presented an update on the status of the National Poultry Improvement Plan low pathogenic Avian Influenza control program for the Senior Coordinator, Mr. Andrew H. Rhorer, USDA-APHIS-VS. The provisions of this new program were published as an interim rule in the Federal Register on September 26, 2006, and are open for comment to November 2006. The provisions will be contained in 9 Code of Federal Regulations Parts 53, 56, 145, 146, and 147.

Dr. Brian McClusky, National Surveillance Unit (NSU), VS-APHIS-USDA, delivered an update on the National Animal Health Surveillance System (NAHSS). This report is included in these proceedings.

Dr. Ernie Zirkle, Chair of the Tracking and Accountability Subcommittee for the Live Bird Marketing System Working Group (LBMSWG), gave an update on the studies of individual bird identification for the LBMSWG. The report is included in these proceedings.

Dr. Fedelis Hegngi, VS-APHIS-USDA presented an update on LBMSWG activities. The report is included in these proceedings.

Dr. Lindsey Garber, CEAH-VS-APHIS-USDA presented the final report on the National Animal Health Monitoring System (NAHMS) Poultry 2004 study. Her report is included in these proceedings.

Dr. Andrea Miles, North Carolina Department of Agriculture, presented a Resolution requesting the American Veterinary Medical Association Animal Welfare Committee to declare full approval of water-based foam for mass depopulation of poultry. This Resolution was passed by the Committee and referred to the Committee on Nominations and Resolutions.

Report of the Vaccinal Laryngotracheitis Subcommittee
2006 Update

ILT Subcommittee Members:
Sherrill Davison, PA; Louise Dufour-Zavala, GA; Maricarmen Garcia, GA; Hashim M. Ghorie, AR; Frederic J. Hoerr, AL; Brett Hopkins, KS; John A. Smith, GA; Donald Waldrip, GA

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. VLT has been sporadic in various regions of the U.S., while in other areas of the country VLT has been reported in clusters of 2-3 years with no cases occurring for many years.

Control and prevention is through vaccination with recombinant fowl pox-vector infectious laryngotracheitis (ILT) vaccine (FP-LT), chicken embryo-origin (CEO), or tissue culture-origin (TCO) vaccines. There are currently several CEO vaccines, one TCO vaccine, and one FP-LT vaccine commercially available. Several CEO vaccines are labeled for administration by water and spray in addition to the preferred eye drop method. The TCO vaccine is labeled for eye drop administration only. The recombinant fowl pox-vector vaccine is administered only by wing web stab inoculation at about 8 weeks of age. It does not contain a live ILT virus and therefore cannot be shed or spread from vaccinated birds. Different states have varying regulations related to the use of CEO vaccine. In many states, in the event that a company wants to vaccinate broilers, a request is made to the state veterinarian for the use of CEO vaccine in a restricted area for a limited time and the poultry complex follows strict biosecurity practices under the supervision of a veterinarian. In other states, the state veterinarian does not limit vaccination with CEO vaccine, while in other states no CEO vaccine usage or importation of poultry vaccinated with CEO vaccine is permitted.

The recommendation from the USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species presented at the 2005 USAHA meeting focused on the role of CEO vaccine in the epidemiology of VLT. The committee offered the following recommendation.

Recommendation 2005

There is sufficient evidence through field epidemiology and molecular epidemiology that chicken embryo-origin (CEO) vaccine is related to clinical cases of VLT. States that have limited the use or eliminated the use of CEO vaccine have reduced or eliminated VLT.

Therefore, it is recommended that CEO vaccine be used only under permit from each state's Department of Agriculture with the advice of an industry health advisory committee/task force. This does not eliminate the use of CEO vaccine, but regulates where it may be used.

In addition, it is recommended that the CEO vaccine be given only by eye drop administration in long-lived birds.

The exception to this recommendation would be in the face of an outbreak of VLT where CEO vaccine may be used on an emergency basis without the use of a permit and may be given by alternative methods of administration (water or spray).

Current vaccination trials

Over the past year, additional laboratory and field evaluations of the FP-LT vaccine in broilers by the *in ovo* route of vaccination have been conducted. The FP-LT vaccine stopped the spread of VLT between flocks in some locations. However, it has been reported that in "hot areas" approximately 12% of *in ovo* vaccinated broiler flocks did break with VLT. (1)

Within a flock, the FP-LT vaccine did not prevent clinical signs or mortality in high-challenged houses especially if additional factors such as poor air quality or other viral challenges were compounding factors. When clinical signs or mortality did occur, they were reduced and of shorter duration. Mortality was typically between 30 to 150 a day for 4-6 days. In the more severe cases, mortality peaked in 3-4 days at 300-500. The higher mortalities were noted in flocks that broke later in the grow-out. In contrast, non-vaccinated or CEO vaccinated flocks that break with VLT may have daily mortalities between 300-1500 for several days. (1)

Additional field evaluations are currently being conducted with a combination of LT vaccines. Some broilers have been vaccinated *in ovo* with the FP-LT vaccine and boosted with CEO vaccine at 14 days of age. Other broilers have been vaccinated with a combination of FP-LT vaccine *in ovo* plus TCO vaccine by spray at 25 days of age. The level of protection will be reported at a later date. Concerns have been raised about the expense of dual vaccination (FP-LT and CEO or TCO).

It is suggested that the FP-LT vaccine be used in a zone approach around a CEO vaccination zone. For example, the flocks in a zone surrounding the index case of VLT would be vaccinated with CEO. Flocks in a second zone around the CEO zone would be vaccinated with the FP-LT vaccine. As flocks inside the CEO zone are processed they should be replaced with FP-LT vaccinated birds. The goal of this approach is to stop the spread of ILT to farms outside the original vaccination zone. The success of this procedure will be measured over the next year. (1)

Laboratory evaluation of *in ovo* vaccination of the FP-LT vaccine has been conducted. Varying dosage levels were evaluated (10x, 1x, ½ x, ¼ x). Hatchability was not affected at the various doses, but body weights at 5 days post hatch were decreased at the 10x dosage level. The birds were challenged at 28 days post hatch, and the protection level was 71%, 59%, 20%, and 33% in the 10x, 1x, ½x and ¼x dosage level respectively. (2)

An experimental recombinant HVT-LT vaccine has also been evaluated by laboratory challenge in layer pullets vaccinated at one day of age subcutaneously. Preliminary studies have demonstrated 100% protection at 3, 7, 10 and 15 weeks post- vaccination, 80% and 70% protection at 20 weeks and 25 weeks post-vaccination respectively. (2)

Suggested action items

The committee believes that additional tools are needed for the prevention and control of VLT and suggests the following:

- Studies of currently available vectored vaccines by the *in ovo* route should be continued.
- Research should be conducted to develop newer molecular vaccines to control and prevent VLT.
- Vaccine manufacturers should determine if an adequate supply of CEO vaccine is available if its use is required in an outbreak situation.
- States should institute the use of a Geographic Information System as an integral part of control and prevention measures.

References

1. Hopkins, B. Vaccination of broilers using a recombinant fowl pox-infectious laryngotracheitis vaccine inoculated *in ovo*, AVMA Convention, Honolulu, Hawaii, July 2006.

2. Rosenberger, J. K. and Rosenberger, S.C. ILT vaccines: field and laboratory assessments, Proceedings of the National Meeting on Poultry Health and Processing, Delmarva Poultry Industry, Inc., Ocean City, Maryland, pp. 81 -85, October 11, 2006.

2006 United States Broiler Industry Update

Bill Hewat
Tyson Foods

General

United States broiler flock health and performance has remained relatively stable over the last several years. Total mortality percentages are moderately decreasing, and seven-day mortality is holding stable or improving. This decrease in mortality is occurring in broilers with significantly heavier weights and higher breast meat yields. Whole bird and parts condemnation rates have also been stable over the past year and are significantly better than in the 10 years past.

Respiratory Diseases

Traditional respiratory diseases, including Infectious Bronchitis Virus (IBV) and Avian Paramyxovirus (lentogenic Newcastle Disease), have been minor issues in 2005 and 2006. The impact of high fuel costs on wintertime performance and bird health is less of a concern this year. Vaccinal Infectious Laryngotracheitis (VLT) virus has been a major problem in certain regions of the country. The VLT epornitic in 2005-2006 resulted in a shortage of vaccines. Consequently, broilers were either vaccinated with partial doses or not vaccinated at all. Most broiler veterinarians believe that VLT will continue to be a major problem this winter.

Immunosuppressive & Enteric Conditions

The incidence of Gangrenous Dermatitis (GD) and Runting and Stunting Syndrome (RSS) have declined over the past year. Stocking densities and out time between flocks, factors that have been implicated in playing a role in GD and RSS, have normalized during the recent down-turn in broiler markets.

Other Conditions

Although Avian Influenza (AI) is not currently a problem in the US, the presence of AI around the globe is cause for concern for our industry. A greater focus on disease surveillance, biosecurity programs and infrastructure, and emergency preparedness exists. The industry is concerned about unresolved issues involving the availability of rapid diagnostic screening tests for Avian Influenza and the timeliness of reporting of confirmed cases. Musculoskeletal problems, including Femoral Head Necrosis (FHN), rickets, and Spondylolisthesis continue to be diagnosed. Factors such as growth rate, genetics, and nutrition have been implicated. Although Salmonella numbers have been reduced from 2005 levels, Salmonella control and mitigation strategies are a concern in certain areas of production in the US.

United States Table Egg Industry Update October 2005 to October 2006

Eric Gingerich
University of Pennsylvania

Overall health of the national table egg layer flock is very good. This is due to the continued availability of high quality vaccines, flock supervision from professional, well-trained flock supervisors, readily available veterinary technical assistance from primary breeder, vaccine company, diagnostic laboratory, and consulting veterinarians, high quality nutrition provided by professional nutritionists, housing in environmentally controlled facilities in cages off litter, and the use of sound biosecurity practices.

A handful of diseases continue to be of concern. They include colibacillosis, *Mycoplasma gallisepticum* (Mg), Avian Influenza (AI), and *Salmonella enteritidis* (SE).

Colibacillosis is a problem mainly of young flocks with mortality rates of 0.5 to 4% per week starting shortly after housing. It is felt that this condition is most often secondary to upper respiratory challenges with Mg, *Mycoplasma synoviae* (Ms), ammonia, infectious bronchitis (IB), etc. It also may be a primary problem if water lines are contaminated with *E. coli*. The overall incidence of early onset colibacillosis is down from recent years. A post-molt colibacillosis syndrome is also seen in some flocks due to declining immune system function, an ascending infection of the reproductive tract, upper respiratory infections, etc.

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 vaccine is being used in a variety of situations and appears to be useful in low challenge situations but still continues to be evaluated in high challenge facilities. Spread of Mg to single-aged units has occurred as well and is dealt with using medication programs using tylosin or tetracycline antibiotics.

AI continues to be a very high concern across the country. Active and passive surveillance programs are increasing across the US in response to the threat of highly pathogenic H5N1 AI (HPAI) from Asia. There is great concern in the layer industry as to the effect of the response to an AI outbreak on movement of eggs and birds from negative flocks in or near the control zones. Discussion and research as to the best ways of bird euthanasia and disposal from large cage layer houses and complexes continues. The threat of low pathogenic AI (LPAI) for layer flocks on the East coast is much reduced due to the efforts by NY and NJ Departments of Agriculture and USDA to reduce the positivity of the live bird markets from 60% positive markets in 2004 to near zero this summer. No significant AI isolations have been made in layer flocks in the US in the last year.

SE was felt to be an issue that was being addressed adequately by state and industry egg quality assurance programs until the announcement on September 22, 2004 that FDA was proposing a program "Prevention of SE in Shell Eggs During Production". FDA received over 200 written comments. Issues discussed were 1) laboratory procedures and laboratory availability for testing, 2) funding for testing, costs incurred if eggs are diverted, and administration of the program, 3) lack of egg pasteurization facilities in many egg producing areas to be able to effectively divert eggs from high risk flocks, 4) wet washing houses required between flocks where SE positive manure samples were found in the previous flock whereas dry cleaning, fumigation, vaccination of in-coming pullets, plus good rodent control has been found to be effective, 5) the excessively low requirement for 45^{o} F egg storage prior to processing, etc. Comments were reopened in May of 2005 to ask questions about pullets. FDA is continuing to work on the program with the final version reportedly available in early 2007.

A disease that has been increasing in incidence recently is coccidiosis and necrotic enteritis especially on the east coast and in one strain of layer. A viral enteritis has been found in several flocks, both caged and cage-free, where egg production and yolk pigmentation are diminished significantly.

Diseases under control and of low incidence are as follows: infectious laryngotracheitis (ILT), IB, fowl coryza, and urolithiasis/gout. These diseases tend to be localized to a region or a farm. The recombinant ILT vaccine has been determined not to be a sufficient replacement for CEO vaccines in high challenge areas but a good reduction of ILT losses in a region of high ILT incidence has been seen.

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

Poultry welfare concerns are increasing as activist groups increase their activities in portraying the caged egg industry as not humane and promoting laws against caged egg production. The United Egg Producers (UEP) Certified Animal Care Program will require the use of full feed molting in the future (2007). Full feed molting programs have been proven to be fully workable in most operations. There is concern that some producers will discontinue the UEP program due to competition with non-compliant producers in markets that are not requiring these cost-increasing welfare practices. Many producers of egg breaking stocks are now being asked to comply with a welfare program (such as UEP's) by their customers.

The egg industry saw below cost-of-production egg prices for most of 2005 and 2006. Continued expansion in the Midwest is felt to be the biggest reason. Some reduction in demand may also be a reason for low prices as some government programs have decreased their subsidization of eggs. Feed price increases appear to be looming due to the competition for grains and soybeans used for alternate energy sources. The percent of eggs that are processed is fairly stable at about 30% with only 1% of eggs exported.

Current Health and Industry Issues Facing the Turkey Industry

David Rives
Prestage Farms

Dave Mills
Jennie-O Turkey Store Company

Steven Clark
Alpharma Animal Health

In preparation for this report to the USAHA Committee on Transmissible Diseases of Poultry & Other Avian Species, Drs. Clark, Rives and Mills contacted several US turkey industry professionals and veterinarians involved in turkey production, to inquire about the health status of turkeys produced in September 2005 through September 2006. The turkey industry reports several disease challenges for this 12 months varying by geographical regions within a state and across the United States. This report lists in Table 1 the challenges by disease and issue.

The lack of approved efficacious drugs is the top disease issue. The withdrawal of the NADA for enrofloxacin in 2005 for use in poultry leaves the industry with no adequate therapeutic response to colibacillosis (ranked #2), or fowl cholera (ranked #10). Tetracyclines are not a viable alternative therapeutic due to Russian import restrictions and limited efficacy. The unscientific methods and poor risk analysis used in the argument for the unprecedented withdrawal of enrofloxacin in this case are a cause of great concern for the industry and for food animal agriculture in general.

Table 3 further illustrates the importance of colibacillosis to the turkey industry. Infections with *E. coli* (colibacillosis) result in significant mortality, morbidity and adverse effects on average daily weight gain (ADG) and feed conversion (FC) performance parameters. The survey reports an average of 19.8% of turkey flocks between 6 to 12 weeks of age are diagnosed with *E. coli* infections. Veterinarians report that it is very important (3.9 score) to have a zero-day withdrawal for an efficacious, cost-effective colibacillosis therapeutic, of which none is currently approved.

Blackhead (ranked #22) is another example of a disease with no efficacious drug approved for use in turkeys. The prevalence of blackhead was relatively low; however the disease can be devastating in the individual flocks affected. Dimetridazole was previously approved for use in turkeys for the prevention and treatment of blackhead; FDA banned the drug in 1987. Dimetridazole was extremely efficacious and the turkey industry recommends that FDA consider allowing limited use of such product(s) in valuable breeder stock, not for human consumption.

Cellulitis (Table 2) remains a major disease issue across all geographic regions; it increased in survey rank to #3. Cellulitis is associated with acute mortality and abdominal subcutaneous fluid and crepitus, most commonly in commercial male turkeys nearing market age. The prevalence and severity of cellulitis has increased in recent years. Little is known about this disease in turkeys, but *Clostridium perfringens* and *C. septicum* appear to play a role in the pathogenesis. Opinions vary as to risk factors and potential causes of the problem (Table 2).

Poult enteritis of unknown etiologies (#5), *Ornithobacterium rhinotracheale* (ORT ranked #8), and leg problems (#6) continue to rank high on the list. Poult Enteritis Mortality Syndrome (PEMS ranked #29 versus #34 previously), and protozoal enteritis (#19 versus #27 previously) increased in ranking on this year's survey. Avian Metapneumovirus (AMPV ranked #30 compared to #22 previously) decreased in importance in the latest survey.

Influenza type A, H3N2 (ranked #13), caused drops in egg production in some breeder flocks in 2004-2005. This virus is endemic in swine across the US, and it is very likely that swine are the source of most H3N2 introductions in turkeys. Improved biosecurity and vaccination programs have reduced the impact of this disease. However, it remains an area of great concern in the current environment of media hysteria over influenza in general.

Highly Pathogenic Avian Influenza (H5N1) continues to infect poultry in Southeast Asia. The continued sporadic transmission to humans has world health authorities concerned about the possibility of further genetic mutation triggering a pandemic. Continued circulation of this virus through poultry in Asia allows for further genetic drift and/or shift that could result in a highly pathogenic and highly transmissible virus among humans. The possibility of the spread of this virus to the U.S. through the illegal transport of infected birds is also a concern. The recent announcement that the NPIP Commercial Poultry H5/H7 LPAI surveillance program provides for 100 % indemnity for commercial plan participants is good news. If flock destruction is necessary in the eradication of H5/H7 LPAI, then 100% indemnity is appropriate, as it is already provided for in the eradication of HPAI.

Foam euthanasia of poultry flocks has shown great promise as a humane method of mass depopulation and is important because of the threat of Highly Pathogenic Avian Influenza (HPAI) introduction into the United States. Support for the continued investigation of foam technology for euthanasia of floor-raised poultry should be expedited. The industry desires approved procedures for administration of this promising technology in preparation for potential introductions of HPAI.

The federal regulations governing the use of autogenous veterinary biologicals are antiquated and inhibitory toward effective preventive applications in the poultry industry. The main issues include the narrow time limits on the use of a microbiological isolate and the restrictions requiring use only in the herd/flock of origin. We urge the Veterinary Services-Center for Veterinary Biologics to revise these regulations in favor of a more effective and user-friendly approach.

While we all desire safe food, public health officials and veterinarians must realize that the most effective interventions to prevent food-borne illness remain proper food preparation and handling. Proper food handling and appropriate processing technologies are the best way forward. Attempting to control food-borne disease by selectively eliminating what are normal intestinal inhabitants of domestic animals essentially represents a national certified raw meat program similar to the hazardous certified raw milk program. Such an effort is distracting to the main food preparation issues, and represents a major policy development failure. While significant progress has been made in *E. coli* 0157 control in beef, it must be pointed out that the improvements resulted from improved processing technology, not on-farm interventions. Pre-harvest interventions were not a factor.

Turkey Production totaled 7206.56 million pounds (live weight) in 2005. Production declined 1.3% (98.25 million pounds) for the year 2005, following a 3.5% and 1.25% decline for the year 2004 and 2003, respectively. Head slaughtered was down 2.4% (248,094,000 head slaughtered in 2005) and average live weight increased by 0.88 pounds (3.24%). Overall domestic demand for turkey products was strong in 2005. Exports exceeded earlier expectations and increased by 28.7%.

Table 1. Turkey health survey (October 2006) of US veterinarians in turkey production ranking current disease issues (1= no issue to 5 = severe problem). Survey response (reply) is 100% (n=19).

Issue	Score Average (1-5)
Lack of approved, efficacious drugs	4.4
Colibacillosis	4.0
Cellulitis	3.5
Late Mortality	3.3
Poult Enteritis of unknown etiologies	3.2
Leg Problems	3.1
Salmonella	2.8
Ornithobacterium rhinotracheale (ORT)	2.8
Bordetella avium	2.7
Cholera	2.5
Heat stress	2.5
Breast Blisters and Breast Buttons	2.4
H3N2 Swine influenza	2.4
Osteomyelitis (OM)	2.4
Tibial Dyschondroplasia (TDC, Osteochondrosis)	2.4
Cannibalism	2.3
Fractures	2.3
Shaky Leg Syndrome	2.3
Protozoal Enteritis	2.2
Round Worms (*Ascaridia dissimilis*)	2.2
Coccidiosis	2.2
Blackhead	2.1
Lentogenic Newcastle Disease Virus (NDV)	2.1
Necrotic enteritis	2.0
Avian Influenza	1.8
Erysipelas	1.8
Mycoplasma synoviae (MS)	1.7
Mycoplasma iowae (MI)	1.6
PEMS (Poult Enteritis Mortality Syndrome)	1.6
Avian Metapneumovirus	1.5
Mycoplasma meleagridis (MM)	1.3
Mycoplasma gallisepticum (MG)	1.3
Spondylolisthesis (Kinky-Back)	1.3
Turkey Coronavirus	1.3

Table 2. Turkey Cellulitis survey (October 2006) of US veterinarians in turkey production ranking current disease issues (1 = NO to 2 = YES, mild to 5 = YES, severe). Survey response (reply) is 100% (n=19).

Clinical presentation: Acute mortality?	3.2
Clinical presentation: Bubble tail?	1.9
Clinical presentation: Abdominal subcutaneous fluid & crepitus?	3.5
Composter for dead bird disposal?	1.2
[Clostridium] contaminated meat-bone meal?	2.1
Meat-bone meal possibly "feeds" the gut clostridium?	1.8
Decreased incidence associated with formaldehyde feed treatment (ex. Termin-8)?	1.5
Decreased incidence associated with intense water sanitation program?	1.6
Multi-age farm sites?	1.8
In hens?	1.8
In toms?	3.3
Mash feed?	1.4
Pelleted feed?	2.0
Expanded feed (expander milling process)?	1.2
Reused litter?	2.9

Table 3. Colibacillosis (*E. coli*) turkey health survey (October 2006) of US veterinarians in turkey production ranking current disease issues (1 = NO to 2 = YES, mild to 5 = YES, severe). Survey response (reply) is 100% (n=19).

Rank the problem: *E. coli* mortality?	3.5
Rank the problem: *E. coli* morbidity?	3.3
Rank the problem: *E. coli* adverse impact on ADG?	3.1
Rank the problem: *E. coli* adverse impact on FC?	3.0
Rank primary colibacillosis	2.3
Rank the problem: *E. coli* in turkeys 0-5 weeks of age?	2.8
Rank the problem: *E. coli* in turkeys 6-12 weeks of age?	3.3
Rank the problem: *E. coli* in turkeys greater than 12 weeks of age?	1.8
What is the frequency (%) of *E. coli* in flocks 0-5 weeks of age?	18.4%
What is the frequency (%) of *E. coli* in flocks 6-12 weeks of age?	19.8%
What is the frequency (%) of *E. coli* in flocks greater than 12 weeks of age?	10.7%
How important is a 0-day withdrawal for an efficacious, cost-effective therapeutic? (1=no issue to 5=very important)	3.9

National Poultry Improvement Plan Status Report

Andrew R. Rhorer
Veterinary Services, Animal and Plant Health Inspection Service

Pullorum-Typhoid Status:

In Calendar Year 2005, there were 2 isolations /outbreaks of *Salmonella pullorum* reported to the Poultry Improvement Staff. There was one isolation/outbreak of *Salmonella pullorum* reported during Calendar Year 2006 from January to October 1, 2006. There have been no isolations of *Salmonella gallinarum* since 1988 in any type poultry.

The isolates in 2005 were all standard strains of *Salmonella pullorum* and the isolates in 2006 were intermediate strain. The number of birds in *Salmonella pullorum* positive flocks (January 1, 2005- October 1, 2006) were as follows:

Number of Birds	No. of Flocks	Strain of Pullorum
>5<25	1	Standard
>25<50	1	Standard
>200	1	Intermediate

Hatchery Participation in the National Poultry Improvement Plan Testing Year 2005	
Egg and Meat-Type Chickens: Participating	283
Capacity	698,974,826
Turkeys: Participating	49
Capacity	33,285,723
Waterfowl, Exhibition Poultry and Game Birds	721
Capacity	26,321,162

Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005	
U.S. Pullorum-Typhoid Clean: Participating- Number	184
Birds in Flocks-Number	3,914,294
Average per Flock	21,273
Primary Breeding Flocks– Proportion of Total	21.7
Primary Breeding Flocks: Birds- Proportion of Total	12.2

Meat-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005	
U.S. Pullorum-Typhoid Clean: Participating- Number	4,866
Birds in Flocks-Number	76,744,870
Average per Flock	15,772
Primary Breeding Flocks: Flocks-Proportion of Total	9.7
Primary Breeding Flocks: Birds-Proportion of Total	6.5

Turkey Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005	
U.S. Pullorum-Typhoid Clean: Participating –Number	525
Birds in Flocks-Number	4,009,155
Average per Flock	7,636
Primary Breeding Flocks: Flocks-Proportion of Total	20.6
Primary Breeding Flocks: Birds-Proportion of Total	7.1

Waterfowl, Exhibition Poultry, and Game Birds Breeding Flocks In the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005	
U. S. Pullorum-Typhoid Clean: Participating	3,826
Birds in Flocks	1,470,287
Primary Breeding Flocks: Flocks-Proportion of Total	32.6
Primary Breeding Flocks: Birds- Proportion of Total	48.2

Mycoplasma gallisepticum , *Mycoplasma synoviae*, and *Mycoplasma meleagridis* positive breeding flocks National Poultry Improvement Plan 2004-2005				
	WEGBY	Egg-type Chickens	Meat-Type Chickens	Turkeys
Mycoplasma gallisepticum	17	0	5	1
Mycoplasma synoviae	17	4	12	7
Mycoplasma meleagridis		0		0

Avian Influenza Serology in Breeding Flocks, July 1, 2004-June 30, 2005 National Poultry Improvement Plan				
State	Type of Breeder	Flocks	Birds	AGID

Alabama	C-Meat-Type	294	650,000	21,000
Arkansas	D-Turkey	22	193,454	880
	C-Meat-Type	419	5,082,483	15,943
	B-Egg-Type	0	0	0
California	B-Egg-Type	4	31,670	1200
	D- Turkeys	63	168,992	1545
Connecticut	B-Egg-Type	9	39,950	360
	C-Meat-Type	2	60	60
Delaware	E-	6	750	180
Florida	B-Egg-Type	3	52,300	90
	C-Meat-Type	26	702,684	468
Georgia	B-Egg-Type	16	367,822	480
	C-Meat-Type	156	2,328,200	4,680
Indiana	B-Egg-Type	13	326177	390
Iowa	B-Egg-Type	50	633,927	2010
Maine	B-Egg-Type	6	40,000	350
Kansas	B-Egg-Type	1	1,000,000	549
Michigan	E-	9	3,500	300
Minnesota	B-Egg-Type	7	57,968	190
	C-Meat-Type	33	453,566	990
	D-Turkeys	71	843,342	1,980
	E-	2	20,925	80
Missouri	C-Meat-Type	27	42,457	810
North Carolina	C-Meat-Type	608	9,069,214	18,460
	D-Turkeys	149	1,050,907	4,480
Ohio	B-Egg-Type	10	231,768	300
	C-Meat-Type	8	79,398	1,200
	D-Turkeys	33	202,992	660
Oregon	B-Egg-Type	1	95,000	240
South Carolina	C-Meat-Type	32	582,354	1,680
Tennessee	C-Meat-Type	84	673,126	33,721
Texas	B-Egg-Type	8	186,297	240
	D-Turkeys	10	84,197	330
	C-Meat-Type	241	5,728,759	7,230
	E-	9	58,515	270
Virginia	B-Egg Type	5	100,000	619
	C-Meat-Type	218	2,121,439	16,030
	D-Turkeys	77	566,458	7,257
West Virginia	C-Meat-Type	1,785	13,387,500	32,634
	D-Turkeys	33	85,800	530
Wisconsin	E	1	4,591	619
Total		4551	47348542	181035

U. S. *Salmonella enteritidis* Clean- Egg-Type Chickens: No. of flocks and birds in flocks by			
State	Environmental	Dead Germ	Bird
Arkansas	1		15000

Flocks	6000		2
Birds in Flocks			
Georgia	1	2	
Flocks	400	46000	
Birds in Flocks			
Illinois	3	2	1
Flocks	3900	3700	1200
Birds in Flocks			
Indiana	15	2	1
Flocks	158345	27479	15092
Birds in Flocks			
Kentucky	1		
Flocks	6625		
Birds in Flocks			
Ohio	14		9
Flocks	183700		91600
Birds in Flocks			
Oregon	2		
Flocks	19516		
Birds in Flocks			
Pennsylvania	14		6
Flocks	166385		78450
Birds in Flocks			
Texas	1		
Flocks	10000		
Birds in Flocks			

Phage type13	Environmental	Dead Germ
Flocks	10	2
Birds in Flocks	143000	3700
Phage type 13A		
Flocks	5	2
Birds in Flocks	54321	27479
Phage type 2		
Flocks	2	
Birds in Flocks	28900	
Phage type 23		
Flocks	21	
Birds in Flocks	16,000	
Phage type 28		
Flocks	2	2
Birds in Flocks	15000	46000
Phage type 34		
Flocks	2	
Birds in Flocks	12500	
Phage type RNDC		

Flocks	1	
Birds in Flocks	7000	
Phage type Untypable		
Flocks	2	
Birds in Flocks	24000	
Phage type 8		
Flocks	15	
Birds in Flocks	157701	

Egg-type Chicken breeding flocks with isolates of *Salmonella enteritidis* by phage type and by year 1989-2006		
Year	No. Flocks	Phage Type
1989	1	13A
1990	11	13A, 13, 8, 28
1991	12	13A, 13, 8
1992	10	Untypable,13A,8,28,34
1993	5	Untypable, 8, 2
1994	3	13A, 8
1995	2	13A, 28
1996	5	Untypable, RNDC, 13A,8,2
1997	2	8
1998	2	8
1999	1	13
2000	4	13, 8
2001	1	13
2002	0	
2003	0	
2004	0	
2005	1	13
2006	1	34

U.S. *Salmonella enteritidis* Clean - Egg-Type Chickens: No. of flocks and birds in the flocks with *Salmonella enteritidis* isolates, 1990-2006			
	Environmental	Dead Germ	Bird
Flocks	56	6	19
Birds in Flocks	599,871	77179	201,342

National Veterinary Services Laboratories Summary of Poultry *Pasteurella-Salmonella-Mycoplasma* Activities 2006

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Pasteurella

During a 12-month period, the National Veterinary Services Laboratories (NVSL) received 257 *Pasteurella multocida* isolates for characterization. Of these, 106 were submitted for somatic type analysis, 25 were submitted for DNA fingerprint analysis, and 126 isolates were submitted for both tests. Results indicated that 19% were type 3, 4; 8% were type 1; 9% were type 3; 4% were type 4; and 3% were type 2, 5. A total of 36% of the isolates were identified as other somatic types. The somatic type of 10% of the isolates could not be identified.

Salmonella

The NVSL serotyped 16,737 *Salmonella* isolates recovered from animals, their environment, or feed. Of the 5271 poultry isolates (32% of total isolates), 3280 were recovered from chickens or their environment and 1991 were recovered from turkeys or their environment. The most common serotypes found in poultry this year are listed in Tables 1 and 2.

Table 1: Most Frequently Identified Serotypes from Chickens

Clinical	Monitor
Enteritidis	Heidelberg
Typhimurium	Kentucky
Kentucky	Typhimurium
Heidelberg	Senftenberg
III 40:z4, z23:-	Enteriditis

Table 2: Most Frequently Identified Serotypes from Turkeys

Clinical	Monitor
Senftenberg	Hadar
Heidelberg	Senftenberg
Hadar	Heidelberg
Montevideo	Saintpaul
Bredeney	Agona

Mycoplasma

The NVSL performed 186 avian *Mycoplasma* hemagglutination inhibition tests. During this same period, 1185 ml of hemagglutination antigen and 946 ml of control sera were provided to other diagnostic laboratories.

Avian Import Activities Fiscal Year 2006

Dr. Larry White
National Center for Import-Export, APHIS

A) **Poultry and Hatching Eggs:** During fiscal year (FY) 2006 15,106,633 poultry including day old chicks, and 17,517,916 poultry hatching eggs were imported into the United States.

B) **Commercial Birds:** The imports of commercial birds are limited to those that are exempt for the Wild Bird Conservation Act, serviced by the U.S. Fish and Wildlife Service. During FY 2006 172,429 commercial birds were released from USDA-supervised private bird quarantine facilities.

C) **Pet Bird Program:** There were 1,457 pet birds imported into the United States and quarantined at a USDA-operated animal import centers during FY 2006. The number of home quarantined birds was 134.

D) **Ratite Importations:** No ratites or ratite hatching eggs were imported into the United States. The current price of ratites and hatching eggs does not justify the cost of importing such birds.

E) **Smuggled/confiscated birds:** There were 86 birds confiscated by Customs & Border Protection during FY 2006

National Veterinary Services Laboratory Activities

Mr. Dennis Senne
National Veterinary Services Laboratory

AVIAN INFLUENZA

Live Bird Marketing System (LBMS). Surveillance in the LBMS in the Northeastern United States for presence of Avian Influenza Virus (AIV) continued in FY 2006. Surveillance in the marketing system has been routinely conducted since 1986, when the markets were first shown to be a source of AIV infection for domestic poultry. In 1994, a low pathogenicity H7N2 AIV was introduced into the LBMS and continues to circulate in the LBMS in spite of efforts to eradicate the virus. In FY 2006, a total of 8,437 specimens in 1,240 submissions from nine states (CT, MA, ME, NH, NJ, NY, OH, PA, and RI) were tested for presence of AIV and avian paramyxovirus type-1 (APMV-1) by virus isolation in embryonating chicken eggs at the National Veterinary Services laboratories (NVSL). Virus (AIV or APMV) was isolated from 15.1% of the submissions and 5.3% of the specimens tested. In addition, 530 swab pools in 182 submissions were tested at the NVSL by real time reverse transcription-polymerase chain reaction (rRT-PCR) for AIV. Approved state laboratories also tested specimens from the LBMS by rRT-PCR and some laboratories performed virus isolation. Results from individual states are not included in this report, but all positive specimens were submitted to the NVSL for confirmation testing by virus isolation. Of the 8,437 specimens submitted to the NVSL, the H7N2 virus was isolated from 133 of 4,675 specimens from NY, and 1 of 3,406 specimens from NJ. Specimens negative for AIV were CT (n=85), MA (n=165), ME (n=8), NH (n=9), OH (n=31), PA (n=1), and RI (n=57). Notable changes were not observed in the amino acid motif at the

cleavage site of the hemagglutinin protein of 46 H7N2 isolates sequenced in 2006. In addition to H7N2, the H5N2 subtype AIV was isolated from two specimens from NJ, eight specimens from NY, and a single specimen from PA. Also, H5N8 and H5N? (N subtype could not be determined) subtypes of AIV were detected in specimens from NJ. Pathogenicity of representative H5 and H7 AIV isolates was determined by the chicken pathogenicity test and deduced amino acid profile at the hemagglutinin cleavage site; all viruses were of low pathogenicity. Other subtypes of AIV isolated were: H3N8 (NJ, n=2), H4N6 (NJ, n=4), H6N8 (NJ, n=2; NY, n=3; PA, n=1), H6N? (NJ, n=6, NY, n=1), H10N7 (NJ, n=2), and untypable, non H5 or H7, influenza A virus (NY, n=3).

In addition to AIV, APMV-1 was isolated from 267 specimens in 133 submissions from CT (n=24), MA (n=4), OH (n=1), NJ (n=128), NY (n=100), and RI (n=8). Pathogenicity of representative APMV-1 isolates was determined by the intracerebral pathogenicity index (ICPI, n=41) test and deduced amino acid profile at the hemagglutinin cleavage site (n=90). All but six isolates were characterized as low virulent (lentogenic pathotype) strains; the six isolates were characterized as pigeon paramyxovirus type-1 (PPMV-1), a highly pigeon-adapted variant of NDV. In addition, an APMV-4 was isolated from 15 specimens: three from NJ and12 from NY.

Low Pathogenicity Avian Influenza (LPAI) in Commercial Poultry and Backyard Birds. Surveillance for AIV in commercial poultry increased significantly in FY 2006 because of initiatives by the National Chicken Council to test all broiler flocks before processing. Although most of this testing is performed locally, the NVSL does provide agar gel immunodiffusion (AGID) reagents for this testing. Positive specimens are submitted to the NVSL for antibody subtyping. A total of 770 submissions were received from 36 states for AIV antibody detection and subtyping in 2006. This is the largest number of submissions for antibody subtyping received at the NVSL in a single year in the absence of a major outbreak of AI in poultry. The vast majority of the submissions (472) from commercial poultry (468 from turkeys and four from chickens) from 10 states (AR, IA, IL, IN, MI, MN, NC, OH, SC and SD) were positive for antibodies to swine influenza virus subtypes H1, H1N1, H3, or H3N2. Vaccination for H1 and H3 is commonly practiced in turkey flocks that are raised in close proximity to swine. Only two isolations of H3N2 were made from turkeys in 2006: one from AR and one from NC. Genetic analysis of the H3 viruses is in process. The only other detection of AIV in commercial poultry (other than H1 and H3 swine subtypes) for FY 2006 was a single turkey flock in SD positive for antibodies to H6N2.

In spite of the increased AI surveillance, there were no detections of H5 or H7 subtypes in commercial poultry in FY 2006. Detection of AIV or specific antibodies to AIV in non-commercial poultry/birds is shown in Table 1.

AIV Surveillance in Wild Waterfowl. In 2006, $18 million in supplemental funding was appropriated for surveillance to detect the highly pathogenic Asian strain of H5N1 in waterfowl from Alaska and the lower 48 states. The waterfowl surveillance is a cooperative effort between USDA's Animal and Plant Health Inspection Service (APHIS, NVSL), Wildlife Services (WS, National Wildlife Research Center, Fort Collins, CO) and the Department of Interior's United States Geological Survey (USGS, National Wildlife Health Center, Madison, WI). Specimens collected from wild-caught and hunter-killed waterfowl as well as from water, environment and feces were screened by real time reverse transcription-PCR (rRT-PCR) for AIV specific RNA at WS, National Animal Health Laboratory Network (NAHLN) laboratories and at the USGS laboratory in Madison, WI. Presumptive H5 and H7 positive specimens from WS, NAHLN and USGS were submitted for confirmation and virus isolation. In addition, specimens from wild bird mortality events (>500 birds) were submitted directly to the NVSL for testing. From June through September, 2006 a total of 746 specimens in 82 submissions were received for confirmation testing. No HPAI H5N1 was detected and no H7 subtype viruses were detected or isolated. However, LPAI H5N1 was detected in specimens submitted from three states (MI, MD, and PA). In addition, H5N2 was isolated from 21 submissions from eight states (AK, AZ, CO, ID, NV, NY, WA AND WI). Also, H5N3 AIV was detected in specimens submitted from CO and MT, H5N4 from PA, and H5N8 from CO. All H5 subtype AIVs were LPAI and of North American lineage. Other AIV subtypes isolated included H3, H4, H6, H9, H10 and H12, as well as APMV-1 and APMV-4 from a variety of duck species. Details of the wild bird surveillance will be reported separately at a later date.

General Surveillance for HPAI and vND Viruses. The NVSL routinely receives specimens from investigations of suspected cases of foreign poultry diseases (FPD) and from the presumptive positive rRT-PCR specimens (AI and ND) from the exotic ND (END) surveillance program. During FY 2006, 826 specimens in 128 submissions from FPD investigations in 30 states were tested at the NVSL. In addition, 495 presumptive positive rRT-PCR positive specimens (AI and ND) in 171 submissions from 24 states were received from NAHLN laboratories. No H5 or H7 AIV or vNDV was detected.

rRT-PCR Proficiency Test Panels. 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 2006, PTs were sent to 178 diagnosticians in 49 laboratories for AI rRT-PCR and 169 diagnosticians in 47 laboratories for APMV-1 (Newcastle disease) rRT-PCR.

AI Diagnostic Reagents Supplied by the NVSL. A total of 24,743 units of AGID reagents (antigen and enhancement serum) were produced and shipped to state, university, and private laboratories during FY 2006. The quantity is sufficient for approximately 2,969,160 AGID tests. An additional 1,460 units (175,200 tests) were shipped to 29 foreign laboratories. This represents a 62% increase in AGID reagents shipped compared to FY 2005.

NEWCASTLE DISEASE

Isolations of Virulent Newcastle Disease Virus (vNDV). No vNDV was isolated from domestic poultry, imported caged (pet) birds, or birds confiscated by U.S. Customs in FY 2006. However, vNDV (velogenic neurotropic pathotype) was isolated from two submissions received from the USGS laboratory in Madison, WI. The specimens were collected from wild birds (double crested cormorant) from Nevada in December 2005 and from Door County, Wisconsin in August 2006. Velogenic neurotropic NDV has been sporadically isolated from wild cormorants throughout the U.S. since 1992. In addition, pigeon paramyxovirus type-1 (PPMV-1), a highly pigeon-adapted variant of NDV, was isolated from pigeons from seven states (CT, FL, MN, NC, NY, OH, and WI).

Isolations of Low Virulent Avian Paramyxovirus Type-1 (APMV-1). During FY 2006, 38 isolates of APMV-1 in 22 submissions from 13 states (CA, FL, IA, ID, ME, MN, NY, PA, SD, TN, TX, WA, and WI) were received for characterization at the NVSL or were isolated at the NVSL from diagnostic submissions. All isolates were characterized as low virulent NDV by the intracerebral pathogenicity index (ICPI) and/or by deduced amino acid motif at the cleavage site of the fusion protein.

ND Diagnostic Reagents Supplied by the NVSL. A total of 284 vials (2ml) of inactivated LaSota antigen were shipped to nine domestic laboratories in eight states and to five foreign laboratories. In addition, 14 vials (0.6ml) of live LaSota virus were shipped to one domestic and four foreign laboratories and 98 vials (2ml) of ND antiserum were shipped to eight domestic laboratories in seven states and seven foreign laboratories.

Table 1. Subtypes of low pathogenicity avian influenza virus (AIV) or specific antibodies detected in non-commercial poultry/birds, FY 2006.

State	**Species**	**Subtype of AIV* (No. Of Isolates)**	**Antibody Subtypes**
Arkansas	Goose	H10N7	
California	Chicken	H6N2 (2)	
	Duck	H3N8, H5N9	H4N6, H5N9, H9N2
	Quail	H4N6, H6N2	H3N2, H4N6, H9N2
	Unknown avian	H4N6	
Delaware	Duck	H6N1	
Georgia	Waterfowl	H12N3	
Florida	Chicken		H3
	Duck	H2N3, H6N2	H12N8
Iowa	Chicken	H6N1, 4	
Idaho	Duck	H2N9, H4N8	
	Pheasant		H2, 12 N5, 9
Illinois	Guinea fowl		H3N8
Massachusetts	Chicken		H3,7 N2,6
	Duck	H11N2	
Michigan	Swan		H1N2
North Carolina	Chicken	H2	
Nebraska	Chicken		H10N7
New Hampshire	Guinea fowl		H6N8
New York	Pheasant		H6N2
	Duck	H6N8	
Pennsylvania	Chicken		H1, H10
	Duck	H4N6 (2), H6N1,4	
	Guinea fowl	H6N8	
	Environment	H4N6, H6N1,4, H6N8, H6N9, H11N6	
Washington	Duck	H6N1,4, H10N7	Multiple

* Low pathogenicity AIV by the chicken pathogenicity test.

Report of the Subcommittee on Avian Influenza and Newcastle Disease

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Southeastern Poultry Research Laboratory
Agriculture Research Service

April 3-6, 2006 the 6th International Symposium on Avian Influenza (AI) was held at St. John's College, Cambridge University, Cambridge, United Kingdom. The co-chairs of the meeting were Ian Brown (United Kingdom), Ilaria Capua (Italy) and David E. Swayne (USA). Dennis Alexander (United Kingdom) served as the Councilor. The program Committee was composed of a multinational group of avian influenza experts: Victoria Bowes (Canada), Nancy Cox (USA), Alberto Laddomada (Belgium), Guus Koch (The Netherlands), Stephano Marangon (Italy), Albert Osterhaus (The Netherlands), Dennis Senne (USA), Les Sims (Australia), Richard Slemons (USA), Erica Spackman (USA), David Suarez (USA) and Alex Thiermann (OIE). The symposium had 48 oral and 72 posters papers and 258 participants representing 47 countries and six continents, making it the largest of the six USAHA sponsored AI symposia. Plans are underway for the 7th symposium to be held in the USA in 2008 or 2009. Input to the location and date are welcome.

Symposia	Year	Location	Number of Papers	Number of Participants	Number of Represented Countries
1st	1981	Beltsville, Maryland, USA	33 oral	99	18
2nd	1986	Athens, Georgia, USA	53 oral	153	15
3rd	1992	Madison, Wisconsin, USA	49 oral	92	8
4th	1997	Athens, Georgia, USA	43 oral	152	16
5th	2002	Athens, Georgia, USA	56 oral & 24 poster	200	36
6th	2006	Cambridge, UK	48 oral & 72 poster	258	47

The proceedings of the 6th Symposium will be published as a Special Issue of Avian Diseases as the last issue of 2006. This issue will be mailed to all participants and Avian Diseases subscribers in March 2007. The proceedings of the 1st to 5th symposia are available from the American Association of Avian Pathologists for a nominal fee (AAAP@uga.edu, http://www.aaap.info/educmat/). Proceedings of the 1st to 4th symposia are available as a CD bundled with the hardcopy of the 5th symposium. The 5th is also available on line and by CD.

There have been several major developments over the past year with AI and Newcastle disease (ND). Beginning in late 2005, H5N1 high pathogenicity (HP) AI spread to several South Central Asian, the Middle Eastern and several Eastern European countries, principally producing mortality in wild birds species, principally swans, but also domestic poultry. Many of the outbreaks have involved village or rural poultry with some major outbreaks in commercial poultry in India, Egypt and Nigeria. Since January 2004, 55 countries have reported infections by H5N1 HPAI virus in wild birds and/or poultry. More than 220 million poultry have died or have been preemptively culled.

Still the major "exotic" disease of poultry around the world is ND. Since August 2005, 19 outbreaks have been reported and have included Brazil, Denmark, France, Greece, Israel, Italy, Japan and United Kingdom. Many countries in the developing world have endemic ND, for example the latest OIE annual report (2004) lists 71 countries with reports of ND outbreaks. To add to the misunderstanding, reports of high mortality in poultry caused by ND virus are commonly confused in the media and on the Internet with H5N1 HPAI, especially for pigeons.

Rapid Antigen Capture Method for the Surveillance of Avian Influenza

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Synbiotics Corporation

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Avian Influenza virus infects domestic and wild birds and is characterized by a full range of responses from almost no signs of disease to very high mortality. Influenza type A virus can infect avian, porcine, equine and other species

including humans. Sixteen serologically distinct hemagglutinin and nine neuraminidase subtypes of Influenza type A virus have been isolated from avian species. Subtypes H5 and H7 are associated with significant to catastrophic losses.

The antigen and antibody surveillance of commercial poultry flocks has been an important element in recent disease control programs worldwide. Virus isolation and identification (VI) is a standard laboratory method for detecting AI. Yet VI is time consuming and costly.

In this paper, we report on the evaluation of an influenza antigen detection test by using H7N2, H7N7, and H5N1 positive samples. The study determines the diagnostic sensitivity and performance of the test. It also provides comparative data on the analytical sensitivity, specificity, and diagnostic specificity of the Flu Detect with other assays.

Avian Influenza Research Update

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Diagnostics

The availability of the real-time Reverse Transcriptase-Polymerase Chain Reaction (RRT-PCR) test for Avian Influenza Virus (AIV) continues to increase in the National Animal Health Laboratory Network (NAHLN). The test is rapid and sensitive, but it was originally validated for tracheal swabs for chicken and turkeys. However, the test is being used for other sample types and species, and RNA extraction efficiency and PCR inhibitors have been an issue with cloacal swabs and tissue samples. Different methods for extracting RNA have been developed that provide improvements in both areas. A procedure for skeletal and cardiac muscle has been bench validated, and an improved cloacal sample testing is in the process of being bench validated. Additional efforts to use robotics to improve throughput for RNA samples is also in progress.

Alternative tests that are commonly used for AIV are the antigen-capture ELISA tests (immunoassay). These tests are popular because they are rapid, simple to perform, and require little equipment or training to perform. These tests, although not as sensitive as virus isolation or RRT-PCR, are effective at identifying virus from birds that are sick or dead from AIV. In an effort to reduce cost, it was proposed that 11 tracheal samples should be pooled instead of the usual five samples for flock surveillance. Studies at the Southeastern Poultry Research Laboratory (SEPRL) and the University of Delaware (Dr. Jack Gelb) show no loss of sensitivity in experimental samples, but some issues of sample volume and practicality remain.

Vaccines

Three AI vaccine technologies show promise for use in US in the near future against H5 and H7 subtypes. The oldest technology, killed whole virus adjuvanted vaccines, can provide solid protection against clinical disease from HPAI challenge. Two H5 inactivated AI vaccines in the United States Department of Agriculture (USDA) Vaccine Bank protect chickens against illness and death, and greatly reduce the number of infected birds when challenged with an Asian strain of H5N1 HPAI virus. In addition, when vaccinated birds become infected they shed two to three $\log_{10}$ less virus than non-vaccinated chickens. Both vaccines induced strong antibody responses as measured by hemagglutination inhibition (HI) test. Another licensed technology, recombinant fowlpox-AI-H5 vaccine, was shown to protect chickens against both low and high challenge doses of an Asian H5N1 HPAI virus. Another promising technology is using Newcastle disease as a vector for AI hemagglutinin protein. In a study using a recombinant Newcastle-AI-H7 vaccine, eye drop vaccination protected chickens from both velogenic ND virus and H7N7 HPAI virus.

Currently, H3N2 subtypes of influenza of swine origin appear to be responsible for turkey production losses and are most prevalent in the field. The objectives of this research were to compare commercial AI vaccines containing either killed H3N4 or an autogenous bi-valent H3N2/ H1N1 following challenge with a recent H3N2 AI field virus in turkeys. Three groups of laying turkey breeder hens were vaccinated with either a commercial killed avian influenza H3N4 vaccine, an autogenous bi-valent killed H3N2/H1N1 vaccine at 20 and 26 weeks of age, or received no AI vaccine (sham). Birds were challenged with an H3N2 AI field isolate recovered from turkey breeders in North Carolina in 2003 (A/turkey/North Carolina/03). No clinical signs of disease were observed in any groups following H3N2 challenge, but unvaccinated birds displayed decreased egg production and increased numbers of poor quality eggs compared to vaccinated birds. The results indicate both vaccines were efficacious and decreased production losses following H3N2 challenge.

Pathogenesis

Highly pathogenic avian influenza viruses cause a systemic infection, including replication in skeletal and cardiac muscle. A recent Asian H5N1 virus was used to experimentally challenge two-week-old chickens by a mucosal route of

exposure, and groups of birds were sampled every 6 hours to follow the course of infection. The virus was inconsistently found at 6 and 12 hours, but virus was consistently found in muscle for most birds at every time point after (18-48 hours). The H5N1 HPAI virus has also been demonstrated in the breast and thigh meat of experimentally and naturally infected chickens, ducks, Japanese quail and geese. In chickens, the virus concentration varied from $5.5\log_{10}$ to $8.1\log_{10}$ mean embryo infectious doses/gram of meat. Cooking efficiently inactivated the H5N1. At 165 F, $10\log_{10}$ of virus was inactivated in less than 1second.

Comparisons of different Asian H5N1 viruses have been made in two-week-old Peking ducks given the same mucosally administered dose. The H5N1 viruses from 1997-2001 could infect ducks, but caused little clinical disease. More recent viruses, however, have become much more virulent in this duck model. Some recent viruses from Vietnam cause 100% mortality in less than three days. The Asian H5N1 viruses continue to change biologically over time with a general increase in virulence in at least some types of ducks.

Molecular Epidemiology

The HPAI H5N1 viruses from Asia, Europe, and Africa all originated from virus that can be traced back to at least 1996. However in recent years the viruses have become differentiated into two phylogenetic clades, 1 and 2. Multiple sublineages are also found within a clade. These clades of viruses often segregate by geographic origin, but recently in northern Vietnam a shift in circulating viruses occurred from clade 1 to clade 2.

Low pathogenic H5N1 avian influenza viruses have been isolated from wild birds from several U.S. states. The sequence analysis shows these viruses are North American origin and have no relation to the Asian H5N1 HPAI viruses.

Movement Protocol for Liquid Egg Product, Further Processed Egg Products, Inedible Egg, Table Eggs and Broken Egg Shells, Egg-Type Hatching Eggs, and Day-Old Chicks Within, Out of, and Into a Control Area

Hugo Medina
Sparboe Companies

1. **Flocks that are found to be infected with highly pathogenic avian influenza (HPAI).**
   - **a.** No movement of unpasteurized liquid egg product, shell eggs, hatching eggs or broken egg shells will be allowed off the premises, except for disposal and must be moved under permit.
2. **Determination of non-infected flocks in the Control Area.**
   - **a.** The absence of infection will be documented by requiring chickens from the daily mortality from each house on the farm be tested each day by the real time reverse transcriptase – polymerase chain reaction (RRT-PCR) and found to be negative.
     - i. All daily mortality (up to a maximum of five chickens) from each house on the farm will be placed in a leak proof container (e.g. heavy duty plastic garbage bag) each morning. Each container will be labeled with the farm of origin, house of origin, and the number of birds found dead in the house that day. The containers will be taken to a designated pick-up point, typically the public road closest to the premises.
     - ii. A state or federal regulatory official or an individual authorized by the Incident Commander will take a tracheal swab from each chicken. Five tracheal swabs will be pooled in a tube containing brain-heart infusion (BHI) broth. From each house, one BHI tube containing tracheal samples (five tracheal swabs/BHI tube) will be submitted as directed by the Incident Commander to an authorized State Veterinary Diagnostic Laboratory (VDL). The state or federal regulatory official or an individual authorized by the Incident Commander must submit these samples on the day of sample collection. The State VDL and the IC will establish the time of day by which samples must be submitted to an authorized VDL (example, by 12:30 pm). VDL personnel will perform RRT-PCR testing on these samples immediately upon receipt and electronically send test results to the Incident Commander (IC) by the end of each day. The IC will report the test result information to the premise as soon as it is available.
3. **Movement of liquid egg product, further processed egg products, inedible egg, table eggs and broken eggshells, egg-type hatching eggs, and day-old chicks from non-infected flocks.**
   - **a.** Movement of liquid egg product, table eggs, egg-type hatching eggs, further processed egg products, and broken egg shells *within and out of* a Control Area will be allowed for those flocks testing negative (see Section 2 above) as follows:
     - i. Unpasteurized liquid egg product can move from breaking operations within the Control Area directly to pasteurization plants located within or out of the Control Area by permit. The transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

ii. Pasteurized liquid, frozen, dried, or precooked egg products from plants within or out of the Control Area may move within or out of the Control Area without permit (accompanied by documentation of origin of the products). The transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

iii. Inedible egg from graders and/or breaking plants in a Control Area may move by permit for pasteurization or to approved waste disposal sites within or outside the Control Area. The transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

iv. Washed and graded shell eggs destined for food service, retail marketing, further processing, or for breaking may be moved out of the Control Area by permit if they have been washed and sanitized using 100 – 200 ppm chlorine solution. The transport vehicle must have official seals placed on the door(s) that provide access to the eggs before leaving the farm. A permit must be issued and a state or federal regulatory official or a person authorized by the Incident Commander must place seals on the vehicle. The Incident Commander will authorize companies to break the seals outside of the control area with proper documentation. Egg handling materials used in the transport of eggs to breaking or further processing plants must be destroyed at the plant or cleaned, sanitized and returned to the premises of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. In addition, the transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

v. Nest run shell eggs (not washed and sanitized) must be moved directly for washing and grading, further processing, or to an off-line breaking operation. Movement is allowed by permit only. Company personnel under the authorization of the Incident Commander must place seals on the vehicle. Egg handling materials must be destroyed at the destination plant or cleaned, sanitized and returned to the premise of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. In addition, the transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

vi. Broken egg shells on the farm or from breaking plants, pasteurization plants, and/or further processing plants may be moved within or out of the Control Area for commercial use or disposal at an approved site by permit. The transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

vii. Hatching eggs from within the Control Area may be moved to hatcheries within the Control Area with a permit. Egg handling materials must be destroyed at the hatchery or cleaned, sanitized and returned to the premise of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. In addition, the transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

viii. Hatching eggs may be moved out of the Control Area by permit. The chicks must be placed under a "post-hatch" quarantine for 30 days. Egg handling materials must be destroyed at the premises of destination or cleaned, sanitized and returned to the premise of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. In addition, the transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the hatching egg premises within a Control Area. The State Veterinarian of the state of destination must be faxed a copy of the restricted movement permit within 24 hours of issuance.

ix. Day-old chicks may be shipped by permit within or out of the Control Area and must be placed under a 30-day quarantine. The State Veterinarian of the State of destination must be faxed a copy of the restricted movement permit within 24 hours of issuance. Hatcheries may receive eggs that originate outside the Control Area (accompanied by documents showing the origin of the eggs) without a permit.

b. Movement of liquid egg product, shell eggs, broken egg shells, and hatching eggs *into* a Control Area will be allowed without permit under the following conditions:

i. Pasteurized liquid egg product and unpasteurized liquid egg (and blends) from breaking plants and/or pasteurization plants outside a Control Area (and accompanied by documentation of origin) may move into pasteurization and/or further processing plants located in a Control Area without permit. The transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises in a Control Area.

ii. Shell eggs may move into breaking, grading, pasteurization, and/or further processing plants from outside Control Areas (accompanied by proof of origin) without a permit. Egg handling materials must be destroyed at the plant or cleaned and sanitized as authorized by the Incident Commander and returned to the premises of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. The transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

iii. Broken egg shells may move into a Control Areas (accompanied by proof of origin) without a permit. The transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

iv. Hatching eggs may move into a hatchery from outside Control Areas (accompanied by proof of origin) without a permit. Egg handling materials must be destroyed at the plant or cleaned and sanitized as authorized by the Incident Commander and returned to the premises of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. The transport vehicle's tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

4. Determination of Release of Movement Restrictions

a. After all infected flocks in a Control Area have been depopulated and all infected premises have been cleaned and disinfected, a minimum of 42 days must pass or environmental sampling must prove HPAI virus negative status for the infected premises before any premises in the Control Area can be released from restrictions. At that time all premises within the Control Area would be eligible for release from movement restrictions by the Incident Commander.

The World Organization for Animal Health (OIE) Updates

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Avian Influenza (AI)

In May of 2005, the International Committee of the World Organization for Animal Health (OIE) adopted a new Code Chapter on Avian Influenza and established risk-based import measures for trading in poultry commodities as they relate to AI. The Code Chapter addresses all highly pathogenic strains of AI as well as the H5 and H7 subtypes of low pathogenicity AI. The chapter was slightly updated in May of 2006. Specifically, the OIE clarified the definition of poultry to include all "domesticated" birds and added the requirement that table eggs be sanitized.

Given the global spread (Asia, Africa and Europe) of the highly pathogenic H5N1 (Asian) strain, and the role that wild birds may play as a vehicle in the international transmission of the virus, the OIE is strongly encouraging its Member Countries to investigate reports of illness in wild birds, and any findings of highly pathogenic AI need to be reported immediately to the OIE.

This year, OIE also adopted an associated appendix providing the recommended time and temperature parameters for the inactivation of highly pathogenic AI in eggs, egg products and raw poultry meat.

Future work of the OIE will include re-writing the Code Chapter on Newcastle disease. This chapter will likely be patterned after the Code Chapter on Avian Influenza.

Animal Welfare

No new guidelines for animal welfare were adopted this past May. The guidelines on Animal Slaughter and Killing for Disease Control do contain recommendations affecting poultry and were only slightly revised this year. The OIE is now developing guidelines for the housing and production of terrestrial animals, which would also include poultry.

National Animal Health Reporting System (NAHRS) Report

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The NAHRS is a reporting system designed to collect data through State Animal Health Officials on the occurrence of confirmed OIE reportable diseases in commercial livestock, poultry, and aquaculture species. The USDA-APHIS uses

NAHRS data as one of several sources to complete U.S. OIE animal diseases status reports and to support trade negotiations. With the OIE requiring twice yearly disease occurrence reports from member nations, the importance of NAHRS in providing valid information for these reports has increased. The NAHRS is a voluntary reporting system and currently 44 States participate, with several other non-participant States still planning future participation, and some States reluctant to discuss participation until after upcoming elections.

In 2006 the NAHRS Steering Committee addressed the following NAHRS related issues: Completion of updates to the NAHRS UM&R and reporting forms to reflect OIE reporting changes; need to enhance representation on the NAHRS Steering Committee; the expansion of NAHRS reportable aquaculture diseases to include all OIE reportable aquaculture diseases; continue the enhancement of the NAHRS On-line Reporting System; and the request from the equine industry, through the NAHRS Equine Commodity Chair, to explore utilizing NAHRS as a reporting mechanism to collect summary level, quantitative information on equine infectious anemia (EIA).

Report of Revisions to the Summary Highly Pathogenic Avian Influenza (HPAI) Response Plan – August 2006

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The United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) prepared a draft Summary of the National HPAI Response Plan that was posted on the USDA website on April 21, 2006. The initial draft Summary was an abstract of the 1100 page National HPAI Preparedness and Response Plan. The Summary contained general guidance on the National Emergency Response framework; laboratory testing, reporting, and response; Field Operational Response guidelines; and general personal protective equipment (PPE) and safety measures. Although the Summary was comprehensive in content, it was not entirely disease specific in guidance.

APHIS solicited comments from federal and state regulatory agencies, industry stakeholders, and the general public since the posting of that draft. In addition, APHIS participated in three stakeholder meetings to discuss response strategies and concerns. The first meeting was held on April 27, 2006 in Atlanta, GA. Four Stakeholder Working Groups were formed at this meeting to discuss the plan and to provide recommendations for revisions to it. The second meeting was held on June 14-15, 2006 with United Egg Producers (UEP) in Atlanta, GA. The third meeting was held July 17, 2006 in Honolulu, HI during the American Veterinary Medical Association (AVMA) and American Association of Avian Pathologists (AAAP) annual conference. Each of these meetings gave USDA further opportunities to hear from interested stakeholders, and to understand what concerns they might have with the HPAI Summary Response Plan.

Since April 2006, APHIS has considered all comments received on the draft Summary Plan and issues and concerns raised in the various stakeholders meetings; the four Stakeholder Working Groups reports created at the April 27th meeting in Atlanta; federal and state agencies correspondences; and general public comments from the USDA website. These comments provided valuable insights and direction in revising the Summary HPAI Response Plan.

The Revised Summary was posted on the USDA web site in August 2006. It now contains more Avian Influenza (AI) disease-specific guidance for HPAI outbreak response and retains the comprehensive response strategy of the complete National Animal Health Emergency Management System (NAHEMS) plan. The Revised Summary contains the principles of an outbreak response to HPAI to include diagnosis and reporting of HPAI, quarantine and movement controls, epidemiological investigation, definition of the HPAI index case, humane mass depopulation methods, appendices with specific references to approved disinfectants for AI, disposal options for HPAI, a decision tree for AI vaccine use, and an APHIS Directive for PPE in an HPAI outbreak response.

In the process of revising the Summary, several policy decisions were identified and have been forwarded to the Deputy Administrator, Veterinary Services (VS), for consideration. These policy decisions, therefore, are still in discussion and have not been incorporated in the Revised Summary.

Although the content of this revision is more HPAI disease-specific, the plan is intended to complement regional, State, and Industry plans that are written to be more specific to local issues and needs. States should continue to develop plans that are specific to their poultry industry and requirements. This is a living document and will evolve as we gain additional information and communicate further with our partners and stakeholders.

Update on the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) Program's Partnerships to Accomplish the Goal of Early Detection of Highly Pathogenic (HP) H5N1 Avian Influenza Virus (AIV) in Wild, Migratory Birds

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USDA-APHIS-WS enhanced partnerships with other federal departments, all 50 State Wildlife Management Agencies, and over 45 laboratories in the National Animal Health Laboratory Network (NAHLN) to plan and implement the largest surveillance effort ever undertaken cooperatively by federal, state and local partners to investigate wildlife for a single disease. This commitment affords the continued protection of American agriculture, such as the poultry and egg industry, public health, and natural resources by working both domestically and internationally to survey for HP H5N1 AIV in wild birds. In March 2006, *An Early Detection System for Asian H5N1 Highly Pathogenic Avian Influenza in Wild Migratory Birds, US Interagency Strategic Plan* (Plan) was completed and released. The Plan was co-developed by a cadre of wildlife professionals, including wildlife veterinarians, epidemiologists, quantitative ecologists, wildlife biologists, and other professionals. The Plan established standards for strategies to collect samples, perform diagnostics, and manage data. Five sample collection strategies outlined in the Plan have proven effective as well as the diagnostic screening and confirmation testing by using real-time reverse transcriptase-polymerase chain reaction (rRT-PCR) and virus isolation, respectively. All confirmatory and pathogenicity testing of wild bird samples is conducted at USDA-APHIS, Veterinary Services, National Veterinary Services Laboratory in Ames, Iowa.

Since wild, migratory birds, particularly ducks, geese and shorebirds, are natural reservoirs for Type A AIV, USDA-APHIS-WS decided to conduct surveillance both domestically and internationally. The current strategy focuses on collecting a robust number of samples by applying all five collection strategies and working in all 50 States. To best implement the surveillance efforts on a National scale, USDA-APHIS-WS rated all 50 States using the following criteria: species specific migratory paths, historic disease prevalence, habitat characteristics, geographic size and location of each State, logistics of capturing birds, and most importantly, input from the Association of Fish and Wildlife Agencies and the 4 Flyway Councils. This rating system has proven effective in ensuring proper allocation of resources and focusing efforts in locations that will potentially yield the best results.

Currently, the main focus has been in Alaska because a great number of birds migrate from HP H5N1 AIV endemic countries across the Bering Sea and into the United States. Cooperative efforts between USDA-APHIS-WS and State Wildlife Management Agencies in the lower 48 States and Hawaii are currently expanding to prepare for the upcoming fall migration. International activities also are rapidly evolving and will likely prove useful if HP H5N1 AIV enters the Western Hemisphere.

Proposed outcomes of the surveillance efforts should yield large sample sizes from wild birds. USDA-APHIS-WS and State Wildlife Management Agency plans currently call for collecting samples from between 75,000 to 100,000 wild birds and approximately 50,000 environmental samples in the form of fecal material. Currently, over 28,000 cloacal samples and 20,000 environmental samples have been collected and analyzed for HP H5N1 AIV by rRT-PCR through the partnerships between USDA-APHIS-WS, State Wildlife Management Agencies, and NAHLN laboratories. The summary results of this data will be placed on the Wildlife Disease Information Node for public access and viewing. Specific results and other details are shared between contributors and collaborators and made public through press releases or posting on appropriate Agency websites.

Update on United States Department of Interior Surveillance of Migratory Birds for Early Detection of Highly Pathogenic Avian Influenza H5N1

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As part of the United States Interagency Strategic Plan for early detection of highly pathogenic avian influenza (HPAI) H5N1 in migratory birds, the United States Department of Interior (DOI) has been conducting surveillance since April 1, 2006. Surveillance strategies used by DOI include sampling of live-trapped birds (Strategy #2) and sport- and subsistence-hunted birds (Strategy #3), and avian influenza (AI) testing in carcasses from wild bird mortality events (Strategy #1). Initial surveillance by DOI has focused on sampling in Alaska, the lower Pacific Flyway, and Hawaii and United States territories and freely-associated states in the Pacific; while testing in mortality investigations spans all states and territories. Species selected for surveillance were prioritized based on known ecology, behavior, and population movement and migration patterns to optimize likelihood of interactions with migratory birds from HPAI areas in Asia. During the 2006

surveillance season (1 April 1 2006 – 31 March 2007), a total of >28,000 surveillance samples from DOI are anticipated under strategies #2 and #3. The number of samples that will be tested from birds dying in mortality events will be dependent on the number and composition of such events.

Cloacal swabs from birds sampled in strategies #2 and #3 and cloacal, tracheal and other tissues from carcasses necropsied in strategy #1 were screened for AI at the United States Geological Survey - National Wildlife Health Center (NWHC) by matrix polymerase chain reaction (PCR) assay; AI-positive samples were then screened for H5 and H7 by real-time PCR assays. Samples positive for H5 and H7 subtypes were sent to the United States Department of Agriculture (USDA) - National Veterinary Services Laboratory for confirmation and N-subtyping. All samples were also inoculated into chicken eggs at NWHC for virus isolation, followed by the above PCR assays on allantoic fluid from virus-positive samples.

As of 5 October 2006, a total of 12,045 samples from were tested at NWHC from subsistence hunting in Alaska; and 4,823 samples were tested from live-sampled birds from Alaska, the lower Pacific Flyway, and Hawaii. Sport-hunting samples from the fall 2006 season are currently being collected in the field. Testing for AI was conducted on 609 carcasses received at NWHC as of 5 October from 62 separate mortality events in 32 states, the Mariana Islands, Midway Atoll and Puerto Rico. Neither HPAI H5N1 or low-pathogenicity H5N1 AI virus has been detected in any samples tested at NWHC to date; AI virus was identified in 371 (2.1%) of 17,477 cloacal swabs from all three surveillance strategies, and H5 subtype was identified in 12 of the 371 AI-positive samples.

Results of DOI surveillance under the Interagency Strategic Plan, combined with those from the USDA expanded surveillance, can be viewed at the NWHC-managed HPAI Early Detection Data System (HEDDS) found at http://wildlifedisease.nbii.gov/ai.

National Animal Health Surveillance System

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In response to the *2001 Animal Health Safeguarding Review*, Veterinary Services in 2002 formed the National Surveillance System Issue Group, which developed critical action plans necessary for the transition to the National Animal Health Surveillance System (NAHSS). Several of these key activities were finalized in 2003, including identification of a national surveillance coordinator, establishment of the National Surveillance Unit (NSU), and formation of the NAHSS Steering Committee. The NSU was organized to serve as the coordinating entity of surveillance related activities, including planning, evaluation, integration and enhancement. The NSU is the first unit within Veterinary Services with personnel devoted solely to surveillance and surveillance design, coordination and enhancement.

The NAHSS Steering Committee is a key driver of the NAHSS. The NAHSS Steering Committee represents NAHSS stakeholders and includes representatives from livestock and poultry industries, state animal health agencies, diagnostic laboratory organizations, academic institutions, private practitioner organizations, and relevant Federal agencies.

The NAHSS Steering Committee is charged with guiding the National Center for Animal Health Surveillance in its efforts to establish National Animal Health Surveillance Programs, specifically to guide and support the National Surveillance Unit in the design and planning for implementation of efficient and accurate surveillance for relevant animal diseases. The committee ensures that a wide array of viewpoints is considered before taking specific actions. The Steering Committee functions to:

- Ensure consideration of all Safeguarding Review recommendations
- Guide strategic planning
- Interact with constituencies and obtain stakeholder input and support
- Request and review documents and plans (early and late)
- Seek outside expertise and help (panels and working groups; teams)
- Quality control
- Guide research

This committee has been meeting monthly by teleconference since May 2004 and also meets face to face two times a year. The last face to face meeting was held in Fort Collins, Colorado in August 2006. The steering committee identified their immediate priorities for Veterinary Services and the National Surveillance Unit. They include:

- Prepare toolbox/methods for surveillance, including surveillance during an outbreak and post-outbreak
- Functional Database, that will aggregate all surveillance data – (all species; in particular poultry - AI)
- completion of an FMD / Vesicular Disease Plan
- Education and Outreach, including education on surveillance and data standards, communication; and surveillance for FAD, ED; improve visibility of the NSU's surveillance standards efforts

In addition, the steering committee discussed the one, three and five- to 10-year future of the NAHSS:

Future of NAHSS

One Year

Wide recognition so that state and federal personnel are aware of the NAHSS

- Expand surveillance standards and ensure that all stakeholders and partners know and understand these standards
- Surveillance standards promoted through Professional Development System (PDS) training system; this will also allow personnel (especially field staff) to work with states and others to educate on goals/objectives/etc
- Increase communication between the different units of VS involved in surveillance
- Assist industry with pressing needs (e.g. FSIS mandate on H5N1); will put NAHSS on the map
- Test and pilot plans more fully before widespread implementation
- Ensure more coherence to surveillance component of cooperative agreements
- Complete priority action items identified by Steering Committee

Three Years

- A fully-funded NAHSS working in close partnership with the agricultural sector, with agriculture and a key beneficiary of the system
- Industry trust gained through factors like management of test results and confidentiality
- Wide recognition throughout VS that National Surveillance Unit (NSU) has a toolbox available to assist stakeholders
- Broader surveillance standards focus; include initial detection and post-outbreak response
- Define internal boundaries vis-à-vis surveillance roles under different scenarios (surveillance, outbreak, post-outbreak)
- Every program reviewed and plan written according to surveillance standards
- Improved data streams (especially wildlife)
- Improved National Animal Health Laboratory Network (NAHLN) data and greater state participation
- A functional national disease database with standards
- More collaboration and communication with wildlife infrastructure

Five to Ten Years

- Nationally-recognized 'surveillance czar' in place
- Transparency in surveillance
- Products and results relied upon by others for decisions & support
- Internationally-recognized as a governing body over surveillance
- Food safety and public health recognize NAHSS and want to interact
- NAHSS approach 'inoculated' into all animal and human health aspects
- Methodology and results validate so that performance of the system is known
- Metrics and evaluation of surveillance systems complete with a plan for change (or not) based on results

Report on Individual Bird ID

Ernest Zirkle
Chair, Tracking and Accountability Subcommittee of the Live Bird Marketing System Working Group

The Live Bird Marketing System (LBMS) of the North East consists primarily of three states. Pennsylvania produces approximately 80% of the birds while New York and New Jersey have the bulk of the markets, 90 and 35 respectively, with only five in Pennsylvania. Low Pathogenic Avian Influenza (LPAI) has existed in this market system for at least 15 years.

A group of involved and concerned individuals had been addressing issues in the LBMS since LPAI became endemic and were known collectively as the LBMS working group (WG). This group became recognized by USDA as the forum for addressing all issues. Over the last several years USDA has received funding for control and eradication of LPAI from the markets and the system. The first goal was to establish Uniform Standards for Control of AI in the LBMS and this was accomplished in short order. In 2003 subcommittees were appointed which included the identification (ID) subcommittee, however by-laws were not developed and the structure remained informal. A chair for the Subcommittee was appointed and anyone who wished to join was accepted. Representation on this Subcommittee was not equally divided between the states involved. Out of twelve voting members in 2004 -2005, seven were from Pennsylvania, two each from New Jersey and New York, and one from Delaware (DE).

USDA funded two studies through Kadix LLC during 2003 -2005 to determine: 1) if there are potentially feasible methodologies for individual tagging of birds entering into the LBMS, and 2) to conduct pilot studies to determine retention

rates of tags. Included in these studies were both neck tags on day-old chicks and glue tags on mature birds, the latter to be applied at load out. Documented were the costs of tags, labor, ease of visibility, readability and retention rates through final inspection in the markets. The initial project included the flexibility to adapt materials and techniques if initial approaches proved impractical. The second project was completed January 21, 2005. Kadix reported that neck tags in broilers had up to 98% retention rates, guinea fowl retention rates were 85% and glue tags ranged from over 95% in broilers to 100% in turkeys. Costs of materials, printing and labor amounted to less than $.10 per bird. There were some logistical concerns, for instance the length of time to apply tags in hot weather, and Kadix recommended that further studies be done to find technologies (automation) to alleviate these problems.

On February 7th, 2006, the Identification Subcommittee of the LBM WG met in Trenton, NJ. The purpose of this meeting was to discuss the Kadix report, including whether or not to recommend continued studies in the area of individual bird identification. The Subcommittee also prepared a report for the LBM WG meeting to be held in Florida. The Subcommittee vote split along state lines with the majority, all members from PA, voting as a bloc to defeat further efforts to explore individual identification in the LBMS. Because the minority position members strongly disagreed with the majority position, two papers, a majority and minority opinion, were submitted to the full WG.

On February 23rd, 2006 the Identification Subcommittee presented the majority and minority reports to the WG. In addition the Subcommittee met, changed its name from the Identification Subcommittee to the Tracking and Accountability Subcommittee, and agreed to support continued trials in both individual bird identification and RFID crate tagging, as well as to explore development of a method of electronic tracking movement of birds. Following that meeting NY and NJ agreed that they would support crate-tracking studies as an interim proposal. At a conference call of the Subcommittee following the February meeting, Pennsylvania stated that they would not consider any further studies of individual bird identification but strongly supported crate tracking and electronic movement of crates and birds. This was consistent with the Pennsylvania report at this Committee's meeting last October, where Pennsylvania touted crate identification and tracking as their preferred option to monitor bird movement into the live bird markets.

A meeting, on July 25th entertained 'conceptual' proposals from three potential vendors of RFID crate tracking capabilities and a fourth interested vendor participated via conference call. A degree of urgency was conveyed to the entire Subcommittee since the USDA funds available were due to sunset on September 30th, 2006. Pennsylvania Subcommittee members, as the initial proponents of this proposal, agreed to take the lead on drafting a request for proposal (RFP) for final review/approval at the Subcommittee meeting to be held as part of the full LBMSWG meeting scheduled for September.

At the meeting of the LBMS WG in Austin, Texas Sept, 19-20th, the Tracking and Accountability Subcommittee met again. At this meeting, which included Pennsylvania representation, it was decided by vote, to cease efforts directed to support exploring the RFID Crate Tagging Pilot Project proposal, reasoning that it would not allow trace back of birds from the market to the farm. It was agreed that when birds are unloaded in the LBMS and then commingled, trace back to the farm of origin is lost. Tracking crates, as a tool to ensure proper washing and eliminate illegal movement, is potentially positive, but still only an interim step to the necessity of individual bird identification. Additionally, from this meeting, suggested and supported by Pennsylvania members, was the addition of new members from interested states and an agreement to limit the number of votes from each state to four, representing producers, regulators, distributors and market owners.

To date there have been no forthcoming guidelines for any pilot trials to track movement of birds or poultry transport coops. Even though the ear marked funding has been carried over until January 1, I regret that I cannot report any progress at this meeting. Additionally, there have been no further studies towards any form of individual bird identification although one vendor is striving to develop an automatic tagging system for day-old chicks at the hatchery and there are improved glue materials waiting to be tested.

There are members of the Subcommittee from several states who strongly suggest that USDA fund continued studies and pilot trials into the modalities of individual bird identification. Equally, there are members who want nothing more to do with individual bird identification. It should be understood that having a method that works and is economically feasible does not obligate or presuppose that individual bird identification will become mandatory until adopted by industry and the regulatory community as a viable practice.

Live Bird Marketing System (LBMS) Low Pathogenicity Avian Influenza (LPAI) Program Working Group Report

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Since 1986, States have been monitoring live bird markets (LBMs) in the Northeastern United States for the presence of avian influenza (AI) viruses that may pose a threat to the commercial poultry industry. On October 20, 2004, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) published uniform program standards to prevent and control H5 and H7 LPAI subtypes in the U.S. LBMS. The standards cover (1) licensing, (2) AI testing, (3) recordkeeping, (4) sanitation, (5) biosecurity, (6) surveillance, (7) inspection, (8) trace backs, (9) premises registration, (10) trace outs when positives occur, and (11) response to positive facilities. The standards apply to LBMs, auctions, and small sales, as well as to producers and distributors who supply the markets. The standards are currently being implemented. States are responsible for enforcing LPAI program standards. All LBMs, producers, and distributors that supply the markets must be registered or licensed with the State and must allow Federal and State inspectors access to their facilities, birds, and records. These facilities must also have written biosecurity protocols in place. USDA-APHIS coordinates and administers the program. USDA-APHIS provides personnel and resources to assist States with implementation and compliance with program requirements.

Surveillance in LBMS remains a high priority. As of fiscal year (FY) 2006, USDA-APHIS has initiated cooperative agreements with 31 States. Of those 31 States, nine (Alabama, Colorado, Kentucky, Nebraska, New Hampshire, Oklahoma, Oregon, Washington, and Wisconsin) and Puerto Rico joined the program to conduct LBMS surveillance.

In February and September 2006, the LBM working group met to address prevention and control of LPAI H5 and H7 in the LBMS. Even though the northeast remains a central area of concern, the program has expanded to a national scope with the addition of many new states in the Midwest and the Western region. In addition, the working group discussed the program's progress, shared ideas, and agreed on the implementation of the program.

As part of USDA's initiative to combat LPAI, Veterinary Services (VS) facilitated a LBMS training course on August 29-31, 2006, at the University of Minnesota, College of Veterinary Medicine, St. Paul, Minnesota. The purpose of the course was to inform and familiarize State and Federal employees working in the LBMS throughout the United States with various aspects of the LBMS. These aspects included respiratory diseases that affect poultry, laboratory testing, biosecurity, personal protective equipment, demonstration of correct euthanasia techniques, geographic information system, State and Federal regulations, the role of USDA's Investigation and Enforcement Services, risk communication, the National Animal Identification System, an update on high pathogenicity AI H5N1 in Asia, and cultural sensitivity in the LBMS setting. Ninety-two State and Federal personnel from 32 States and territories and seven international attendees from Pakistan, Philippines, El Salvador, Guatemala, Kenya, and Romania participated in the lectures, discussion groups, hands-on poultry wet-labs, and the field trip.

In FY 2006, 101,435 samples from 12 States (Connecticut, Florida, Georgia, Massachusetts, Maine, Missouri, North Carolina, New York, Pennsylvania, Texas, Virginia, and Vermont) were submitted to be tested for the presence of AI antibodies on agar gel immunodiffusion. In addition, 24,455 samples (each sample representing five individual swabs pooled for a composite single sample) from seven States (Massachusetts, Maryland, Maine, New Jersey, New York, Pennsylvania, and Texas) were submitted to be tested for the presence of AI virus by virus isolation. Further, 19,857 tracheal/oral pharyngeal swab samples (each sample representing five individual swabs pooled for a composite single sample) from 15 States (Connecticut, Delaware, Florida, Massachusetts, Maryland, Missouri, North Carolina, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Texas, Virginia, and Vermont) were submitted to be tested for the presence of AI virus by real-time reverse-transcriptase polymerase chain reaction. Testing at the National Veterinary Services Laboratories (NVSL) is not included in this report, but all positive specimens were submitted to NVSL for confirmation.

As a result of recent efforts by VS and the States, we have seen a marked decline in the incidence of LPAI viruses in the LBMS in the United States, particularly in New Jersey and New York. For example, in New Jersey's retail LBMs, of the 189 sampling visits (test events) to 36 markets in FY 2006, only two markets were positive at least once, as compared to 23 markets positive in FY 2005. The incidence of LPAI in New Jersey's LBMs has decreased from 20 percent in FY 2005 to 1.6 percent in FY 2006. In the New York LBMs, of the 884 sampling visits to 100 LBMs in which over 12,000 pooled samples were collected, only 18 markets were positive at least once during FY 2006, as compared to 40 markets positive in FY 2005. In New York's retail LBMs, the percent of samples positive over the total number of samples submitted has decreased from 6.3 percent in FY 2005 to 1.1 percent in FY 2006.

National Animal Health Monitoring System (NAHMS) Poultry 2004

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The National Animal Health Monitoring System (NAHMS) has completed its Poultry 2004 study. An information needs assessment process, soliciting input from potential poultry information users, concluded with the 2003 USAHA Transmissible Diseases of Poultry Committee recommendation that NAHMS poultry activities in 2004 focus on the nontraditional poultry industries, such as backyard flocks and live-bird markets. Based on this recommendation, the NAHMS Poultry 2004 has taken a three-pronged approach, with studies addressing backyard flocks, game fowl breeders, and live poultry markets. The objectives of the studies were to: 1) provide a basic understanding of health, biosecurity and bird movement practices of these non-traditional poultry industries, and 2) identify potential risk factors for repeated presence of low pathogenicity avian influenza virus (LPAIV) H5/H7 in live bird markets.

To estimate the density of backyard flocks (premises with fewer than 1,000 birds other than pet birds) within one mile of commercial operations, a sample of 350 commercial poultry operations in 18 top poultry producing states (accounting for 81% of U.S. value of poultry production) was selected from the National Agricultural Statistics Service (NASS) list of poultry operations. A one-mile radius circle was drawn around each operation, and door-to-door canvassing was conducted within these circles to enumerate premises with birds. Premises with backyard flocks completed a questionnaire focusing on bird health, movement, and biosecurity practices.

A similar questionnaire, provided in both English and Spanish, was mailed to all members of State affiliates of the United Gamefowl Breeders Association (UGBA) as well as to members of State associations not affiliated with UGBA.

Results from this study estimated the average density of backyard flocks at less than two flocks within one mile of commercial operations. More than one-third of commercial operations had no backyard flocks located within one mile. Employment of household members in the commercial poultry industry was low for both backyard flocks (3.5% of premises) and gamefowl breeder flocks (0.8% of premises). Gamefowl breeder flocks were larger, used more health care and biosecurity practices, and moved more frequently compared to backyard flocks.

One objective of the live poultry market component of Poultry 2004 was to identify potential risk factors for markets persistently positive for LPAIV H5/H7. A questionnaire was administered to market operators that covered types of birds and other animals in the market, biosecurity, and cleaning and disinfecting practices. History of testing for avian influenza from March 2004 through March 2005 was obtained for each market.

Testing for avian influenza virus was performed more frequently in markets in the North region compared to the South. Markets in the North region had at least one positive test for LPAIV H5/H7 on 14.6% of testing occasions and there were no positive tests in the South region during the study period. Factors associated with repeated positive tests in the North region included frequency of cleaning and disinfecting, trash disposal of dead birds and offal, and being open seven days per week. Presence of rabbits was statistically associated with repeated presence of LPAIV H5/H7, but may be a proxy for other factors such as multiple sources of birds. The role of multiple sources of birds, as well as the role of suppliers and dealers needs further evaluation.

Reports from the Poultry 2004 study can be found at the USDA-APHIS-VS-CEAH web site: www.aphis.usda.gov/vs/ceah/ncahs.