

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

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The Committee met on November 7 and 8, 2005 from 12:30 pm-5:30 pm each day at the Hershey Lodge and Convention Center, Hershey, Pennsylvania. There were 66 Committee members and 95 guests in attendance for a total of 161. Chair John A. Smith presided, assisted by Vice-Chair Willie M. Reed. The Chair welcomed the Committee, reviewed the Committees' mission statements, summarized the 2004 meeting, and reported on the responses to the 2004 Resolutions and Recommendations.

Significant events during and following the 2004 meeting in Greensboro, NC included the following. Dr. Ernie Zirkle of New Jersey delivered the report of the 2003-2004 ad hoc subcommittee on Prevention and Control of Avian Influenza (AI) in the Live Bird Marketing System (LBMS) at the 2004 meeting. Dr. Lynne Siegfried et al of USDA APHIS VS presented the Uniform Standards for the cooperative state-federal-industry LBMS AI control program that resulted from this subcommittee's efforts later in the 2004 meeting. An update on the progress of this program was given at the 2005 meeting and is included in these Proceedings. Dr. Lee Myers of the Georgia Department of Agriculture presented the report of the 2003-2004 ad hoc Exotic Newcastle Disease (END) Task Force, expressing disappointment in the response of USDA APHIS VS to this Task Force. A two-part recommendation resulted from this discussion at the 2004 meeting. First, the Committee requested that the Deputy Administrator of USDA APHIS VS designate a member of the Animal Health Programs and Policy staff to establish a process to exchange information and work cooperatively on poultry health issues throughout the year with the Committee. Second, the Committee requested that USDA APHIS VS prepare a final report on the expenditures, milestones, and performance outcomes (including numbers of birds tested) from the \$9.4 million Commodity Credit Corporation (CCC) funds allocated for an END National Surveillance Program and share this with the Committee. Dr. Fidelis Hegngi of USDA APHIS VS has been appointed as liaison with the Committee on END issues, a report on the expenditures from the CCC funds was provided and distributed at the 2005 meeting, and Dr. Hegngi and Ms. Madeline Fletcher of USDA provided a further update on the program at the 2005 meeting. Copies of both reports are included in these proceedings.

Other significant events during and following the 2004 meeting in Greensboro, NC included the reactivation of the Subcommittee on Infectious Laryngotracheitis, chaired by Dr. Sherrill Davison of the University of

Pennsylvania, Kennett Square, PA. This subcommittee was charged with preparing a white paper on the current epidemiology of Vaccine-induced Infectious Laryngotracheitis (VLT) and proposing updated control measures based on new science and recent experiences. The resulting white paper and suggested control measures were presented at the 2005 meeting and are included in these proceedings. Dr. Lindsey Garber of USDA APHIS VS Centers for Epidemiology and Animal Health (CEAH) announced that the National Animal Health Monitoring System (NAHMS) Poultry 2004 study would focus on non-commercial poultry practices, as recommended in 2003 by this Committee. Dr. Garber gave a report on the study at the 2005 meeting, and that report is included in these Proceedings. Dr. Donna M. Gatewood of USDA APHIS VS Center for Veterinary Biologics (CVB) reported in 2004 that the COFAL test for Avian Leukosis Virus in vaccines had been replaced by the more sensitive p27 ELISA test, as recommended by this Committee in 2003. A symposium on AI was held at the 2004 meeting, covering outbreaks of H7N2 AI in Connecticut layers, H6N2 in California, H7N2 on the Delmarva Peninsula, H5N2 and H7N3 in Texas, and H7N3 in British Columbia during the preceding year. There have been few outbreaks of significance in the United States in the past year, and attention has shifted to the international situation and the occurrence of AI in humans. Several updates on the current situation were presented and discussed at the 2005 meeting and those reports are included in these Proceedings. The one Resolution from 2004 was joint Resolution 5 and 32 with the Committee on Salmonella, which was passed by USAHA. A generally favorable response from USDA FSIS and DHHS FDA was received and copies were provided to the Committee.

After this review of the events of the preceding year, the Committee received and discussed the following reports.

Report of the Subcommittee on Vaccine-Induced Infectious Laryngotracheitis (VLT)

Dr. Sherrill Davison of the University of Pennsylvania presented the following white paper on VLT and the accompanying suggested VLT control program and recommendations.

Vaccinal Laryngotracheitis – Overview in the United States

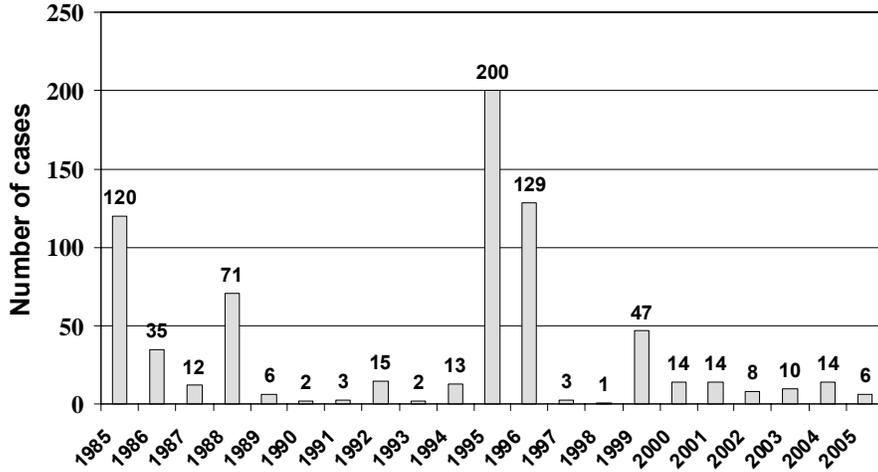
ILT Subcommittee Members/Contributing Authors: Sherrill Davison, Louise Dufour-Zavala, Maricarmen Garcia, Hashim Ghori, Frederic Hoerr, Brett Hopkins, John Smith, and Donald Waldrip

Other Contributing Authors: Bruce Charlton, Richard Dutton, Spangler Klopp and Marcelo Lang

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 (Figure 1).

Figure 1. VLT through the years – characteristic yearly pattern



Historical Perspective by Region of the Country
Southeastern Region

In one state, VLT caused serious problems from 1978 through 1980. From 1980 until 1998, there were many years of no cases of VLT, with eight cases maximum occurring in any one year. An ongoing serious problem of VLT began in 1998 that has continued through 2005. In 1998, intensive investigation of backyard poultry near the index VLT case in broilers failed to identify a source of infection. It was concluded that the onset coincided with a shortage of tissue culture-origin (TCO) laryngotracheitis (LT) vaccine used for eyedrop administration to broiler breeder pullets. Instead, chicken embryo-origin (CEO) vaccine was used in the breeder pullets, likely creating a reservoir of virus to infect broilers. All randomly selected LT virus isolates tested had a DNA pattern matching CEO vaccine strains.

In another state in the region, a severe VLT outbreak occurred from 1994-1996. The total number of broiler cases was over 300 and covered most of the state. ILT vaccine associated outbreaks continue to be reported in broilers in this state. Isolates have been analyzed by sequence analysis and have been determined to be CEO-like.

Northeastern Region

In the mid 1980s, the poultry industry in one state in the Northeast began experiencing an increase in the number of VLT cases. In 1984-1985, there were 38 confirmed cases (flocks) affecting approximately 1.8 million chickens. In the following year, 1986, only five cases were reported. Between 1988 and 1990, there were over 90 cases of ILT in the state. Since that time the number of outbreaks has been sporadic and over the last few years no VLT cases have occurred. The outbreaks are related to a mixed population of chickens (layers, breeders, and broilers) and the use of CEO vaccine in layers and breeders.

In another northeastern state, VLT outbreaks occurred in broilers in the late 1980s and mid 1990s. These outbreaks were related to residual CEO vaccine in backyard flocks.

Midwest Region

VLT caused problems in layers and pullets in the late 80s and early 90s and was suggested to be related to the route of administration of the CEO vaccine. Flocks that experienced VLT problems were using the CEO vaccine in the water once during the pullet rearing stage. Current vaccination programs include eyedrop administration of TCO or CEO vaccine at about 9 weeks and spray administration of CEO at 12 to 14 weeks. Some recombinant fowlpox-vectored ILT (FP-LT) vaccine is being used. VLT has not been seen on any complexes since the institution of CEO vaccine at 9 weeks and spray at 12 weeks.

Western Region

For the 11 years between 1995 and 2005 the majority of the VLT cases occurred in the late 1990s. Back yard flocks accounted for 11.7% of VLT diagnosed and commercial poultry accounted for 88.3 %. On average there were 2 cases/year in broilers and 11 cases/year in layers. All cases were epidemiologically related to the use of vaccines (either broilers being in close physical proximity to layers or layers experiencing problems 2 to 3 weeks post vaccination).

Seasonality and Population Distribution

Since the development of intensive broiler production in the latter half of the 20th century, VLT in broilers has tended to occur on an approximate 7 to 8 year cycle. Epornitics have typically lasted one or occasionally two years, with a summer hiatus in multiple-year outbreaks. Seasonal incidence varies between states and varies between outbreaks. In some years and in some regions of the country, cases occur throughout the year, while in other areas of the country outbreaks occur primarily during the fall, winter, and early spring. Problems generally begin in October or November of each year and reach a peak in March or April, depending on the timing and extent of the control responses such as vaccination program implementation. Persistence of cases into the summer months and after cessation of broiler vaccination schemes also seems to be an emerging problem (Figure 2).

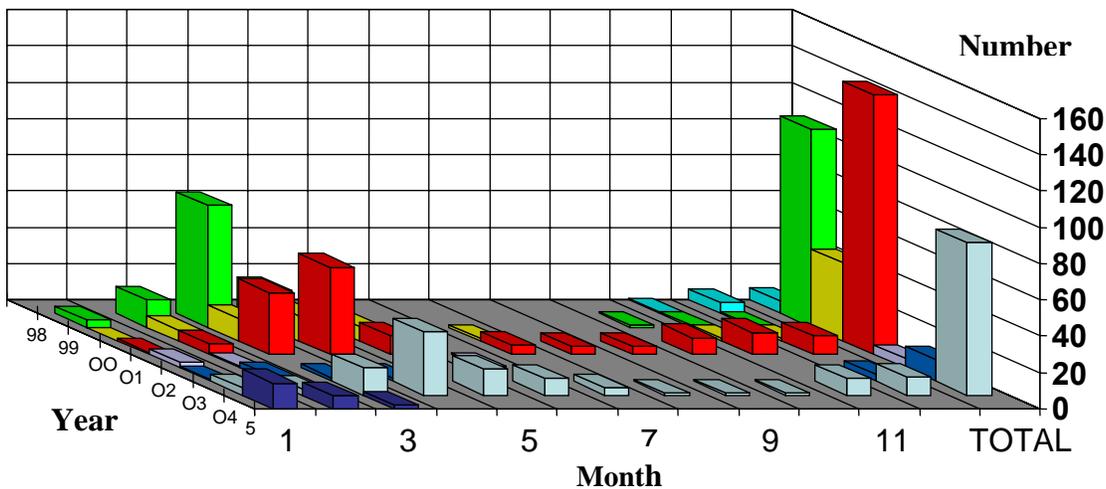


Figure 2. Characteristic annual distribution of cases

Usually one production area has been involved; however the distribution of cases throughout different geographical areas of a state also seems to be increasing. The following are examples in one state, but similar scenarios have been reported in other states. The 1994-95 and 1995-96 epornitics began in an intensive production area in the southeast of one state and spread locally from there. In a separate outbreak, the affected flocks were generally located along live-haul routes to processing plants. This was due to many flocks breaking just a few days prior to processing. Moving birds to processing during clinical disease creates a biosecurity hazard because infected chickens that are actively shedding virus are transported to the processing plant with feathers and mucus discharges being disseminated from the live-haul trucks while passing by poultry farms. This epornitic eventually involved an area of roughly 48 x 96 km (30 x 60 miles) or 4680 km² (1800 square miles). Another epornitic had 3 separate foci with no epidemiological link.

VLT has occurred primarily in areas that are densely populated with broilers, broiler breeders, layer breeders and commercial layers. The majority of flocks that have been affected were unvaccinated broilers; however, pullets, layers, breeders, roasters and backyard flocks were also diagnosed with VLT. In one state, no cases occurred in broiler breeders vaccinated with tissue culture LT vaccine administered by eyedrop and no cases occurred in layer breeders vaccinated by eyedrop using either vaccine. One case occurred in a peafowl. In another state, historically, broiler breeders and layer breeders have been vaccinated twice by eyedrop (8 and 15 weeks) and have not had clinical VLT even though surrounding flocks were experiencing clinical disease. The mixed population of birds with the long-lived birds being vaccinated with CEO vaccine appears to be a factor related to VLT outbreaks.

Clinical Presentation

Historically, chickens less than four weeks of age do not contract ILT. One broiler flock and one pullet flock were confirmed with VLT at three weeks of age. More characteristically, broilers broke between four and eight weeks of age (about 80 percent of the broiler flocks that develop LT are 40 days of age or older), pullets between seven and fifteen weeks of age and layers throughout the lay cycle. Several flocks were confirmed with VLT after molting.

Clinically, most flocks have exhibited severe respiratory disease including difficulty in breathing and expectoration of blood from the trachea. Other flocks had only a mild respiratory disease characterized chiefly by conjunctivitis (Linares, *et al.*, 1994). Mortality has varied greatly between flocks (mortality range: broiler flocks, 0.7%-50%; pullet flocks, 1.3-16%; layer flocks, normal to 12%). Daily mortality in pullet and layer flocks has not followed a pattern, but in unvaccinated broiler flocks mortality characteristically has doubled each day (e.g. 50, 100, 200, 400 birds). More severe cases have reached daily mortality of 200 birds per flock and either have decreased or the birds have been transported to processing. In some layer flocks there may have been no change in egg production, while in other cases there may be a decrease in production of 5-15 % with no change in egg shell quality (Davison, *et al.*, 1988).

Postmortem Findings

The most common postmortem lesions were hemorrhage and caseous material in the trachea; however, some broilers did not show the classical form of the disease. In these flocks, conjunctivitis and slight mucous in the trachea were the only lesions. Secondary bacterial infections were rarely seen in conjunction with ILT infection in birds breaking with VLT near processing age. This is supported by the fact that affected broiler flocks had no higher condemnation rates due to septicemia/toxemia than normal (Davison, *et al.*, 1988). In other broiler flocks that broke with VLT at 3 to 4 weeks of age and stayed in the field for an additional 3 to 4 weeks prior to processing, severe *E. coli* airsacculitis has been seen. Concurrent viral infections (infectious bronchitis or paramyxovirus infection) are also uncommon (Davison, *et al.*, 1988).

Poultry Laboratory Survey on ILT Diagnostics

Eight state poultry laboratories were contacted and given a list of questions related to their individual practices in the diagnosis of VLT. Six of the eight laboratories responded. All six laboratories based their VLT diagnosis on at least two tests. Table 1 summarizes the battery of tests used by the different laboratories surveyed. All laboratories performed at least one test that permitted the rapid diagnosis of VLT. In addition, other laboratories outside of this survey were also contacted. The results of this survey adequately reflect procedures used in other laboratories to diagnose VLT. Diagnostic tests were divided into three categories: rapid tests, virus isolation, and ILT isolation confirmatory tests.

Table 1. Battery of LT diagnostic tests performed in different state poultry laboratories

Laboratories	Rapid Test				Virus Isolation		Virus isolation confirmatory tests		
	DFA ^A	Histo ^B	PCR ^C	IHC ^D	CAM ^E	CE cells ^F	Histo-CAM ^G	PCR ^H	EM ^I
1	√	√	√		√	√	√	√	
2		√			√		√		
3			√		√			√	
4		√	√		√		√	√	
5		√			√	√			
6		√		√	√				√

^A Direct fluorescent antibodies (DFA) done in tracheal and eyelid smears

^B Histopathology examination of formalin-fixed paraffin embedded trachea and eyelid tissues

^C PCR performed directly on trachea and eyelid scrapings

^D Immunohistochemistry on formalin-fixed paraffin embedded trachea and eyelid tissues

^E Plaque formation on chicken embryo chorioallantoic membrane (CAM)

^F Chicken embryo kidney (CEK) or chicken liver (CLi) cell culture

^G Histopathology examination of formalin-fixed paraffin embedded CAM material

^H PCR on CAM or tissue culture material

^I Electron microscopy on inoculated tissue culture material

Rapid Diagnostic Tests

The most frequently utilized rapid test was histopathology examination of fixed tissues. Histopathology examination remains the standard method for the rapid diagnosis of ILT for primary, same-day or overnight diagnosis of VLT. Conjunctiva and trachea must both be examined, as inclusion bodies in mild or subacute cases are often found only in conjunctiva. The advantage to histopathology is that it usually provides a definitive diagnosis within 24 hours of first presentation into the laboratory system. The disadvantages are that a trained pathologist is needed to provide an accurate diagnosis, the inclusion bodies are present only at an early stage of infection, and other avian viruses produce inclusion bodies.

Virus Isolation

Virus can be isolated from field material in specific-pathogen-free (SPF) CE inoculated via the CAM route followed by the identification of plaque formation characteristic of ILT viral replication. Virus isolation is also possible in primary chicken embryo kidney (CEK), chicken embryo liver (CELi), or in chicken kidney (CK) cells. Viral isolation may take three to four passages before plaque formation or cytopathic effect caused by ILT replication appears in the CAM or primary chicken cell cultures, respectively. In addition, ILT replication in primary chicken cell cultures is easily overgrown by other viruses that will mask the cytopathic effect of ILT.

Two of the laboratories perform virus isolation by both CAM inoculation and primary chicken embryo cell culture. All laboratories performed additional tests to confirm the isolation of ILT on the chicken embryo CAM or in tissue culture. Confirmatory tests included histopathology examination or PCR on the CAM material, and electron microscopy examination on tissue culture material. Virus isolation does give a definitive diagnosis but there is a long turn-around time, lack of sensitivity, a requirement for SPF eggs, and confirmatory tests to validate the isolation.

Diagnostic results obtained for VLT cases submitted during one or two years are shown in Table 2. For laboratories 1 and 5, histopathology examination of tissues was significantly more effective than virus isolation in the diagnosis of ILT, while for laboratories 2 and 4, diagnosis of ILT by histopathology examination and virus isolation correlated perfectly.

Table 2. Comparison of LT diagnosis in surveyed poultry diagnostic laboratories

Laboratories	Histo ^A	Virus isolation ^B	PCR ^C	DFA ^D	IHC ^F
1	18/18 ^E (100%)	9/15 (60%)	13/13 (100%)	17/18 (94%)	-
2	38/80 (48%)	38/80 (48%)	-	-	-
3	- ^G	11/20 (55%)	12/36 (33%)	-	-
4	2/2 (100%)	2/2 (100%)	2/2 (100%)	-	-
5	29/29 (100%)	7/29 (24%)	-	-	-
6	19/20 (95%)	1/2 (50%)	-	-	12/12 (100%)

^A Histopathology examination of formalin-fixed paraffin embedded trachea and eyelid tissues

^B Virus isolation in CAM

^C PCR performed directly on tracheal scrapings

^D Direct fluorescent antibodies in trachea and eyelid smears

^E # of positive samples/total number of samples tested

^F Immunohistochemistry on formalin-fixed paraffin embedded tissues

^G Test not performed in that particular laboratory

Immunoprobes to detect viral antigens are also used for rapid identification of VLT. Fluorescent-labeled polyclonal antibodies (FA) are commonly used as immunoprobes to detect viral antigens in tracheal and conjunctival smears (Braune and Gentry, 1965; Wilks *et al.*, 1979; Ide, 1978; Goodwin *et al.*, 1991). The direct fluorescent-labeled antibody test is specific and has a fast turn-around time, but the availability of stable, good fluorescent antibody conjugate, the need for a microscope and the capacity to read fluorescent-labeled slides are disadvantages. Immunoperoxidase-labeled monoclonal antibodies have been used to detect viral antigens from frozen tissue sections and from fixed tissues (Guy *et al.*, 1992; Sellers *et al.*, 2004). Monoclonal antibodies have also been used to detect viral antigens in suspensions of tracheal scrapings by enzyme-linked immunoabsorbent assay (ELISA) (York and Fahey, 1988). Single PCR amplification procedures have been used successfully to detect ILT DNA from tracheas of experimentally and naturally infected chickens (Abbas, *et al.*, 1996; Alexander and Nagy, 1998; Williams *et al.*, 1994) and from extra-tracheal sites such as the conjunctiva and trigeminal ganglia (Williams *et al.*, 1992, Alexander and Nagy 1997). Nested PCR amplification procedures have also been

developed to increase the sensitivity of detection of viral nucleic acid from formalin-fixed, paraffin embedded tissues (Humberd *et al.*, 2002) and from trigeminal ganglia of vaccinated birds (Han and Kim, 2003).

One laboratory performed DFA on trachea and eyelid smears. DFA results reported by this laboratory indicated that 17 of 18 (94%) samples were positive and the results obtained by DFA correlated satisfactorily with histopathology examination of tissues (Table 2). IHC on formalin-fixed paraffin embedded tissues showed good correlation with histopathology examination in laboratory 6. Efficiency of PCR ranged from 33 to 100%. A direct comparison between "PCR and virus isolation" and "PCR and histopathology examination" was not possible because not all the samples were tested by PCR. However, PCR results from laboratory 1 indicated that 12 samples were positive by PCR, by histopathology and by DFA.

In general, two laboratories concluded that in their hands virus isolation produces a significant number of false positives. Four of the five laboratories that utilize histopathological examination of tissues agree that this procedure is a reliable rapid way to diagnose ILT and that PCR is mostly used as a confirmatory test.

Serology is not a primary diagnostic tool for LT. Immunity to LT viral infection is primarily cellular rather than humoral (Jordan, 1981, Robertson, 1977). Birds were bursectomized surgically at one day of age, subsequently treated with cyclophosphamide, and then vaccinated for ILT. Birds challenged with ILT virus did not produce antibody but were immune (Robertson, 1977).

Some authors suggest that the ELISA is a rapid and accurate test to determine the immune status of a vaccinated or infected flock (York *et al.*, 1983). A commercially available ELISA was tested as a potential screening test for antibody to LT viral infection. Since humoral antibody production is not the primary immunological response to infection, the authors suggest that serological monitoring will not differentiate infected, asymptomatic or uninfected flocks (Leong, *et al.*, 1994).

Control and Prevention

Control and prevention is through vaccination with recombinant fowl pox-vectored ILT vaccine (FP-LT), CEO, or 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 eyedrop method. The TCO vaccine is labeled for eyedrop 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 (Appendix). 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.

Vaccination programs vary widely between states and between different companies within a state. Commercial layers and layer breeders are usually vaccinated twice with modified live vaccines. Birds at eight weeks of age are vaccinated using the recommended eyedrop procedure, but subsequent vaccinations usually involve spray or water administration. Some producers have switched from spray vaccination to water vaccination at 16 weeks of age because several pullet flocks have had severe reactions including mortality following spray vaccination. This change in the route of administration to water was also in response to producers' concerns that spray vaccination had a higher potential of spread to neighboring flocks. Broiler breeders may be handled as described for layer breeders, but often are vaccinated only once, usually by eyedrop at 10-12 weeks of age.

Broilers are usually not vaccinated unless they are in an area of an outbreak. When this occurs, they are then vaccinated between 10 - 21 days of age in the water and the vaccine may be combined with Newcastle disease virus/infectious bronchitis (NDV/IBV) vaccine. Again, there is variation related to the timing of the vaccination in broilers depending on the company. In general, most agree that vaccine reactions are reduced when administered at this age and increase, as the birds get older. Vaccination past 3 weeks of age is typically avoided due to the increase in associated reactions. Vaccination with modified live virus ILT vaccines prior to 10 days of age is generally held to be relatively ineffective.

Vaccination may also be used in the face of an outbreak in commercial pullets, layers and breeders. Both water and spray vaccinations have been used with success in reducing the spread of the disease within a flock of

pullets, layers, and breeders. To obtain the best result as soon as the diagnosis of VLT is determined in a pullet, layer, or breeder flock, vaccine should be administered immediately. Vaccination of broiler flocks in the face of an outbreak has mixed results. The vaccination, in some situations, increased rather than decreased the mortality.

The variety of ILT vaccination programs in different classes of birds is listed below.

I. Commercial layer pullets

- A. CEO - by eyedrop, spray or drinking water at 6-8 wks of age initially
 - 1. 2-3 x per flock depending on degree of challenge
 - 2. During an ILT break by water usually at 1x or 2x dosage, possibly by spray
- B. TCO - by eyedrop at 6-10 weeks of age, rarely used alone except in very low challenge areas
- C. Recombinant alone at 8 weeks by wing web stab
- D. Recombinant has been used Sub Q at hatchery; currently not approved
- E. Recombinant by wing web stab plus ½ dose CEO spray same week in high challenge areas with common CEO usage by neighboring farms and companies

II. Broiler Breeders

- A. Recombinant at 8 weeks by wing web stab
- B. Recombinant + TCO by eyedrop
- C. Recombinant has been used subcutaneously at hatchery; currently not approved
- D. TCO by eyedrop at 8-12 weeks of age (most common)
- E. CEO rarely used and avoided due to the risk of spreading of ILTV to adjacent farms

III. Broilers

- A. CEO by water or spray at 10-21 days of age only during regional ILT breaks
- B. Recombinant has been safely used in-ovo and subcutaneously at hatchery; currently not approved

Vaccination failure as a cause of an epornitic has been documented in two situations. The failure was related to a change in the manufacturing of the vaccine resulting in a reduced titer of the vaccine. It is extremely important that high titer vaccine be administered especially if the vaccine is applied by spray or water. These routes allow for more potential error in adequately vaccinating each bird.

Source of Epornitics

VLT is caused by an alphaherpesvirus and carriers are produced by either previous exposure to field virus or vaccine virus (Bagust *et al.* 1986, Bagust *et al.*, 1986, Hughes *et al.*, 1987, Hughes *et al.*, 1991, Williams, *et al.*, 1992). The main sites of latency for ILT virus have been shown to be the trigeminal ganglion (Bagust *et al.*, 1986, Williams, *et al.*, 1992) and the trachea (Bagust *et al.*, 1986, Hughes *et al.*, 1987, Hughes *et al.*, 1991). Reactivation of latent virus has been suggested as the cause for clinical disease in some flocks (Hughes, *et al.*, 1991). In layers, reactivation of the CEO vaccine is considered the primary cause for VLT.

Research has also shown that through backpassage the chicken embryo-origin vaccine virus, but not the tissue culture-origin vaccine virus, may revert to the more pathogenic parent strain. A modified-live CEO product was passaged 20 times in specific-pathogen-free chickens. After 10 chicken passages, there was an increase in virulence consisting of an increase in mortality and an increase in the severity and duration of the disease (Guy *et al.*, 1991).

Transmission between flocks has primarily been associated with their geographical proximity to an infected flock and a breakdown in biosecurity. Movement of personnel, improper dead bird and manure disposal and exchanging of farm equipment have all been associated with LT outbreaks (Davison, *et al.*, 1988). Some cases emerge far away from endemic regions and the cause cannot readily be identified. Direct or indirect contact with backyard fowl has not been a common risk factor. Game fowl breeders are advised to vaccinate with TCO LT vaccine. Ideally, live-haul trucks carrying flocks with active disease are taken to the processing plant by a route that minimally exposes other flocks.

Communication/Control Measures

Control measures for ILT are based on vaccination and biosecurity, but more importantly, on good communication with essential poultry industry personnel. All the states that have experienced outbreaks of VLT have a committee in place to make rapid decisions on measures to be taken to contain the outbreak. The composition of the committees varies between states but in general, industry, laboratory, university, and state

government personnel are members. This committee is essential for the proper communication of the location of ILT flocks, their proximity to other poultry, and vaccination strategies. In general, the committees are convened when 2-3 cases of VLT are reported in a locale. It is essential that control measures be implemented immediately and aggressively. Final decisions on LT control measures need to be made and adhered to by all involved industry members. In general, if all adhere to the agreed plan of control, the number of cases is minimized.

This committee's control over cleaning out and the movement of contaminated litter is critical to VLT control. This is no easy task, as many outbreaks now start in the springtime and growers want to clean out. The process of getting all birds vaccinated and the process of stopping vaccination are delicate because neighboring farm activities and vaccination dates need to be coordinated.

The committee decides on the appropriate size zone around the index case. The initial zone should include a wide enough area to control the disease, yet not be so large that control measures will become difficult. The area of the initial zone will vary between the states and the area within a state affected. Progressively enlarging zones of vaccination have occurred in some outbreaks. The vulnerable point was the 21-day vaccination age limit in broilers (28 days of age maximum in high-risk situations), which allowed older flocks to break in vaccination zones and perpetuate the supply of virus. Cases continually jumped past vaccination zone borders. In the epornitics that were severe, there was reluctance to vaccinate broilers and compliance with control programs was incomplete. Nevertheless, resistance to ILT vaccination of broilers will likely continue due to the penalties associated with the use of live CEO ILTV vaccines in intensively reared broilers. These vaccines frequently produce harsh reactions and decrease performance, while increasing condemnations due to airsacculitis. Early in an epornitic, broiler managers are faced with a choice between risking a few cases of potentially severe ILT, as opposed to ensuring that many flocks will experience moderate disease due to vaccine usage. It is also difficult to successfully vaccinate a rapidly growing, intensively reared bird for ILT, NDV, and two serotypes of IBV within a short 6 to 8 week lifespan. In particular, many producers have noted that vaccines for the Arkansas serotype of IBV are difficult to use with ILTV vaccine. Removing the Arkansas vaccine from the program to accommodate the ILTV vaccine jeopardizes the IBV program. Special cases happen often. An example would be that some farms within a zone might be exempted from vaccination for different reasons.

The first measures to be taken within a zone are biosecurity-related and usually include increased downtime for all farms within the zone (2-3 weeks), discontinuation of cleanout and manure spreading within the zone, and elimination of all unnecessary visits from people. In addition, birds over 14 days of age would not be serviced on the farm, but personnel would conduct service by telephone interview. Personnel from utility companies, equipment repair companies, and growers outside the zone are made aware of the situation so they can also increase their biosecurity measures. Control procedures have emphasized biosecurity and identification of risk factors. Breaks in biosecurity can be identified for most infected flocks. Some broiler cases occur near commercial layer flocks. If not directly adjacent to a commercial layer flock, there are often family connections between caretakers of flocks. Farm visitors or workers that have direct or indirect association with other infected flocks are the most common breach of biosecurity.

In the initial stages of an outbreak when vaccination is not being considered, the affected flock is removed and the house is immediately heated up to 100 degrees F for 100 hours. It is suggested that the house be kept empty for a minimum of 2-3 weeks. Heating houses can prove difficult to enforce because of the expense due to high fuel prices. Litter is kept in the house and conditioned, composted in the house, or deep stacked outside, but nearby the house. Litter is not spread on fields until it has been composted or deep stacked for four weeks or more to inactivate LT virus. In some states, the litter may not be removed from the house and no outside composting or cake out is done. Clean out of the house can occur only after a subsequent unvaccinated flock has been grown on the premise with no evidence of VLT signs. In other states, clean out with a complete wash down and disinfection is done. The litter may be spread if it is immediately plowed under or may be composted in an area away from the poultry house. It has been advised, in some situations, that the next flock be vaccinated.

These initial control measures have been successful in many situations in stopping the outbreak. If additional cases occur, especially if unexpected epidemiologically, a decision is made on vaccination within the original zone or an expanded zone. After all birds are vaccinated within the vaccination zone, clean out of the houses is allowed again, but litter may only be spread within the vaccination zone. If litter has to be taken outside the zone, it is composted either inside the house or under plastic outside the house for three to four weeks before movement. Litter must be completely covered when transported. Sharing of litter equipment should be limited to only within the vaccinated zone.

Vaccination is usually stopped after 2 cycles although the time of year, number of cases, and time since the last case are all part of the consideration to stop vaccination. One month after the last case, in many situations, appears to be adequate. Some states stop clean out again for the immediate period when birds become susceptible again. When vaccination stops within a zone, there is no removal of litter from the houses until every farm in the zone has grown a complete flock with no vaccination and no VLT signs, unless the litter is heat treated (100 hours, 100 degrees) or composted (under plastic, for 21 days). If no cases are diagnosed during this period (typically 12-14 weeks after the stop vaccination date), the outbreak is declared over and litter spreading can resume. Other states do not have restrictions for clean out.

Field results are now available with the FP-LT recombinant vaccine as the sole ILT vaccine for breeders under conditions of severe challenge. During an extensive outbreak of VLT in broilers in one state, 17 broiler breeder flocks (involving all ages of birds in production in the affected area) that had been vaccinated with FP-LT developed VLT. These cases in broiler breeders vaccinated with FP-LT vaccine were characterized by low morbidity and mortality, typically 200 birds or less. This pattern suggests that these birds were missed in the immunization process. The resulting problem, however, is that each infected flock then has virus-infected chickens that maintain a reservoir of the challenge virus.

In one state, a commercially available live FP-LT vectored vaccine was used in field trials in leghorn pullet flocks and evaluated by tracheal challenge in a laboratory setting using the National Veterinary Services Laboratory ILT challenge virus. To successfully control outbreaks of fowl pox in certain geographic areas, pigeon pox vaccine is given simultaneously with fowl pox vaccine. Interference of the pigeon pox with the FP-LT + AE vaccine was also evaluated (Davison – submitted for publication).

Overall, the results indicate that the FP-LT + AE vaccine provides adequate protection against ILT viral challenge. Proper administration is essential. In one flock, inadequate protection was most likely due to poor vaccine administration. In addition, the simultaneous administration of pigeon pox vaccine did not appear to interfere with protection against ILT viral challenge.

Geographical Information System Technology

Rapid responses to VLT outbreaks have been improved by the use of Geographical Information System (GIS) technology. A computer record of the location of poultry flocks, flock characteristics, and the location of support industry, such as feed mills, processing plants, rendering plants, and hatcheries is essential in control efforts during a disease outbreak. Buffer zones around infected flocks for vaccination are easily created using the current computer technology. Live-haul routes may be mapped to reduce the spread of the disease to susceptible flocks. More informed policy decisions about control and the implementation of particular control measures were enhanced by the use of this system.

ILT Molecular Epidemiology

The first attempt to genotype ILT strains in the U.S. was through the use of restriction fragment length polymorphism (RFLP) analysis of the viral genome (Andreasen *et al.*, 1990, Guy *et al.*, 1989, Keeler *et al.*, 1993, Keller *et al.*, 1992). Outbreak-related isolates from several states were analyzed by RFLP and most of the isolates were either identical or showed only minor DNA pattern differences to the vaccine strains, suggesting that vaccine strains circulating in the field were the cause of ILT outbreaks. The continuing use of RFLP as a genotyping technique was limited due to the difficulty in propagating virus to high enough titers to obtain sufficient pure viral DNA to perform the assay. With the advent of the PCR amplification of specific viral genes followed by nucleotide sequencing, RFLP analysis of the amplification product has been used more frequently to differentiate among ILT strains. A main advantage of PCR-based genotyping techniques is that isolation of pure viral DNA is not required and low amounts of non-pure viral DNA are sufficient to perform the assay.

Several PCR-RFLP assays have been designed to differentiate vaccines from ILT field isolates from Australia, Canada, Taiwan, Korea, and Ireland (Trist *et al.*, 1996; Clavijo and Nagy, 1997; Chang *et al.*, 1997; Han and Kim, 2001; Graham *et al.*, 2000). In particular, PCR-RFLP assay of the ICP4 gene was able to discriminate between vaccine and field isolates from Taiwan (Chang *et al.*, 1997) and Northern Ireland (Graham *et al.*, 2000). In both reports, viruses obtained prior to the introduction of ILTV vaccine were identified as non-vaccine virus, while only vaccine viruses were identified after the implementation of ILT vaccination in the region.

A PCR-RFLP assay for the viral glycoprotein E (gE) gene allowing differentiation of CEO vaccine viral subpopulations and CEO-like outbreak-related isolates in the US (García and Riblet 2001) has aided the understanding of the epidemiology of the disease. Polymorphism of the gE gene was observed with enzymes

EaeI and *DdeI* among vaccine strains. Restriction enzyme *EaeI* easily differentiates the TCO vaccine from CEO vaccines (Table 3). Three RFLP patterns were observed with enzyme *DdeI*. Patterns A and B were characterized as single patterns, while pattern C was characterized as a mixture of patterns A and B, suggesting that a mixed population of viruses are present in pattern C vaccines. Pattern A was observed for the TCO vaccine and one CEO vaccine, while pattern C was observed for five of the six CEO vaccines analyzed.

Table 3. RFLP Analysis ILTV Vaccine Strains

	<i>EaeI</i> Patterns		<i>DdeI</i> Patterns		
	TCO	CEO	A	B	C
CEO-1		X			X
CEO-2		X			X
CEO-3		X			X
CEO-4		X			X
CEO-5		X			X
CEO-6		X	X		
TCO	X		X		

A total of 42 tracheal samples from outbreak-related broiler and layer flocks were collected during 1998 and 1999 from the Mid-Atlantic, Southwest, North Central, and Southeast regions. Out of 17 samples from vaccinated flocks, two were from flocks vaccinated with TCO and 15 were from flocks vaccinated with CEO. As expected, *EaeI* RFLP patterns correlated with the vaccine administered to each flock. RFLP analysis with enzyme *EaeI* on samples from non-vaccinated flocks indicated that 100% of the outbreak-related isolates were CEO-like viruses. Further RFLP analysis of viral samples from non-vaccinated flocks with *DdeI* indicated that 68% of the samples had RFLP pattern A, 28% pattern B, and 4% had the mixed-pattern C typical of most CEO vaccines (Table 4).

Table 4. RFLP Analysis gE-*EaeI*/*DdeI* on clinical samples from nonvaccinated flocks

Regions	<i>EaeI</i> patterns		<i>DdeI</i> patterns		
	TCO	CEO	A	B	C
SE	0/2	2/2	0/2	2/2	0/2
MA	0/20	20/20	14/20	5/20	1/20
SW	0/3	3/3	3/3	0/3	0/3
Total	0/25	25/25	17/25	7/25	1/25
%	0	100%	68%	28%	4%

The epidemiological data generated during this study showed that 96% of the CEO-like isolates obtained from non-vaccinated flocks possess single patterns A (68%) or B (28%) with *DdeI* enzyme. These findings suggest that recent ILT outbreaks originated from vaccine-derived viral sub-populations circulating in the field. Identification of molecularly different populations of viruses within the currently used ILT vaccine is the first step towards developing better molecular epidemiological tools to track vaccine isolates and to precisely identify the source of poorly attenuated strains in the field. In another study, fifty-six LT field viruses tested from 1998 through 2005, representing broilers and broiler breeders, had a DNA RFLP pattern identical to CEO vaccine strain subgroup A (Table 5).

Table 5. RFLP analysis summary of 56 ILT isolates from broilers and broiler breeders 1998 - 2005

Year	# Tested	# CEO / A	%
1998	1	1	100
1999	2	2	100

2000	0	n/a	n/a
2001	8	8	100
2002	1	1	100
2003	0	n/a	n/a
2004	31	31	100
2005	13	13	100
Total	56	56	100

This trend continues through 2005. Wild-type LT viruses have not been identified in either commercial or noncommercial poultry during this time.

To further differentiate among US ILT isolates, nucleotide sequencing of multiple genes has been performed. The multiple-gene-sequence-typing approach has been used to characterize 27 ILT isolates collected between 1991 to 2005 from broilers, layers, broiler breeders, and backyard flocks. Sequence analysis of multiple genes allows the differentiation of US ILT isolates into three main groups: CEO-like (23 isolates), TCO-like (1 isolate), and field or backyard flock isolates (3 isolates). Based on multiple gene sequencing, all US commercial poultry isolates were identified as vaccine-related strains.

Silent LT

During the winter of 2001-spring 2002, evidence was gathered that a mild to moderate VLT virus infection was circulating in broiler flocks in the southeast U.S (Sellers et al., 2003). Clinical signs observed in suspect infected birds were characterized by mild tracheitis, swollen sinuses and conjunctivitis with no mortality and minimal serological response. Infrequent intranuclear inclusion bodies with or without syncytial cell formation were observed in infected tissues and in the chorioallantoic membrane of infected embryos. A nested ILT PCR (Humberd et al., 2002) and immunohistochemistry (IHC) (Guy et al., 1992) were utilized to confirm the presence of VLT in fixed tissues and CAMs. Attempts to propagate the virus in CEK and Celi cells were not successful and only limited viral propagation was possible in CAM. Two-week-old SPF birds inoculated with field material exhibited the mild signs observed in broilers in the field. Tracheal swabs and tissues taken from the SPF birds were also positive by nested ILT PCR. After 2002, this mild form of ILTV disappeared from the field in the state in which it was originally detected. Although the viral DNA amplified from clinical samples appeared related to CEO vaccine, we were not able to determine the exact origin and to propagate the virus in vitro.

Suggestions

Over the years, our knowledge base concerning the diagnosis, epidemiology, control and prevention of VLT has increased tremendously. The more recently available molecular diagnostic tools have shown that the isolates from outbreaks in various regions of the county are almost universally related to the CEO vaccine. Given the newer molecular techniques and molecular-based vaccines, the reduction of VLT is achievable. A Model State Program has been developed based on information assembled from various states and presented in this paper. In considering a Model State Program for the control of VLT, the variation in the composition of the poultry population must be considered. This is not a variable that can be changed; but other areas that can be controlled and changed are CEO vaccine usage, diagnostic testing, and various aspects of the control program including litter management and the use of GIS technology. The following is a compilation of comments from scientists who have worked directly with VLT outbreaks and have developed the newer molecular diagnostic tests.

Vaccination

The results of PCR testing are a powerful statement for the infection of unvaccinated broilers with CEO-like isolates and strongly suggest that use of CEO vaccine should be reduced or eliminated. However, diverse and strongly held opinions persist about ILT vaccination. Several such opinions are stated below as illustrations.

One major question remains to be answered: What is the original source of the epornitics? Molecular epidemiology using current tools seems to indicate that most "wild" ILT viruses from field cases are similar to vaccine strains. Use of CEO ILTV vaccines in classes of poultry other than broilers (such as heavy breeders and commercial leghorns) is common and is one potential culprit. The long hiatuses between outbreaks prior to 1994, in the face of ongoing use of CEO ILTV vaccine in other classes of birds, are certainly mysterious, and may cast doubt on this theory. The reasons for the increasing frequency of ILT in broilers in recent years are easier to speculate upon. Such reasons may include increasingly dense poultry populations, mixing of different classes (breeders, leghorns, and broilers) in the same geographical area, rapid population turnover (due to rapid growth rates and short down times), and lax biosecurity. The obvious alternative of ceasing vaccination of long-lived birds with CEO ILTV vaccines is not likely to be popular, because the risk of ILT in such flocks is not acceptable. This is especially true when one considers that the consequence of CEO ILTV vaccine use in these birds does not appear to be nearly as injurious as it is in broilers. The tissue culture-origin ILTV vaccine is safer, but the supply of this vaccine is sometimes limited, and some managers feel that immunity is compromised. The FP-LT recombinant vaccine has so far not been widely embraced by managers.

Since the chicken is the only natural host for ILTV, eradication would seem to be a feasible and worthwhile goal. Development of an effective ILTV vaccine that does not shed nor revert to virulence and that is readily available would advance the possibility of eradication. If the use of CEO ILTV vaccines in long-lived classes of birds were indeed the major source of epornitics in broilers, then development of a safer vaccine for use in these long-lived birds would also lessen the urgency for eradication.

The method of vaccination in commercial layers and breeders should be considered. The manufacturers suggest eyedrop vaccination, but several CEO vaccines have label claims for water and spray administration. Over the past several years, no VLT has been present in one state and the suggestion has been made that this has been due to the method of administration. The majority of birds have been vaccinated twice by eyedrop rather than the previously used spray or water vaccination. The proponents of eyedrop vaccination also cite that, in areas with VLT, the breeder flocks vaccinated twice by eyedrop never broke with VLT.

In one area of the country, roaster flocks were successfully vaccinated with CEO vaccines by water administration (approx 10% of all birds) without any "spill over" problems into the 90% unvaccinated broilers in the same area. Thus, it is believed by some that the risk of using CEO vaccines in a concentrated broiler growing area is very low. The use of CEO vaccine in roaster flocks has created an economically divisive (and politically sensitive) situation. Producers who raise smaller birds to 40 days of age or younger prefer not to vaccinate for laryngotracheitis. Producers who raise older and larger broilers must vaccinate to protect flocks through the 45-60 day of age finishing period.

An alternative suggestion has been that an entire industry (within a state or throughout the United States) should use only TCO vaccine. This is based on the molecular epidemiological information and on the occurrence of a VLT outbreak when birds vaccinated with CEO vaccine were introduced into a state where only TCO is used. There has been considerable hesitation because of a single supplier situation and, therefore, an uncertain supply of the TCO product. Now with another alternative, the recombinant product, some are reconsidering this decision.

Vendors of over-the-counter LT vaccines should be contacted and asked to sell only TCO LT vaccine. It would be beneficial if all states would also do this, although it is recognized that vaccines can be purchased by mail order from many sources. Even with this loophole, reducing the over-the-counter sources of CEO LT vaccine is deemed worthwhile. We have done very little outreach to noncommercial poultry regarding VLT. One laboratory offers free TCO vaccination to any owner with a diagnosed case. They always accept.

The hobby/fancy/4-H flocks are required to vaccinate for LT prior to a fair or show in some states. Most will use the TCO vaccine, but the administration of the vaccine is improper and immunity to LT is minimal. For example, a 4-H club will buy one vial of TCO vaccine and reconstitute it. The vaccine vial is passed from person to person over a several day time period. Vaccine made in small dose bottles would be useful in this population of birds and would have a positive effect on the commercial industry by having the small groups of chickens that move from show to show be less of a risk.

No matter which vaccine is used, proper administration is essential. There are many examples of administration failures with all vaccines, including the vectored vaccine.

Diagnosis

The early and rapid detection of infected birds is pivotal to avoid the spread of the disease. Therefore, development of reagents, standardization of procedures, and enabling poultry laboratories to improve rapid LT diagnosis will have a great impact on the control of the disease. PCR testing should be instituted as a standard test along with histopathology and virus isolation. This is a useful tool in detecting VLT in flocks undetected by other standard testing methods.

Additional specific recommendations include:

- 1) Development and production of stable antibodies for the detection of ILTV in trachea and eyelid smears by DFA or in formalin-fixed paraffin embedded tissues by IHC procedures (preferably monoclonal antibody).
- 2) Standardization of samples used for PCR (tracheal swabs vs. tracheal scrapings), standardization of DNA extraction and PCR procedures among laboratories.

Prevention and Control

There are some reoccurring themes in control of VLT amongst states. It is essential that control measures be instituted aggressively. Litter management is an essential part of reducing spread of the disease to surrounding flocks. Vaccination in a zone surrounding an index flock must be large enough to contain the outbreak. Some company representatives attributed the fewer cases in some years to improved biosecurity. The specific biosecurity principles need to be outlined and available as a standard protocol for the industry. States that have VLT and a population distribution of mixed poultry may choose different control measures than an area of the country that has a very uniform population.

Geographical Information System Technology

The use of GIS technology is essential for the rapid response needed to control VLT. This technology is readily available and should be a tool used by the poultry industry of each state, not just for the control of VLT, but other infectious diseases as well.

Model State Program

A Model State Program is outlined in a separate document.

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Appendix

Table 6. The distribution of type of vaccine versus class of bird within one state

Class of bird	Number of Complexes	Number using TC	Number using CEO	Number using R
Broiler integrators	20	17	2	1
Commercial Layers	5		5	
Primary Breeders, Hatching Egg Producers, and Companies with only Breeders	8	5	2	1
Total	33	22	9	2

Vaccinal Laryngotracheitis (VLT) Voluntary Control Program
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This control program was developed through scientific studies and experiences of those who have controlled vaccine-related laryngotracheitis (VLT) outbreaks. The components of the program include a committee/task force, diagnostic capabilities, Geographical Information System technology, biosecurity procedures, litter management and vaccination programs. Previously developed written programs from three states were used as a basis for this document. The committee acknowledges that there currently are differences in control policies and reporting of VLT among states, between industry types (commercial layers versus broilers), and within industries including between companies. For the control and prevention of VLT to be successful the committee feels that the following guidelines should be adhered to by all industries raising chickens and that distinctions between industry segments not be allowed to influence LT control programs.

Committee/Task Force

Control measures for VLT are based on vaccination and biosecurity, but, more importantly, on good communication with essential poultry industry personnel. All the states that have experienced outbreaks of VLT have a committee in place to make rapid decisions on measures to be taken to contain the outbreak. The composition of the committees varies between states but in general, industry, laboratory, university and state government personnel are members. The purpose of the committee/task force is to develop and implement plans to prevent and stop a threat as well as control and/or eradicate poultry diseases that could result in serious economic losses to the commercial poultry and egg industries, including outbreaks of VLT. This committee is essential for the proper communication of the location of ILT flocks, their proximity to other poultry and vaccination strategies. In general, the committees are convened when 2-3 cases of VLT are reported in a locale. It is essential that control measures be implemented immediately and aggressively. Final decisions on ILT control measures need to be made and adhered to by all industry involved. If an individual chooses to do something different than what the committee has decided, more cases will occur. In general, if all adhere to the agreed plan of control, the number of cases will be minimized.

The success of an effective defensive program is dependent on efficient recognition and reporting of VLT wherever it appears. Perhaps the most critical period is during the time between when the infection makes its "silent" entry and when it becomes recognized, confirmed, and the plan implemented. A plan of action should be implemented in the event of a VLT outbreak or suspicion of an outbreak. The success of the plan of action will depend on:

1. Reaction time when VLT is first suspected
2. Readiness of personnel; phone numbers, fax numbers, e-mail addresses; procedures to follow; and supplies to go into action
3. Understanding the dynamics of the local poultry industry (i.e. hauling area, market area, etc.)

Diagnostic Capabilities

It is essential that the diagnosis of VLT be made rapidly and accurately. To this end, a rapid test should be included as an initial test for ILT viral detection. These include direct fluorescent antibodies done in tracheal and eyelid smears; histopathology examination of formalin-fixed paraffin embedded trachea and eyelid tissues; PCR performed directly on trachea and eyelid scrapings; immunohistochemistry on formalin-fixed paraffin embedded trachea and eyelid tissues.

Freshly dead birds and live birds with clinical signs should be submitted to the laboratory. Submission of freshly dead birds is important because the characteristic tracheal lesions (caseous plugs, hemorrhage) may not be present in live, clinically ill birds.

The most frequently utilized rapid test is histopathology examination of fixed tissues. Histopathology examination remains the standard method for the rapid diagnosis of ILT for primary, same day or overnight diagnosis of VLT. This requires using conjunctiva and trachea for examination, as inclusion bodies in mild or subacute cases are often found only in conjunctiva.

Samples for virus isolation should be collected in conjunction with the samples for the rapid testing. Confirmatory tests for virus isolation include histopathology examination or PCR on the CAM material, and electron microscopy examination on tissue culture material.

Geographical Information System Technology

Being able to make quick responses to a VLT outbreak has been improved by the use of Geographical Information System (GIS) technology. A computer record of spatial data of poultry flocks (maps) and corresponding flock information (attributes) and the location of support industry, such as feed mills, processing plants, rendering plants and hatcheries is essential in control efforts during a disease outbreak. Buffer zones around infected flocks for vaccination purposes are easily created using the current computer technology. Live-haul routes may be mapped to reduce the spread of the disease to susceptible flocks.

Biosecurity Procedures

General procedures

- A. Avoid direct and indirect contact between all other chicken flocks.
 1. Consider all chicken flocks especially those previously vaccinated for Laryngotracheitis as potential sources due to carriers.
- B. Allow no visitors onto poultry premises.
 1. Only authorized people allowed near to or in poultry houses and only after biosecurity clearance (no contact with other flocks, etc.).
 2. Growers have the authority to prohibit any unauthorized persons from coming onto their property.
 3. Virus is shed in nasal and oral secretions. It can contaminate litter, equipment, the general environment, and anything entering the environment. Therefore, people and equipment must be cleaned and disinfected before moving between poultry premises.
- C. Offer educational programs to train and certify all workers (from breeders through hatcheries, grow-out, and slaughter) on methods of disease transmission and biosecurity.
- D. Publish and distribute biosecurity steps and procedures for each industry worker, customized to apply to their particular type job.
 1. Insist that sales personnel, feed delivery people, egg customers and pick-up people absolutely stay out of houses.
 2. Enforce biosecurity procedures to all sales and service personnel, vaccination crews, exterminators, moving crews, feed and egg truck drivers, equipment repair people, electricians, plumbers, utility personnel and others entering your farm.
 3. Take biosecurity precautions yourself and include employees, family and neighbors since all can spread disease. Do not visit other poultry farms. Do not allow visitors in your poultry houses.
 4. Use all-in, all-out operations where possible.
 5. Provide obvious, outside receptacle for feed slips, invoices and messages.
 6. Know your pullet sources and their vaccination program.
 7. Do not remove dead birds from house unless they are contained in plastic garbage bags or in covered containers. Burn, bury, compost or render dead birds. Transport in plastic bags or covered containers. Never throw dead birds on the fields.
 8. Do not allow employees to have backyard poultry or pet birds.
 9. Do not keep any stray chickens after flock is removed (not even one).
 10. Do not allow equipment to be brought to your farm that has not been cleaned and disinfected.
 11. Institute a rodent control program. Do not forget stray dog and cat control.

Biosecurity procedures for specific personnel throughout the poultry industry are located in the Appendix.

Biosecurity/disease control zone

The committee/task force decides on the appropriate size zone around the index case. The initial zone should include a wide enough area to control the disease, yet not so large that control measures will become difficult. The area of the initial zone will vary between the states and the area within an affected state. Progressively enlarging zones of vaccination have occurred in some outbreaks. The vulnerable point has been the 21-day vaccination age limit (28 days of age maximum in high-risk situations), which allowed older flocks to break in vaccination zones and perpetuate the supply of virus. Cases have continually jumped past vaccination zone borders.

The first measures to be taken within a zone are biosecurity-related and usually include: increased downtime for all farms within the zone (2-3 weeks), discontinuation of clean out and manure spreading within the

zone and elimination of all unnecessary visits from people. In addition, birds over 14 days of age should not be serviced on the farm, but personnel should conduct service by telephone interview. Personnel from utility companies and equipment repair companies and growers outside the zone should be made aware of the situation so they can also increase their biosecurity measures. Following are options used successfully in three different states.

I. Litter handling during a clinical outbreak of VLT—option 1.

WITH NO IMMEDIATE INTENT TO VACCINATE

1. Immediately after the affected flock is removed, heat houses to 100 degrees F for 100 hours.
2. Keep the house empty for a minimum of 3 weeks.
3. The litter may not be removed from the house; no outside composting, no cake out.
4. Clean out can occur only after a subsequent unvaccinated flock has been grown on the premise with no evidence of VLT signs.

WITHIN A VACCINATION ZONE

1. Once vaccination starts, there is no clean out until all houses in the zone have been vaccinated. After all have been vaccinated, houses can be cleaned out and litter spread within the Zone with no restrictions.
2. If litter has to be taken outside the Zone, it will be composted either inside the house, or under plastic outside the house for 21 days before movement.
3. Litter has to be completely covered (complete tarping) when transported.
4. Limit litter equipment sharing to only within the Zone; clean and disinfect between farms

WHEN VACCINATION IS DISCONTINUED

1. When vaccination stops within a Zone, there is no removal of litter from the houses until every farm in the Zone has grown a complete flock with no vaccination and no VLT signs, unless the litter is heat treated (100 hours, 100 degrees) or composted (under plastic, for 21 days).
2. Subsequently, clean out can resume with no restrictions

II. Wash down and disinfection of a VLT-contaminated premise—option 2

A full wash down and disinfection is recommended between flocks (pullet, layer or broiler) if the previous flock has experienced VLT. In some areas of the country a complete wash down and disinfection is not a feasible method for cleaning a contaminated VLT premise, due to the limitation of litter availability and disposal options. Therefore, alternate procedures are outlined below. The following recommendations should be considered for a broiler house.

1. Nothing can leave the farm prior to cleaning and disinfection of the VLT contaminated premise.
2. The house should be closed up and heated to greater than 100 F for at least 3 days.
3. If the litter is being re-used, wet areas should be piled and covered.
4. The surfaces should be sprayed with disinfectant.
5. The house should be left empty for a minimum of 3 weeks.
6. The next flock should be vaccinated for VLT or, if the flock is in a non-endemic or isolated area, the flock may go without vaccination.
7. If a complete wash down and disinfection is being done, heat the house then remove the litter, pile it and cover it outside for several weeks if possible. It is best to wait until summer to spread. Do not spread the manure immediately.

III. Wash down and disinfection of a VLT-contaminated premise—option 3

1. Following removal of a flock for approved disposition, the poultry houses shall be closed and nothing removed including feed, litter, equipment, etc.
2. Spray premises inside and out with an adult fly knockdown product, such as permethrin.
3. Apply products for effective rodent control.
4. Treat interior of house and litter with a broad-spectrum insecticide to control beetles, etc.
5. Allow house to stand idle for several days and longer if possible.
6. Remove all litter, manure, and feathers for disposal in a safe manner, preferably on the farm by:
 - a. Approved composting methods for disease conditions.
 - b. Burial
7. Completely wash down the ceiling, walls, curtains, windows, fans, equipment, and floors with a sanitizing detergent in ample water. Rinse with water under pressure until "like-new" clean. Repeat the wash and rinse steps where necessary.

8. After inspected and certified as adequately clean, thoroughly wet all surfaces of the equipment and houses with an approved disinfectant. Spray the floors and lower wood and block structures with a phenolic or cresylic product until wet.
9. Thoroughly clean and disinfect workroom, egg room, pump room, and all storage areas.
10. Rid outside area of all spilled litter, manure, etc. and spray disinfect outside of curtains, windows, sills, and fan shutters and disinfect all doorways, walks, and drives out 15 feet from house with phenolic or cresylic disinfectant.
11. Clean and spray disinfectant on areas outside of house that are dust coated by exhaust fans.
12. Thoroughly clean and spray disinfect all loaders, trucks, trailers, spreaders, tractors, hand tools, etc. used in the C&D process.

Vaccination

Recommendations for the vaccination of replacement pullets to prevent VLT

Three types of ILT vaccine are available: a recombinant fowl pox-vectored ILT (FP-LT) vaccine and two types of modified-live ILT vaccines, the chick embryo origin (CEO) vaccine and a tissue culture origin vaccine (TCO). The FP-LT recombinant vaccine is administered by wing-web stab and the modified-live vaccines are recommended for use by the eyedrop method, although both water and spray application routes have been used with the CEO product and some CEO products are labeled for water and spray administration. The normal reaction to the FP-LT vaccine is a typical pox take, and with the modified-live vaccines a slight swelling and red discoloration of the eyelid membranes and tissue around the eye with excess fluid accumulation is expected. The CEO vaccine virus will spread to non-immune birds and may cause a mild disease. Proper precautions must be taken with CEO vaccines in order to prevent vaccine virus infection of susceptible birds. There is minimal spread of the TCO vaccine. The FP-LT vaccine does not shed ILT virus and does not spread

1. For replacement pullets, a single application of FP-LT vaccine at 8 weeks of age or two applications of modified-live vaccine are recommended. With modified-live vaccines in layer replacements, the first dose may be administered at 7-8 weeks of age and the second at 15-16 weeks of age. Some companies have been vaccinating pullet flocks at 7 weeks and again as early as 12 weeks of age. For breeder pullets, the first dose is typically administered at 8-12 weeks of age and the second at 18-20 weeks of age.
2. Recommended administration of the commercially available ILT vaccines is by wing web stab for the FP-LT vaccine and by the eyedrop method for the modified-live vaccines. It is important that each bird receive a full dose by careful application. Since the FP-LT vaccine does not spread, any missed bird is completely unprotected, so complete coverage is essential with this vaccine.
3. If a pullet or layer caged flock has been diagnosed with VLT early in the course of infection, rapid vaccine administration in the water with the CEO vaccine should decrease the mortality.
4. Re-vaccination at molt is suggested. The birds may not have protection from pullet vaccination for more than 1 lay cycle.

Since the chicken is the only natural host for ILT, eradication would seem to be a feasible and worthwhile goal. Development of an effective ILTV vaccine that does not shed nor revert to virulence and that is readily available would advance the possibility of eradication. If the use of CEO ILTV vaccines in long-lived classes of birds were indeed the major source of epornitics in broilers, then development of a safer vaccine for use in these long-lived birds would also lessen the urgency for eradication. In addition, the limitation of CEO vaccine use in commercial layers and breeders has been suggested.

The method of vaccination in commercial layers and breeders should be considered. The manufacturers suggest eyedrop vaccination, but several CEO vaccines have label claims for water and spray administration. Over the past several years, no VLT has been present in one state and the suggestion has been made that this has been due to the method of administration. The majority of birds have been vaccinated twice by eyedrop rather than the previously used spray or water vaccination. The proponents of eyedrop vaccination also observe that in areas in which the breeder flocks are vaccinated twice by eyedrop, VLT is essentially non-existent.

An alternative suggestion has been that an entire industry (within a state or throughout the United States) should only use TCO ILT vaccine or the FP-LT product. This is based on molecular epidemiological information and on the occurrence of VLT related to birds vaccinated with CEO vaccine being introduced into a state where only TCO is used.

Recommendations for the vaccination of broilers to prevent VLT

Broilers are usually not vaccinated unless they are in an area of an outbreak. When this occurs, they are then vaccinated between 10 - 21 days of age in the water with CEO vaccine that may be combined with

Newcastle disease virus/infectious bronchitis virus (NDV/IBV) vaccine. Vaccination past 3 weeks of age is not suggested due to the increase in associated reactions. Recent research suggests that using the recombinant FP-LT vaccine *in ovo* at 19 days of incubation may be a safe alternative to the use of modified-live ILT vaccines in broilers, but this method is not currently approved.

If a broiler flock is experiencing VLT, immediate vaccination appears not to reduce mortality, and in some cases will increase mortality. Regional vaccination of broiler flocks for ILT should be discussed with the committee/task force prior to implementation.

APPENDIX

Biosecurity Procedures for Poultry Farms/Poultry Growers

1. Keep poultry houses locked; fasten from inside while inside.
2. Resident flock manager should have clothing (including shoes, boots, hat, and gloves) when caring for flocks separate from those worn off the farm.
3. Flock manager and other caretakers should not visit any other poultry flocks.
4. Do not allow visitors in or near the poultry houses.
5. After caring for the flock, change clothes completely and wash hands and arms before leaving premises.
6. Essential visitors such as owners, fuel and feed delivery drivers, meter readers, poultry catchers and haulers, and service personnel must put on protective outer clothing including boots and headgear prior to being allowed near the flocks.
7. Monitor vehicles entering premises for poultry pickup or delivery, feed delivery, fuel delivery, etc. to determine if they have been scrubbed down and the undercarriage and tires spray disinfected prior to entering. If vehicle does not appear to be properly sanitized, growers should not admit the vehicle to the property.
8. All coops, crates, and other poultry containers or equipment must be cleaned and disinfected prior to use and following use.
9. Sick or dying birds should be submitted to a state/university laboratory for diagnosis. Commercial growers should contact their flock supervisors.
10. Dead birds must be properly disposed of by composting or burial or incineration.
11. Persons handling wild game (especially waterfowl) must change clothes completely and bathe prior to entering poultry premises.
12. Keep "Stop", "Keep Out" and similar type signs posted at drive entrances.

Biosecurity Procedures for Operators of Feed Delivery and Feed Pickup Trucks, Chick Delivery Buses, and Egg Pickup Vehicles

1. General Procedures
 - a. Each driver will be furnished with clean coveralls, rubber boots, disposable plastic boots, disinfectant, bucket and brush, spray insecticide, plastic bag for dirty coveralls, disposable or washable headgear, and paper towels.
 - b. Driver and vehicle will visit only one farm per delivery or pickup.*
 1. Vehicle will carry only enough feed, ingredients, chicks, or egg racks and flats for one delivery per trip.
 2. Upon completion of delivery or pickup, vehicle will return immediately to terminal base for complete cleaning and disinfection.
- * Procedure is applicable for any highly pathogenic agents. If milder strains are present, procedure may be modified to permit multiple visits to those farms identified as such.
2. Procedures for Farm Visit
 - a. Drivers will operate only sanitized vehicles and will wear clean boots, washable or disposable headgear, coveralls, or rain suits. This preventive equipment will be put on prior to exiting the vehicle. Care must be taken to take only equipment that can be cleaned and sanitized after use.
 - b. At no time will feed or egg pickup drivers be allowed to enter a poultry house. Chick delivery drivers who must enter a poultry house will be required to shower and wear clean clothing prior to making a delivery.
 - c. Consideration should be given on how a driver will approach and enter each farm to minimize the chance of dust or manure contamination. When at all possible, avoid driving vehicle by the fan side or downwind side of a poultry house; avoid driving through or near manure piles.
 - d. Flies or other insects should be prevented from entering the vehicle; in the event they do, they should be killed with a spray insecticide prior to leaving the farm premise.

3. Procedures for Return from Farm Visit
 - a. After delivery or pickup, driver and vehicle must return directly to its operation base for complete cleaning and disinfection and disposal or disinfection of equipment. No intermediate stops between the farm and the operation base should be made for any reason.
 - b. Upon the driver's return to the operation base, the driver will disinfect all rubber equipment, place washable clothing into a plastic sack and seal same, and place any disposable items that have been used in a plastic bag and seal for safe disposal. The vehicle will be completely cleaned and disinfected inside and out before visiting another farm.
 - c. Egg pickup drivers will not enter hatcheries or egg warehouses, but can help unload from the truck. After unloading is completed, the driver will disinfect himself and his vehicle in accordance with 3b above. All egg containers unloaded from the vehicle must either be completely disinfected or destroyed after eggs are processed. No traffic should occur between the storage area and the chick processing area without an extensive disinfection procedure.

Biosecurity Procedures for Poultry Catching Crews

1. Precautions regarding clothing and footwear.
 - a. Dress in freshly laundered clothing.
 - b. Wear clean, disinfected, rubber boots or freshly laundered sneakers.
2. Carry lunches in disposable bags and leave bags on premises.
3. Leave vehicle windows closed and spray with insecticide to kill flies.
4. After chickens have been caught and loaded:
 - a. Load equipment and personnel into transport vehicle and return to wash station.
 - b. Clean and disinfect catching devices, hooks, nets, fences, and coops.
 - c. Clean and disinfect inside and outside of vehicle used to haul crew and equipment.
 - d. Crew members should remove clothing and shoes or boots, bathe, wash hair, and dress in street clothes and shoes.
5. Do not enter other poultry premises unless you have changed into freshly laundered clothes and proper footwear.
6. Crew members must not visit flocks other than ones where they are working - unless step 1a and 1b are repeated.
7. Crew members must not visit stores, restaurants, etc. after catching and before cleaning vehicles and clothing. This prohibition includes time spent waiting for empty live-haul trucks to come to farm.

Biosecurity Procedures for Live-Haul Trucks, Crews, Trailers, Forklifts, Coops, and Cages

1. Crews and equipment should visit only the farm from which flock is to be moved and then return to the base of operation for thorough cleaning and disinfection.
 - a. Crew members should wear freshly laundered clothing.
 - b. Wear clean, disinfected, rubber boots or freshly laundered sneakers.
 - c. Carry lunches in disposable bags (personnel not permitted to leave farm to go to local market for drinks, cigarettes, etc.)
 - d. Leave vehicle windows and doors closed and spray with insecticide to kill flies.
2. After chickens have been caught and loaded:
 - a. Live-haul trucks and crew will go directly to processing plant.
 - b. Remaining crewmembers will load equipment and return to wash station.
 - c. Clean and disinfect all equipment and vehicles used with this flock.
 - d. Clean and disinfect inside and out of all vehicles used.
 - e. Clean and disinfect live-haul tractor inside and out, the trailer after it has been unloaded, and all coops, cages, chains, tarps, and ropes.
 - f. Dispose of all disposables (lunch bags, masks, caps, etc.) in containers provided for hazardous materials.
 - g. Crew members should remove clothing and shoes or boots, bathe, wash hair, and dress in street clothes and shoes.
3. Crew members must not enter other poultry premises unless they have changed into freshly laundered clothes and proper footwear.
4. Crew members should not visit poultry flocks other than the ones where they are working.
5. Crew members must not visit stores, restaurants, etc. after catching and before cleaning vehicles and clothing.

Crews Moving Hens to Slaughter, Vaccination Crews and Beak Trimming Crews

1. Crews and equipment should be permitted only on the farms where flock is to be handled and then return to base of operation for thorough cleaning and disinfection. Only clean crews and equipment are permitted onto these farms.
 - a. Crew members should wear freshly laundered clothing.
 - b. Wear clean, disinfected boots or freshly laundered sneakers.
 - c. Carry lunches in disposable bags (personnel not permitted to leave farm to go to local market for drinks, cigarettes, etc.).
 - d. Leave vehicle windows and doors closed and spray with insecticide to kill flies.
2. After chickens have been caught or processed:
 - a. Live-haul trucks will go directly to processing plant.
 - b. Pullet and cockerel-moving trucks and crews will go directly to farms where chickens are to be housed.
 - c. Beak trimming or vaccinating crewmembers will load equipment and return to wash station at base of operation.
 - d. Clean and disinfect all equipment used with this flock.
 - e. Clean and disinfect inside and out of all vehicles used.
 - f. Clean and disinfect live-haul tractor, pullet/cockerel mover tractor, trailers after they have been unloaded, and all coops, cages, chains, tarps, and ropes.
 - g. Clean and disinfect forklifts and other equipment used.
 - h. Dispose of all disposables (lunch bags, masks, caps, etc.) in containers provided for hazardous materials.
 - i. Crew members should remove clothing and shoes or boots, shower, wash hair, and dress in street clothes and shoes.
3. Crew members must enter other poultry houses unless they have changed into freshly laundered clothes and proper footwear.
4. Crew members should not visit poultry flocks other than the ones where they are working.

Biosecurity Procedures for Personnel Other Than Growers Working Inside Poultry Houses

1. No entry is permitted unless it is absolutely necessary. No entry is permitted in or near poultry houses without prior authorization from the contracting poultry company and grower and without a biosecurity clearance on the scene by the flock supervisor or poultry health official.
2. Park service vehicle well away from poultry house; keep windows closed.
3. Required clothing and footwear -
 - a. Freshly laundered or disposable coveralls
 - b. Rubber boots, cleaned and disinfected, or, as a second choice, disposable plastic boots
 - c. Disposable cap and mask
4. Lay out only equipment and tools required for this job -
 - a. With washcloth dipped in disinfectant and wrung damp-dry; wipe all surfaces of all equipment and tools to be taken in poultry house. A spray disinfectant on equipment and tools may also be used.
5. When work is completed -
 - a. Clean and disinfect all tools and equipment removed from poultry house.
 - b. Remove boots, clean and disinfect.
 - c. Remove and dispose of disposables in plastic bag.
 - d. Remove coveralls and place in plastic bag.
 - e. Wash hands and arms in disinfectant solution.

Recommendations for Vaccine Related Laryngotracheitis (VLT) Control

ILT Subcommittee of the USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species
November 7, 2005

RECOMMENDATION:

There is sufficient evidence through field epidemiology and molecular epidemiology that chicken embryo-origin (CEO) vaccine is related to clinical cases of VLT. States which 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 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 eyedrop 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).

RECOMMENDATION:

There currently are differences in control policies and reporting of VLT among states, between industry types (commercial layers vs. broilers) and within industries including between companies. For the control and prevention of VLT to be successful, the guidelines in a voluntary control program should be adhered to by all industries raising chickens.

The Vaccinal Laryngotracheitis (VLT) Voluntary Control Program is a compilation of programs used in three states. The components include an advisory health committee/task force, diagnostic capabilities, Geographical Information System technology, biosecurity procedures, litter management and vaccination programs.

Therefore, it is recommended that all states form an industry health advisory committee/task force to work with the State Departments of Agriculture and adopt the Model Vaccinal Laryngotracheitis (VLT) Voluntary Control Program developed by the ILT subcommittee of the USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species. Each state may use all or part of the plan according to their specific state needs.

Dr. G. Thomas Holder of Allen's Hatchery, Inc., Salisbury, MD made a motion that the Committee accept the subcommittee report and recommendation as information. The motion was seconded and passed unanimously.

Dr. Y. M. Saif of the Ohio State University, Wooster, OH made a motion that the Subcommittee on Infectious Laryngotracheitis be continued, with the charge to monitor the epidemiology and further developments in control measures for Infectious Laryngotracheitis, and report annually to the Committee. The motion was seconded and passed unanimously.

Annual Disease Status Reports from Industry

Dr. William Hewat of Tyson Foods presented the annual disease report for the broiler industry.

General: The US broiler flock health and performance has remained relatively stable over the last two years. The following information comparing 2004 and 2005 performance parameters is based on correspondence with colleagues in broiler production and Agristats data. While overall mortality percentages are moderately increasing, seven-day mortality is holding stable or improving. However, this decrease in livability is occurring in broilers with significantly heavier weights and higher breast meat yields in 2005 than 2004. Condemnation rates, including whole bird and parts condemn, have increased slightly this year but are significantly better than in the 10 years past.

Respiratory Diseases: Traditional respiratory diseases, including Infectious Bronchitis (IBV) and avian paramyxovirus infections (API), have not been an issue this year. Concerning IBV and API, many broilers industry veterinarians have more difficulties with the negative impact of high heating costs on bird health than with these primary disease agents. Infectious Laryngotracheitis (ILT) virus has been a problem in certain regions of the country but has been associated with vaccine virus.

Immunosuppressive & Enteric Conditions: As in 2004, the broiler industry continues to be plagued with a variety of syndromes that are thought to be associated with immunosuppression. Among broiler veterinarians, Gangrenous Dermatitis (GD) is considered the most consistent and serious problem in their operations. Many immunosuppressive agents have been associated with GD, but no single control measure has been identified. More recently, Inclusion Body Hepatitis (IBH) and Runting and Stunting Syndrome (RSS) have been reported to be associated with outbreaks of GD. In certain areas of the country, RSS has been a noteworthy problem. The

syndrome is characterized by poor performance, uniformity problems, high cost, and high mortality. RSS has occurred in all types and sizes of broilers and may be associated with a myriad of etiologies. This condition has been linked to management practices such as short down times and increased stocking density that allow pathogen loads to build in the houses. Recent market conditions that resulted in the need to rapidly increase production may have exacerbated this problem.

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. Musculoskeletal problems, including Femoral Head Necrosis (FHN), rickets, and Spondylolisthesis have appeared to be on the increase this year. Factors such as growth rate, genetics, and nutrition have been implicated. Salmonella control and mitigation strategies are also a concern in certain areas of production in the US.

The following table summarizes the disease concerns of 17 broiler company veterinarians who were polled for this report:

Disease Concern	Number of Responses
Gangrenous Dermatitis	12
Runting & Stunting Syndrome	7
Infectious Laryngotracheitis	3
Inclusion Body Hepatitis	3
Femoral Head Necrosis	3
No Specific Problems	3
High Fuel Prices	3
Rickets	2
Respiratory Disease (Minimal)	2
Salmonella	2
Histomoniasis	1

Dr. Eric Gingerich of the University of Pennsylvania presented the annual disease report for the table egg layer industry for October 2004—October 2005.

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 are still of concern however. They are colibacillosis, *Mycoplasma gallisepticum* (Mg), avian influenza (AI), and *Salmonella enteritidis* (SE).

Colibacillosis is a problem mainly of young flocks resulting in 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*. 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 is mainly 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 the success of this vaccine continues to be evaluated. 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 concern for layer flocks on the East coast as the ever-present H7N2 continues to be found in the live bird markets of New York and New Jersey and intensive active surveillance continues. No

significant AI isolations have been made in layer flocks in the US in the last year. Active and passive surveillance programs are increasing across the US in response to the threat of H5N1 from Asia.

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 F egg storage prior to processing, etc. FDA is continuing to work on the program with the final version likely available in 2006 with implementation planned for 2007.

Diseases under control and of low incidence are as follows: infectious laryngotracheitis (ILT), IB, coccidiosis, necrotic enteritis, fowl coryza, and urolithiasis/gout. These diseases tend to be localized to a region or a farm. Good success using the recombinant pox-vectored ILT vaccine in a region of high ILT incidence has been seen.

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

Poultry welfare concerns are minimal as compliance to program requirements for participants have been met. The United Egg Producers (UEP) Certified Welfare Program will require the use of full feed molting in the future (2007). Full feed molting programs have been proven to be fully workable. 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.

The egg industry saw below cost-of-production egg prices for most of 2005. Continued expansion in the Midwest is felt to be the biggest reason. Relatively low feed prices continue to allow inefficient producers to stay in production. The percent of eggs that are processed is fairly stable at about 30% with only 1% of eggs exported.

Dr. David J. Mills of the Jennie-O Turkey Store Company presented the annual disease report for the turkey industry, written by Dr. Mills and Dr. Steven Clark of Alpharma Animal Health.

In preparation for this report the authors contacted several US turkey industry professionals and veterinarians involved in turkey production to inquire about the health status of turkeys produced in October 2004 through October 2005. The turkey industry reports several disease challenges for these 12 months varying by geographical regions within a state and across the United States. The accompanying Table lists the challenges by disease and issue.

The lack of approved efficacious drugs is the top disease issue. The withdrawal of the NADA for enrofloxacin for use in poultry leaves the industry with no adequate therapeutic response to colibacillosis (ranked #2), or fowl cholera (ranked #12). Tetracyclines are not a viable alternative therapeutic due to Russian import restrictions and efficacy. The unscientific methods and poor risk analysis used in the argument for the unprecedented withdrawal of enrofloxacin are a cause of great concern for the industry and for food animal agriculture in general.

Blackhead, a disease with no efficacious drug approved for use in turkeys, has been diagnosed in commercial production areas of the Southeast and Midwest. While the prevalence of blackhead was relatively low, the disease can be devastating in the individual flocks affected. Anti-protozoal drugs exist that are very efficacious, and should at least be allowed therapeutically in valuable breeder stock.

Cellulitis has emerged as a major disease issue across all geographic regions. The prevalence and severity of cellulitis has increased. Little is known about this disease in turkeys, but clostridial species (*C. perfringens* and *C. septicum*) play a role in the pathogenesis. Poulter enteritis of unknown etiologies, *Ornithobacterium rhinotracheale* (ORT), and leg problems continue to rank high on the list. Other diseases of particular interest in certain geographic areas include Avian Metapneumovirus (AmPV), and protozoal enteritis.

Influenza type A, H3N2, has caused drops in egg production in some breeder flocks, and has infected some commercial flocks but caused no clinical disease. 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. This is of great concern in the current environment of media hysteria over influenza in general.

Salmonella ranked high in the survey, but seldom causes clinical disease in turkeys. Salmonella contamination is a food safety issue. While we all desire safe food, the current focus on pre-harvest control of salmonella in poultry has caused some concern in the industry, and thus the high ranking. Proper food handling and appropriate processing technologies are by far more effective in reducing the risk of food borne illness than attempting to selectively eliminate normal intestinal inhabitants of domestic animals.

Turkey Production totaled 5.45 billion pounds (ready-to-cook) in 2004. Production declined 3.5% (200 million pounds) for the year 2004, following a 1.25% decline for the year 2003. Head slaughtered was down 5.1% and average live weight increased by 0.33 pounds (1.2%). Declines were evidently a response to earlier poor profitability in predominantly further processed items from heavy toms. Overall domestic demand for turkey products was strong in 2004, while exports decreased by 8%. Exports are expected to rebound in 2005 by an estimated 18%, reaching 526 million pounds.

The following table presents the results of a turkey health survey (October 2005) of US veterinarians in turkey production, ranking current disease issues (1= no issue to 5 = severe problem). The survey response (reply) rate was 57% (n=15).

Issue	Score	Issue	Score
Lack of approved, efficacious drugs	4.2	Newcastle Disease Virus (NDV)	2.3
Colibacillosis	3.6	Necrotic enteritis	2.1
Late Mortality	3.5	Blackhead	2.1
Cellulitis	3.2	Coccidiosis	2.1
Leg Problems	3.1	Avian Metapneumovirus	2.1
Ornithobacterium rhinotracheale (ORT)	3.0	Cannibalism	2.1
Poult Enteritis of unknown etiologies	2.9	Round Worms (Ascaridia dissimilis)	2.1
H3N2 Swine influenza	2.9	Avian Influenza	1.9
Salmonella	2.8	Erysipelas	1.8
Tibial Dyschondroplasia (TDC, Osteochondrosis)	2.8	Protozoal Enteritis	1.8
Bordetella avium	2.6	MI	1.8
Cholera	2.5	Mycoplasma meleagridis (MM)	1.5
Fractures	2.5	Mycoplasma synoviae (MS)	1.5
Breast Blisters and Breast Buttons	2.4	Mycoplasma gallisepticum (MG)	1.4
Heat stress	2.4	Spondylolisthesis (Kinky-Back)	1.4
Shaky Leg Syndrome	2.4	Turkey Coronavirus	1.3
Osteomyelitis (OM)	2.4	PEMS (Poult Enteritis Mortality Syndrome)	1.2

Annual National Veterinary Services Laboratory (NVSL) and National Poultry Improvement Plan (NPIP) Status Reports

Mr. Dennis Senne of USDA APHIS VS NVSL in Ames, IA presented the annual status reports on Avian Import Activities and NVSL Avian Influenza and Newcastle Disease Virus Diagnostics.

Avian Import Activities FY 2005

- A) **Poultry and Hatching Eggs:** During fiscal year (FY) 2005 17,595,266 poultry including day old chicks, and 15,759,279 poultry hatching eggs 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 2005 186,605 commercial birds were released from USDA-supervised private bird quarantine facilities.
- C) **Pet Bird Program:** There were 1,115 pet birds imported into the United States and quarantined at a USDA-operated animal import centers during FY 2005. The number of home quarantined birds was 188.

- 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 163 birds confiscated by Customs & Border Protection during FY 2005.

Avian Influenza:

Live Bird Marketing System (LBMS)

Surveillance in the LBMS in Northeastern United States for presence of avian influenza virus (AIV) was again a high priority in FY 2005. 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 2005, a total of 8,294 specimens in 1,307 submissions from 10 states (CT, FL, MA, ME, NH, NJ, NY, OH, PA, and RI) were tested for presence of AIV by virus isolation in embryonating chicken eggs at the National Veterinary Services Laboratories (NVSL). In addition, 641 swabs in 207 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 8,294 specimens submitted to the NVSL, the H7N2 virus was isolated from 625 of 4,357 specimens from NY, 247 of 3,592 specimens from NJ, and 8 of 187 specimens from MA. Specimens negative for AIV were RI (n=43), CT (n=37), OH (n=29), FL (n=22), PA (n=19), NH (n=5), and ME (n=3). Notable changes were not observed in the amino acid motif at the cleavage site of the hemagglutinin protein of 264 H7N2 isolates sequenced in 2005. In addition to H7N2, an H5N5 was isolated from a duck from MA and an H5N2 virus was isolated from an environmental swab from NY. Pathogenicity of representative H7N2 AIV isolates as well as the H5N5 and H5N2 viruses 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: H1N1 (NY, n=3), H2N3 (NY, n=11), H4N2 (NY, n=3), H4N6 (NJ, n=3), H4N8 (NJ, n=1), H6 (NY, n=1) and H10N9 (FL, n=8). In addition to AIV, avian paramyxovirus type-1 (APMV-1) was isolated from 480 specimens in 232 submissions from NY (n=313), NJ (n=125), MA (n=26), CT (n=6), and RI (n=6). All but 20 isolates were characterized as low virulent (lentogenic pathotype) strains; the 20 isolates were characterized as pigeon paramyxovirus type-1 (PPMV-1). In addition, an APMV-6 was isolated from 2 specimens from NY.

Low Pathogenicity Avian Influenza (LPAI) in Commercial Poultry

In November 2004 a layer flock in RI was found to be positive for antibodies to H6 and H9 (N2 and N8) AIV as a result of routine surveillance testing. No clinical disease or drop in egg production was noted. In December 2004, antibodies to H4N6 were detected at slaughter in a single flock of turkeys in Virginia. No additional flocks in the area were found to be seropositive for AI. In January 2005, a LPAI H4N8 virus and specific antibodies were detected in a small flock of turkeys in CA with clinical disease. The infected premises were voluntarily depopulated to prevent further spread of the disease. Also in CA, antibodies to H6N2 were detected in a chicken flock that had been vaccinated with H6 vaccine. In March 2005 a flock of commercial turkeys in MA were positive for antibodies to H4N2 AIV. Real time RT-PCR assays tests performed on additional specimens from the flock were negative and no virus was isolated.

In May 2005, antibodies to H7N2 were detected in a duck production facility in New York. The facility was immediately quarantined. Subsequent testing of the duck flocks yielded a low pathogenicity H7N2 virus. The operation was isolated from other birds and facilities and did not interface with the live bird marketing system. The flock owners are continuing to clean and disinfect between flocks while sending ducks to an on-site USDA processing facility.

In PA, an H4N2 virus of low pathogenicity was isolated from a chicken flock and a commercial egg layer flock in PA was positive in June for antibodies to H2N2. Both flocks were found to be positive during routine surveillance monitoring. There were no reports of clinical disease or drop in egg production.

In FY 2005, 319 submissions (311 from turkeys, 8 from chickens) from 12 states (AL, FL, IA, IL, IN, MI, MN, NC, NY, OH, SD, and VA) 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. The H3N2 virus was isolated from turkey flocks in NC and MN. Molecular analysis of both H3N2

viruses showed that they were of swine origin. Detection of AIV or specific antibodies in non-commercial poultry/birds is shown in the accompanying Table.

rRT-PCR Proficiency Test Panels

Laboratories conducting surveillance testing for AI and ND are required to have one or more diagnosticians pass an annual proficiency test to perform official rRT-PCR tests. In FY 2005, 91 diagnosticians representing 39 laboratories were approved to perform official rRT-PCR tests for AI and APMV-1 (Newcastle disease).

AI Diagnostic Reagents Supplied by the NVSL

A total of 15,016 units of AGID reagents (antigen and enhancement serum) were produced and shipped to state, university, and private laboratories during FY 2005. The quantity is sufficient for approximately 1.8 million tests. An additional 1,231 units (147,720 tests) were shipped to 14 foreign laboratories.

Newcastle Disease

Isolations of Virulent Newcastle Disease Virus (vNDV).

During FY 2005, one isolate of virulent NDV (velogenic neurotropic pathotype) was isolated from a wild bird (double crested cormorant) from NV. In addition, pigeon paramyxovirus type-1 (PPMV-1) was isolated from pigeons or doves in 14 submissions from 8 states (FL, ME, MI, MN, NJ, NY, OR, and PA). No virulent Newcastle disease virus was isolated from domestic poultry, imported caged (pet) birds, or birds confiscated by U.S. Customs in FY 2005.

Isolations of Low Virulent Avian Paramyxovirus Type-1 (APMV-1).

During FY 2005, 50 submissions of APMV-1 from 12 states (AL, CO, FL, IA, MA, MN, NC, NJ, NY, PA, VA, 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 by deduced amino acid motif at the cleavage site of the fusion protein.

Isolations of Other APMVs.

In FY 2005, APMV-2 was isolated from a pheasant in WI and from seven submissions from imported pet birds in quarantine facilities in CA and FL. An APMV-3 was isolated from a single submission from imported pet birds in a quarantine facility in CA. The birds were allowed entry into the U.S.

Newcastle Disease and Avian Influenza Surveillance Programs.

Following the California outbreak of vND in backyard game fowl in 2002-03, the USDA established an ND and AI surveillance program specifically targeting backyard birds. USDA identified 30 laboratories to participate in the program and the laboratories would receive reimbursement for testing. Under the program, 8,911 specimens from 19 states (AL, AZ, AR, CO, CT, NY, FL, GA, IA, MD, MI, MN, MS, NJ, PA, SC, VA, WA, WI) were tested for ND in FY 2005 and 3,976 specimens from 17 states (same labs for ND except for MN and NJ) were tested for AI. No AIV or vND infections were detected.

ND Diagnostic Reagents Supplied by the NVSL.

A total of 239 vials (2ml) of inactivated LaSota antigen were shipped to 15 domestic laboratories in 9 states and to 4 foreign laboratories. Fifty-six vials (0.6ml) of live LaSota virus were shipped to 2 domestic and 1 foreign laboratory and 74 vials (2ml) of ND antiserum was shipped to 11 domestic laboratories in 9 states and 5 foreign laboratories.

Table. Subtypes of low pathogenicity avian influenza virus (AIV) or specific antibodies detected in non-commercial poultry/birds, FY 2005.

State	Species	Subtype of AIV (No. of Isolates)	Antibody Subtypes (No. of Submissions)
California	Duck		H10
Georgia	Flamingo*		Multiple H & N (2)
Massachusetts	Duck	H4N6 (1)**	
Maryland	Duck, swan	H11N3 (1)**	H11 (1), Multiple H & N (1)
Maine	Loon		Multiple H & N (1)
Minnesota	Flamingo*		Multiple H & N (1)

Missouri	Flamingo*		Multiple H & N (2)
Ohio	Flamingo*		Multiple H & N (1)
Pennsylvania	Duck, goose		H2N2 (1), H2N3 (1), H3N2,3,6 (1) H4N6 (1), H6N2 (1), H11N4,8 (1)
Texas	Flamingo*		Multiple H & N (3)

* A group of flamingos from South Africa were imported through a USDA quarantine facility and later found to be positive for antibodies to AIV. The birds were shipped to zoos in 5 states. No clinical signs were observed in any of the birds and no AIV was isolated.

** Low pathogenicity AIV by the chicken pathogenicity test.

Ms Kathleen Ferris of USDA APHIS VS NVSL presented the **NVSL Diagnostic Bacteriology Report** that summarizes poultry *Pasteurella-Salmonella-Mycoplasma* activities.

Pasteurella

During a 12-month period, the National Veterinary Services Laboratories (NVSL) received 275 *Pasteurella multocida* isolates for characterization. Of these, 113 were submitted for somatic type analysis, 38 were submitted for DNA fingerprint analysis, and 124 isolates were submitted for both tests. Results indicated that 29% were type 3, 4; 11% were type 1; 9% were type 3; 8% were type 4; and 7% were type 2, 5. A total of 35% of the isolates were identified as other somatic types. The somatic type of 2% of the isolates could not be identified. Of the isolates submitted for DNA fingerprint analysis, 10.5% had profiles identical to those of *P. multocida* attenuated vaccine strains, 10% matched the profile of somatic reference type 3, strain P-1059 (type 3 component used to manufacture bacterins), and 79% were wild-type profiles.

Salmonella

In support of the National Poultry Improvement Plan, a total of 1,525 ml of stained microtiter antigen, 805 ml of tube test antigen, 104 vials of positive control serum, and 54 vials of negative control serum for *Salmonella pullorum* testing were provided to industry and diagnostic laboratories. A total of 90 sera were tested for pullorum-typhoid using the microagglutination test. The NVSL serotyped 18,589 *Salmonella* isolates recovered from animals, their environment, or feed. Of the 5559 poultry isolates (30% of total isolates), 3276 were recovered from chickens or their environment and 2283 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	Number	Monitor	Number
Enteritidis	43	Heidelberg	669
Heidelberg	23	Kentucky	484
Kentucky	23	Typhimurium	344
Typhimurium	12	Senftenberg	209
Senftenberg	7	Enteritidis	181
All Others	58	All Others	1223
Total	166	Total	3110

Table 2: Most Frequently Identified Serotypes From Turkeys

Clinical	Number	Monitor	Number
Senftenberg	87	Hadar	543
Heidelberg	74	Senftenberg	308
Hadar	23	Heidelberg	129
Montevideo	23	Saintpaul	89
Bredeney	18	Agona	86
All Others	107	All Others	796
Total	332	Total	1951

Mycoplasma

The NVSL performed 264 avian *Mycoplasma* hemagglutination inhibition tests and 98 plate tests. During this same period, 970 ml of hemagglutination antigen and 740 ml of control sera were provided to other diagnostic laboratories.

Mr. Andrew R. Rhorer, Senior Coordinator of the USDA APHIS VS National Poultry Improvement Plan (NPIP) presented the annual NPIP Status Report.

Pullorum-Typhoid Status:

In calendar year 2004, there were 42 isolations /outbreaks of *Salmonella pullorum* reported to the Poultry Improvement Staff. There was one isolation/outbreak of *Salmonella pullorum* reported during calendar year 2005 from January to October 1, 2005. There have been no isolations of *Salmonella gallinarum* since 1988 in any type poultry. The isolates in 2004 were all standard strains of *Salmonella pullorum*. The numbers of birds in *Salmonella pullorum* positive flocks (January 1, 2004-October 1, 2005) were as follows:

Number of Birds	No. of Flocks	Strain of Pullorum
>5<25	1	Standard
>25<50	1	Standard
>50<100	5	Standard
>100<500	19	Standard

Hatchery Participation in the National Poultry Improvement Plan, Testing Year 2004	
Egg and Meat-Type Chickens Participating	291
Capacity	686,485,055
Turkeys Participating	50
Capacity	33,812,294
Waterfowl, Exhibition Poultry and Game Birds	798
Capacity	26,236,374

Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary, Testing Year 2004	
U.S. Pullorum-Typhoid Clean: Participating-Number	185
Birds in Flocks-Number	3,296,546
Average per Flock	17,819
Primary Breeding Flocks: Flocks-Proportion of Total	26.9
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 2004	
U.S. Pullorum-Typhoid Clean: Participating-Number	5,260
Birds in Flocks-Number	74,656,183
Average per Flock	16,094
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 2004	
U.S. Pullorum-Typhoid Clean: Participating-Number	608
Birds in Flocks-Number	4,895,832
Average per Flock	8,052
Primary Breeding Flocks: Flocks-Proportion of Total	13.2

Total	
Primary Breeding Flocks: Birds-Proportion of Total	3.8

Waterfowl, Exhibition Poultry, and Game Birds Breeding Flocks In the National Poultry Improvement Plan Participation and Testing Summary, Testing Year 2003	
U. S. Pullorum-Typhoid Clean: Participating	3,649
Birds in Flocks	1,173,993
Primary Breeding Flocks: Flocks-Proportion of Total	34.9
Primary Breeding Flocks: Birds- Proportion of Total	58.1

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

Avian Influenza Serology on Breeding Flocks July 1, 2003-June 30, 2004 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	326,177	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	47,348,542	181,035

<p><i>U.S. Salmonella enteritidis</i> Clean - Egg-Type Chickens No. of flocks and birds in the flocks with <i>Salmonella enteritidis</i> isolates, 1990-2005</p>			
	Environmental	Dead Germ	Bird
Flocks	55	6	19
Birds in Flocks	599,871	77179	201,342

<p><i>U.S. Salmonella enteritidis</i> Clean- Egg-Type Chickens No. of flocks and birds in flocks by State with <i>Salmonella enteritidis</i> isolates, 1990-2005</p>			
Arkansas	Environmental	Dead Germ	Bird
Flocks	1		15000
Birds in Flocks	6000		2
Georgia			
Flocks	1	2	
Birds in Flocks	400	46000	
Illinois			
Flocks	3	2	1
Birds in Flocks	3900	3700	1200
Indiana			
Flocks	15	2	1
Birds in Flocks	158345	27479	15092
Kentucky			
Flocks	1		
Birds in Flocks	6625		
Ohio			
Flocks	13		9
Birds in Flocks	183700		91600
Oregon			
Flocks	2		
Birds in Flocks	19516		
Pennsylvania			
Flocks	13		6
Birds in Flocks	166385		78450
Texas			
Flocks	1		

U.S. <i>Salmonella enteritidis</i> Clean- Egg-Type Chickens		
No. of flocks and birds in flocks by State with <i>Salmonella enteritidis</i> isolates, 1990-2005		
Birds in Flocks	10000	

Phage type 13	Environmental	Dead Germ
Flocks	9	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	1	
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 <i>Salmonella enteritidis</i> by phage type and by year 1989-2005		
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	8

Dr. Fred Hoerr of Auburn University, Chair of the Subcommittee, presented Report of the Subcommittee on Mycoplasma.

Dr. Stanley Kleven (GA) reported *Mycoplasma iowae* (MI) infection in turkey poults in 2005. MI is associated with mid to late embryo mortality, but this problem occurred as unthrifty, stunted poults, some with shortened shanks and synovitis. Progeny of specific breeder flocks were affected. No serological test exists for MI; the agent was isolated from dead-in-shell and pipped embryos. Isolation on agar was more efficient than in broth, adaptation of cultures to broth medium was difficult, and isolates were very slow growing and fastidious. Infection was detected in 0 to 20 % of such embryos. A PCR procedure (Marois) was effective but molecular "fingerprinting" by RAPD was incomplete because of trouble maintaining cultures in vitro in order to obtain DNA for RAPD testing. Some isolates of MI were possibly more virulent than others, based on variable clinical signs in poults from different breeder flocks.

Dr. H. L. Shivaprasad (CA) reported on an *M. gallisepticum* (MG) outbreak in primary turkey primary breeders occurring prior to 2005. Eighteen-week-old turkey breeder candidates presented with respiratory signs. Extensive testing and trace back revealed that MG was widespread in multiple generations of a breeding program; 16,000 birds of young pure line stock, 15,000 young breeders, and more than 200,000 eggs were destroyed. The source of the MG was not identified. Pedigree stock was treated with fluroquinolone and vaccinated with an MG bacterin; eggs were dipped in an antibiotic solution. Progeny hatched from the pedigree stock were negative for MG.

Dr. Eric Jensen (AL) reported on *M. synoviae* (MS) infection in a grandparent meat-type chicken flock in Tennessee. Risk factors included proximity to backyard flocks and translocation of flocks from rearing to laying farms. A routine surveillance program detected the infection. Stringent operational biosecurity prevented horizontal transmission, including additional surveillance by serology and PCR during periods of higher risk.

Dr. Sherrill Davison (PA) reported on continuing research with *Mycoplasma gallisepticum* (MG) in commercial layers. A bioassay using sentinel turkeys was used to address a problem of isolation of MG impeded by overgrowth of non-pathogenic mycoplasmas. The turkeys were cultured for MG. MG isolates characterized by random amplified polymorphic DNA (RAPD) and gene-targeted sequencing (GTS) included "wild" type MGs, "ts-11-like" isolate, "ts-11-derived" isolate, and "F strain-derived" isolate. The pathogenicity of one "ts-11-like" MG and two "wild" type MGs were assessed in layers and turkeys by clinical signs and respiratory lesions. The "ts-11-like" strain had minimal pathogenicity but "wild" types were more pathogenic. Mild live MG vaccines were protective against the "ts-11-like" strain but less so for the "wild" MGs.

Drs. Fred Hoerr and Joel Cline (AL) reported on blindness and lameness in 50-day-old broiler chickens with concurrent *Ornithobacterium rhinotracheale* (ORT) and MG infection. At necropsy, affected birds had bacterial panophthalmitis and arthritis.

Annual Report on OIE Poultry Activities

Dr. Michael J. David, Director of Sanitary International Standards in the USDA APHIS VS National Center for Import and Export gave the annual report on the World Organization for Animal Health (OIE) Poultry Activities.

Code Chapter on Avian Influenza (AI).

In May of 2005, the International Committee of the World Organization for Animal Health (OIE) approved a new Code Chapter on AI. This new chapter redefines the types of AI that are reportable, provides a new definition of poultry, and incorporates the concept of compartmentalization. In addition, the chapter describes the parameters countries and zones need to meet to obtain or regain freedom from notifiable AI, and establishes risk-based import measures for trading in poultry commodities. The OIE also approved an associated appendix that provides guidelines for conducting surveillance on AI.

Future work of the OIE will include re-writing the Code Chapters on Newcastle disease and infectious bronchitis.

Disease listing and criteria for notification.

At the May meeting, the International Committee voted to adopt a single list of notifiable diseases as well as the criteria by which diseases become listed and thus become notifiable. There is now a single list of notifiable diseases for terrestrial animals that replaced the old List A and List B disease lists. The criteria for listing a given

disease and the parameters that are associated with each criterion were presented during last year's USAHA meeting. These are as follows:

- Could the disease agent have significant *international spread*?
- Is the disease agent an *emerging agent*?
- Does the disease agent have *zoonotic potential*?
- Will the disease agent have *significant spread in naïve populations*?

As previously described, each criterion is associated with a given set of parameters, and if a disease agent meets at least one of these parameters, it becomes a notifiable disease. In addition to the actual disease agent, *events of epidemiological significance* associated with the disease become notifiable. Such events that may require immediate notification are as follows:

- The first occurrence of a listed disease and/or infection in a country or zone/compartiment;
- The re-occurrence of a listed disease and/or infection in a country or zone/compartiment following a report declaring that the outbreak has ended;
- First occurrence of a new strain or pathogen of a listed disease in a country or zone/compartiment;
- A sudden and unexpected increase in the distribution, incidence, morbidity or mortality of a listed disease prevalent within a country or zone/compartiment;
- Evidence of change in the epidemiology of a listed disease (including host range, pathogenicity, strain) in particular if there is zoonotic impact

Routine reports to the OIE are required to be submitted every 6 months, and emergency reports, as they were previously, are required to be submitted within 24 hours of disease confirmation.

Animal Welfare. The OIE's International Committee adopted four new Guidelines on animal welfare. These are:

- Guidelines on the Transport of Terrestrial Animals by Sea
- Guidelines on the Transport of Terrestrial Animals by Land
- Guidelines on the Slaughter of Animals for Human Consumption
- Guidelines on Killing for Disease Control

Only the guidelines on Animal Slaughter for Human Consumption and Killing for Disease Control contain some pertinent information affecting poultry. The conditions for slaughter and/or killing for disease control are very generic and most, if not all, integrators can meet them without any difficulty.

The next sets of guidelines on animal welfare the OIE will develop and which may impact poultry are guidelines for the housing and husbandry of terrestrial animals. These first sets of guidelines on housing and husbandry will outline some generic recommendations rather than be specific for a particular species.

National Animal Health Reporting System Update

Dr. Stanley D. Bruntz, USDA APHIS VS National Surveillance Unit, Fort Collins, Colorado presented the following update on the National Animal Health Reporting System (NAHRS).

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. NAHRS is part of the United States' comprehensive, integrated National Animal Health Surveillance System and is a joint effort of the USAHA, AAVLD, and USDA-APHIS. The NAHRS Steering Committee is a subcommittee of the USAHA/AAVLD Animal Health Information Systems Committee. Through animal disease surveillance activities, State personnel report qualitative information (yes/no) monthly to NAHRS on the confirmed occurrence of each NAHRS listed disease. 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. The NAHRS adds credibility and validity to reporting. The NAHRS is a voluntary program and currently 43 States participate (several States preparing to participate). In May of 2005, the OIE revised the OIE Reportable Disease List. The changes to the OIE Avian disease list included the addition of avian mycoplasmosis (*M. synoviae*) and Turkey rhinotracheitis; revision of Avian Influenza reporting criteria; and the deletion of Avian Tuberculosis, duck virus enteritis, and fowl pox. The NAHRS Steering Committee has requested that the NAHRS Reporting List be revised to reflect the changes to the OIE Avian Reportable Disease list.

Dr. Stanley Kleven of the University of Georgia, Athens, GA moved that the Committee recommend that the list of reportable diseases of poultry be changed to correspond to the new OIE list. The motion was seconded and passed unanimously. Dr. Kleven, as the representative of the Committee on Transmissible Diseases of Poultry and Other Avian Species, will carry this message to NAHRS.

Dr. Robert Eckroade of the University of Pennsylvania, Kennett Square, PA, moved that the Committee pass a recommendation endorsing NAHRS and encouraging those states not now reporting to do so. The motion was seconded by Dr. Gary Waters (MT) and others, and passed unanimously. The Chair drafted the following recommendation, submitted to the Board of USAHA for forwarding by the President to the state veterinarians of the four remaining states that have not made a commitment to participate in NAHRS.

Recommendation:

The National Animal Health Reporting System (NAHRS) is an animal disease 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 USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species endorses NAHRS and strongly encourages your state to participate in the program.

NAHRS is part of the United States' comprehensive, integrated National Animal Health Surveillance System and is a joint effort of the USAHA, AAFLD, and USDA-APHIS. The NAHRS Steering Committee is a subcommittee of the USAHA/AAFLD Animal Health Information Systems Committee. Through animal disease surveillance activities, State personnel report qualitative information (yes/no) monthly to NAHRS on the confirmed occurrence of each NAHRS listed disease. There is no quantitative (numerical) data collected, and no reports of disease are traceable back to individual premises. The state animal health official is in control of the reporting of all information for each state. 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. The United States is obligated by international agreements to report these data as accurately as possible. The NAHRS adds credibility and validity to our reporting. Participation by all 50 states would add greatly to the credibility of the reports, support our desires for reciprocal transparency, and strengthen our position in trade negotiations. The NAHRS is a voluntary program and currently 43 States participate, with several more States preparing to participate.

Currently, your state is one of only four that have not made a commitment to participate. The Committee on Transmissible Diseases of Poultry and Other Avian Species strongly urges you to join this important program to help protect our vital agricultural trade.

Special Report from the Committee on Salmonella concerning proposed FDA regulations for shell eggs

Dr. David M Castellan of the California Department of Food and Agriculture, Chair of the Committee on Salmonella, presented a report of that Committee's activities on the proposed FDA regulations on *Salmonella enteritidis* in shell eggs.

Raw shell eggs are considered a "potentially hazardous food" as defined by the FDA Model Food Code (1). A potentially hazardous food is "a food that requires time/temperature control for safety (TCS) to limit pathogenic microorganism growth or toxin formation". In 1998 the Food Safety Inspection Service (FSIS) published the *Salmonella enteritidis (SE) Risk Assessment*. One of the major conclusions of the risk assessment was that "broadly based policy may be more effective than a policy directed solely at one area of the egg production-to-consumption chain" (2). Thus, a comprehensive farm to fork approach was promoted. The *Egg Safety Action Plan* was developed in 1999 and included input from the U.S. Food and Drug Administration (FDA), FSIS and State agriculture agencies. In 2004, the Department of Health and Human Services published proposed rules for the *Prevention of Salmonella enteritidis (SE) in Shell Eggs During Production* (3). The FDA proposed rule is the first public health regulatory program affecting food producers for a microorganism that affects human health but with minimal effects on animal health.

The proposed rule will apply to egg producers with greater than 3,000 laying hens who market raw shell eggs indirectly through the shell egg marketing system to the consumer. The proposed rule exempts producers with fewer than or equal to 3,000 laying hens that may sell directly to consumers (e.g. farmers markets) as well as all eggs that are heat treated to achieve a 5-log pathogen reduction standard. Provisions of the proposed rule include meeting National Poultry Improvement Plan (NPIP) SE monitored status, biosecurity, pest control, cleaning and disinfection, refrigeration of eggs stored longer than 36 hours, environmental monitoring at 45 weeks of age and 20 weeks following the completion of molt, in addition to administrative and record keeping

requirements. Positive environmental samples trigger egg testing every two weeks over eight weeks. A positive egg test results in diversion of eggs and egg testing continues until four consecutive negative tests are obtained.

Subcommittee members who provided science-based comments for the public dockets are acknowledged below. Two separate comments were produced totaling 21 pages in length (4). The overriding principle stressed by the subcommittee is that successful SE reduction using a risk based, process control approach used by existing egg quality assurance programs is resulting significant progress over time. Unlike regulations, a process control approach is intrinsically problem-oriented and problem-directed by design. For that reason, comments stress the recognition of existing egg quality assurance plans with a proven record of continual pathogen reduction by FDA through the formation of partnership agreements. Regional differences including management, climate, demographics and the epidemiology of SE in poultry and humans require a flexible approach that uniform regulations will not provide. The subcommittee recommended that rodent control (including indexing, record keeping and audits), vaccination and cleaning and disinfection between flocks be considered essential components of an SE reduction strategy at the production level. Research is needed to assess possible alternatives to egg diversion using these strategies including competitive exclusion. Flexibility in the promotion and use of wet versus dry cleaning and disinfection methods is advised since climate and management systems will vary considerably and require regionally appropriate solutions. The proposed requirement to refrigerate eggs stored longer than 36 hours is at odds with the best available scientific information and may negatively affect eggshell quality. The exemption of small production units (3,000 hens or less) due to economic considerations is problematic from a disease prevention standpoint. Education and training of farm workers, field and laboratory staff is also a necessary component of a successful SE reduction program. Laboratory methods among human and animal health laboratories vary considerably and proven, standardized methods are required. The administrative, field associated and laboratory costs of the program are considerable. The proposed rule will pose a financial stress on smaller producers and those in areas with inadequate egg breaker capacity. Consumer acceptance and marketability of eggs diverted due to SE may limit their use for human consumption.

The goal of SE pathogen reduction and protection of public health has been gradually achieved by states with existing egg quality assurance programs (4). It will be important to assess the proposed regulatory program similarly over time. Success of the proposed regulation will depend on whether it is part of a comprehensive approach advised by the FSIS *SE Risk Assessment* and whether necessary funding will be available to develop, administer and deliver flexible and effective federal-state partnership programs. It will also be important to monitor and assess States either with or without pre-existing egg quality assurance programs over time once the proposed regulation is enacted. In order to protect public health and meet the goals of *Healthy People 2010* (5), it is essential that SE reduction efforts taken by egg producers be combined with those of egg processors, distributors, retailers, food preparers and consumers along the entire farm to fork continuum.

Acknowledgements:

Eric Gingerich (Chair), Kenton Kreager, Hailu Kinde, Doug Waltman, Charlie Beard, Bob Eckroade, Rich Dutton, Kakambe Nagaraja, Richard Gast, Richard Breitmeyer, Nancy Reimers, Dave Kradle, Dave Halvorson, Mike Opitz, David Glauer, Robin Burton, Rick Willer (USAHA President)

References:

1. FDA 2005 Model Food Code: <http://www.cfsan.fda.gov/~dms/foodcode.html>
2. FSIS SE Risk Assessment: <http://www.fsis.usda.gov/ophs/risk/index.htm>
3. 21 CFR Parts 16 and 118
4. USAHA Comments Submitted to FDA Public Dockets:
December 16, 2004 - Docket Nos. 1996P-0418, 1997P-0197, 1998P-0203, and 2000N-0504
June 6, 2005 - Docket No. 2000N-0504
5. Healthy People 2010 Focus Area 10: Food Safety: <http://www.foodsafety.gov/~dms/hp2010.html>

Reports on Avian Influenza and Newcastle Disease

Dr. Fidelis Hegngi of USDA APHIS VS presented the update on the Live Bird Marketing System Low Pathogenicity Avian Influenza (LPAI) Program Working Group.

There has been an increasing domestic and international concern for Low Pathogenicity Avian Influenza (LPAI) over the past 10 years, due to:

- Persistence of an H7N2 LPAI subtype virus in the Northeastern U.S. live bird market (LBM);
- Ability of H5 and H7 LPAI viruses to mutate to high Pathogenicity avian influenza (HPAI) viruses;

- Transmission of HPAI viruses to humans in certain Asian countries; and
- Extensive trade sanctions against U.S. poultry exports.

The domestic LPAI program provides surveillance for H5 and H7 LPAI prevention and control in the Live Bird Marketing System (LBMS). In October 2004, VS published uniform standards for H5 and H7 LPAI prevention and control in the LBMS to establish a more consistent approach by participating States in the control of LPAI in LBMS. State participation is voluntary; participating States will enact regulations necessary for compliance of their LBMS including producers, distributor, and retail market components.

In January, April, and September 2005, the LBM working group met to address prevention and control of LPAI H5 and H7 in the LBMS with a focus on the Northeast (New York, New Jersey, Pennsylvania, and the New England States) and to discuss the program's progress, to share ideas, and to concur on the implementation of the program. In FY 2004, 10 States participated in the LBMS surveillance (NY, NJ, CT, MA, ME, PA, VT, CA, FL, and TX). In FY 2005, we have initiated cooperative agreements with 21 States (CA, DE, FL, GA, IL, IN, KY, MA, ME, MD, MN MO, NC, NJ, NY, OH, PA, SC, TX, VA, VT).

USDA's Professional Development Staff (PDS) in collaboration with the National Center for Animal Health Programs (NCAHP) Poultry Staff presented two 3-day training courses at New Bolton Center in Kennett Square, Pennsylvania – one in December 2004 and the second course in September 2005 of FY05. The course was provided to State and Federal Animal Health Technicians (AHTs), Veterinary Medical Officers (VMOs), and other stakeholders working with the H5/H7 LPAI Program in the LBMS. This technical training included a comprehensive program that covered LBMS activities, diseases of poultry, laboratory testing, biosecurity, personal protective equipment, state regulations, demonstration of correct euthanasia techniques, Geographic Information System (GIS), the role of Investigation and Enforcement Services (IES), risk assessment, the National Animal Identification System and an update on HPAI H5N1 in Asia. Federal and State personnel (3 VMOs and 14 AHTs) have been hired and trained.

In FY 2005, a total of 21,081 samples from 6 northeastern states CT (n=1,684), FL (n=85), MA (n=1,964), ME (n=1,819), PA (n=15,517) and VT (n=12) were submitted to be tested for the presence of avian influenza antibodies on AGID. 5,998 samples (each sample representing five individual swabs pooled for a composite single sample) from NY (n=3,000), and PA (n=2,998) were submitted for testing for the presence of AIV by virus isolation. In addition 16,272 tracheal/oral pharyngeal swab samples (each sample representing five individual swabs pooled for a composite single sample) from 9 states, CT (n=687), FL (n=152), MA (n=329), ME (n=2), NJ (n=3,082), NY (n=2,584), PA 9n=9,289), RI (n=75), and VT (n=72) were submitted to be tested for presence of AIV by the real-time RT-PCR. 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 effort by VS and the states, the incidence of LPAI in LBMs in the Northeastern United States has decreased in FY05. For example, the incidence of LPAI in LBMs in New York decreased from 13.0% to 10.4% and in New Jersey there was a decrease LPAI incidence from 43% to 1%.

Dr. Ernie Zirkle, former New Jersey State Veterinarian and consultant to the LBMS Working Group, presented an update on the individual bird identification project.

The individual ID project awarded to KADIX titled "Applications of Bird Identification for Prevention and Control of Low Pathogenicity Avian Influenza in the Live Bird Marketing System" began January 14, 2005 and ended January 31, 2005. The performance-based statement of work provided for five mutually agreed upon deliverables. The two types of ID to be studied, identified in a prior project, were Glue Tag for older birds and Fastack to be applied to day old chicks.

Objective 1: Refine available identification tags for use in hatchling and mature groups of poultry and other avian species.

Objective 2: Using tagging systems of choice that fulfill criteria for animal identification under the National Animal Identification System (NAIS), follow tagged birds through the LBM System evaluating the following:

- The tag of choice in the different components of the LBM system
- How tags may be issued and where they will be printed
- Who may apply tags and where

- Poultry identification responsibilities of the producer, distributor, & LBM

Objective 3: Estimate of cost of tag application and monitoring

- Capture costs of tags, printers, labor, administration, and record keeping
- Find hidden costs associated with program
- Develop recommendations for cost recovery

Objective 4: Determine requirements for an electronic record keeping system for premises ID and for distribution of tags compatible with the needs of the LBMS. Assure applicability to NAIS database.

Objective 5: Examine characteristics of typical end users to understand current issues and provide insight to emerging trends that may affect LBM's future for program development and training purposes.

Accomplishments to date include:

- Cooperation of Hatcheries, Producers and Distributors
- 150,000 birds tagged as day old chicks
- Also tagged minor species, Quail & Guineas
- Now tagging at load out with Glue Tag – 5,000 so far
- Tagged layers at hatch and moving into cages as pullets
- Economic Survey of System is completed and being analyzed.
- Survey of End Users is completed and being analyzed
- All other data is being collected and analyzed

I anticipate having the project completed and having the report submitted to USDA in January 2006.

Mr. Andrew R. Rhorer, Senior Coordinator of the USDA APHIS VS National Poultry Improvement Plan (NPIP), presented an update on the Proposed NPIP H5/H7 Low Pathogenic AI Program for Commercial Layers, Broilers, and Turkeys.

USDA, Animal and Plant Health Inspection Service (APHIS) explored options for how their regulatory response to H5 and H7 LPAI viruses might be revised to better protect our domestic poultry flocks from HPAI and to ensure that any interruptions in trade are scientifically supportable. APHIS requested the U.S. Animal Health Association's (USAHA) Transmissible Diseases of Poultry Committee (TDPC) and the National Poultry Improvement Plan (NPIP) to jointly develop proposed regulatory options for H5 and H7 LPAI. USAHA held a meeting in San Antonio, Texas in conjunction with the 36th biennial conference of the NPIP May 2002, to discuss three main issues:

1. Is federal involvement in the control of H5/H7 LPAI desired, and if so, what form should it take?
2. Should vaccination for H5/H7 subtypes of avian influenza be allowed, and if so, in what context?
3. What approach should be taken to control H5/H7 LPAI in live bird markets?

It was decided that a federally directed program for H5/H7 LPAI is needed, and that the program should have the following characteristics:

1. Maximum local autonomy
2. Minimum standards needed to secure federal backing, but still allow local flexibility, and,
3. Voluntary, Cooperative State-Federal Program:
 - a. State surveillance and initial response plans, and,
 - b. Guarantee of immediate federal assistance with outbreaks for states with qualifying plans.

In addition, it was agreed that vaccine, including H5/H7, should be available as part of science-based control strategies in outbreaks and that the live bird market system should be a voluntary, cooperative State-Federal program with uniform, mandatory provisions for cooperators, and only participating States would be eligible for federal assistance and indemnity.

The delegates to the 36th biennial conference of the NPIP called for the establishment of a LPAI working group. More than 50 industry leaders from the National Chicken Council, the National Turkey Federation, and the United Egg Producers were involved in the process as options were discussed in meetings and conference

calls over the summer and into the fall. The LPAI working group developed proposed active surveillance programs for commercial layers, broilers, and turkeys. These proposed active surveillance programs were presented to and accepted by USAHA TDPC in St. Louis, Missouri. The TDPC asked the NPIP to develop criteria for certifying complexes, slaughter plants, and States as "U.S. H5/H7 Avian Influenza Monitored".

Along with the active surveillance described above, the TDPC asked the NPIP to develop guidelines for a proposed diagnostic surveillance plan, and State Response and Containment plans for the proposed H5/H7 LPAI program for commercial table-egg layers, broilers, and turkeys. The States that fulfill the requirements of all three components and the companies that participate in the voluntary program should have advantages relative to interstate movement and foreign trade and guaranteed immediate federal assistance upon request with financial and material support and indemnity.

The proposed NPIP H5/H7 LPAI program for commercial table-egg layers, broilers, and turkeys was sent to all of the industry organizations, and state poultry health agencies, authorized laboratories and official biennial conference delegates from each of the 48 participating states 150 days prior to the NPIP biennial conference held in San Francisco, California, July, 2004. At the conference, the Table-egg Layer, Meat-type Chicken, and Meat-type Turkey Subparts held committee meetings and developed amendments to the proposed H5/H7 LPAI program. The chairpersons from each subpart committee helped to compile and blend the amendments for consideration by the full conference the following day. The coordinated amendments were considered and accepted by the full conference and the H5/H7 LPAI program for commercial table-egg layers, broilers, and turkeys was therefore ratified. It is envisioned that the proposed "U.S. H5/H7 LPAI Monitored" program for commercial table-egg layers, meat-type chickens, and meat-type turkeys would be administered like the NPIP breeder programs. It is currently going through the administrative rulemaking process within the USDA.

The proposed (still in formative stages) program calls for:

1. Active surveillance for H5/H7 LPAI at the table-egg layer house, and at the broiler and turkey flock level or at the slaughter plants;
2. Makes H5/H7 LPAI a reportable disease and requires all authorized laboratories that perform diagnostic procedures on poultry to examine all submitted cases of unexplained respiratory disease, egg production drops, and mortality for AI;
3. Requires each participating state to have an Initial State Response and Containment (ISR&C) plan for H5/H7 LPAI;
4. Defines H5/H7 LPAI Infection as follows: H5/H7 LPAI virus has been isolated and identified as such or viral RNA specific for H5/H7 LPAI has been detected in poultry, and antibodies to H5/H7 subtype of AI virus that are not a consequence of vaccination have been detected in poultry;
5. Authorizes APHIS to pay for 100 percent of the cost of purchase, destruction, and disposal of poultry infected with or exposed to H5/H7 LPAI, cleaning and disinfection of contaminated barns and equipment, and 100 percent of the cost of any surveillance, vaccination, monitoring, and euthanasia associated with an eradication effort for H5/H7 LPAI, provided that the producers affected by the outbreak are participants in the control program and the State in which the outbreak occurs has a diagnostic surveillance program and an ISR&C plan for H5/H7 LPAI that has been approved by APHIS. For all non-participating flocks of table-egg layers, broilers, and turkeys, APHIS will indemnify only 25% of the above costs.

H5/H7 Antigen Stockpile

Dr. T. J. Myers of USDA APHIS VS reported that additional funding has been allocated for the stockpile and it will continue to expand.

A special report on Planning for Business Continuity During an Outbreak of a Foreign Poultry Disease was presented by Todd McAloon, Sunnyfresh Foods, Monticello, MN, with co-authors Kris McElroy, University of Minnesota, St. Paul MN; Rosalind Zils, Sunny Fresh Foods, Monticello, MN; Dave Halvorson, University of Minnesota, St. Paul, MN; Cecile Ferrouillet, University of Minnesota, St. Paul, MN; Will Hueston, University of Minnesota, St. Paul, MN

Traditional emergency preparedness planning for outbreaks of foreign animal and poultry disease focus on the short term goal of containing the disease spread to limit animal and human health consequences. However, notifiable diseases also can have potentially serious economic consequences for companies, states, and countries where these diseases occur as was the case for Foot and Mouth Disease in the UK in 2001 and the BSE discovery in Canada and the US in 2003. Unfortunately, emergency preparedness planning efforts seldom

consider the long term implications to business such as disruption of food supply chains. This presentation will discuss a multi-governmental agency, multi-state, university collaboration with the egg industry to develop business continuity plans to insure the continued movement of safe food through normal distribution channels in the event of an Avian Influenza outbreak.

In light of today's just-in-time delivery systems, many food processors have limited inventories of either raw materials or processed products. Therefore, a disruption in the raw material sourcing essentially shuts down the supply chain. Processing stops and customers are left with no product. Disruption of the supply chain not only has economic implications but also indirect public health impacts. People perceive risk in terms of both the science and a series of psychological filters such as the newness of the disease, the level of knowledge about the disease, and the apparent ability of government and industry to contain the disease and limit its impacts. Product shortages due to disruption of the supply chain add to the perceived risk experienced by consumers, most of who have become accustomed to an inexhaustible supply of affordable food. Increased perceived risk contributes to psychological stress and mental health problems. In addition, given the major long-term customer commitment by many of today's food processors, this disruption may break contractual agreements and cause irreparable damage to business relationships. The economic impacts of business disruption further impact the public's health indirectly through reduced revenues for producers, processors, distributors, retailers and food service (any company in the food supply system), reduced income for laid-off employees and decreases in city, county and state tax revenues.

Sunny Fresh Foods, a large processor of egg products, asked the University of Minnesota Center for Animal Health and Food Safety to facilitate the expansion of traditional emergency planning to address business continuity issues. University faculty and veterinary public health residents have facilitated a series of meetings involving Sunny Fresh staff and suppliers (egg producers and breaker plants) along with state and federal government officials from both animal health and public health agencies. The meetings have focused on the shared objective of developing a contingency plan that maximizes the continued movement of raw materials and food products in the event of an avian influenza outbreak while protecting both animal and human health.

Through a series of working meetings, a qualitative assessment was completed to evaluate the risk factors associated with disease spread and to identify specific control points along the food chain. The primary hazard of concern is the potential spread of AI among poultry growers. While avian influenza is not considered to be transmitted to humans through food products, the hazard of potential human exposure to viable avian influenza was also considered. The principle exposure routes were evaluated: birds, manure, eggs, equipment and people.

The overall design of the emergency response outlined a multi-stage response plan with three levels of biosecurity: baseline, elevated and highest. The biosecurity levels are tied to various trigger events that would lead to the elevation of biosecurity, such as the diagnosis of a foreign poultry disease in a state that supplies Sunny Fresh with eggs. Again, the overall objective is to have in place sufficient biosecurity to allow movement of raw materials (liquid eggs) to processing while protecting animal and human health.

While this plan focused on a single company and their raw material supply chain, the concept is applicable to numerous other parts of the food system. The idea is to engage producers, processors and others in the food chain in discussions with government officials and university experts *prior to* an emergency, and to consider issues of business continuity as well as animal and human health. This collaborative effort resulted in practical, achievable enhancements in biosecurity and an emergency response plan the producers and processors are committed to implementing. Already, the planning effort has resulted in changes in baseline biosecurity that have decreased the vulnerability of these egg producers, breakers and egg processors to disease transmission. At the end of the day, emergency preparedness plans, including business continuity plans, should be pragmatic, realistic and implementable – the egg processing plan developed through this cooperative effort fulfills all of these criteria.

Mr. Jay P Ross, IT Manager of the California Animal Health and Food Safety Laboratory at the University of California at Davis gave a presentation on the California Pilot Project

Current surveillance and disease mitigation efforts are hindered by poor data quality and the lack of direct data sharing among project/taskforce partners. The California Pilot Project was developed specifically to combat these issues by streamlining data collection and facilitating information exchange. When this project is completed it will provide the groundwork for future implementation of surveillance and mitigation efforts. It is expected that

significant resources will be freed from the burden of data entry and that those resources will be better utilized for more valuable work.

The project was sponsored based upon the lessons learned from the Exotic Newcastle Taskforce in California that wrapped up operations in late 2003. The complexity of managing a 300 person taskforce that was actively working on sample collection, testing, reporting across three separate organizations (and several departments within each organization) led to key problems related to data sharing, and data quality. With each organization entering data separately, there were also problems when comparing the metrics and overall taskforce progress.

The California Pilot Project is a joint effort between the California Animal Health and Food Safety Laboratory (CAHFS) at UC Davis, the Animal Health branch of the California Department of Food and Agriculture (CDFA), and the Animal and Plant Health Inspection Services (APHIS) branch of the United States Department of Agriculture (USDA). This project builds upon the efforts of a National Animal Health Laboratory Network (NAHLN) laboratory results project, the Bovine Spongiform Encephalopathy (BSE) surveillance program, and individual efforts made by various state and federal programs. The avian health surveillance program in California will serve as the test environment to ensure that the designed solution achieves the goals of the project and functions as expected in the real world.

Key project goals:

- Develop an electronic, inter-program solution that reduces the number of data collection problems and generally improves data quality and collection efficiency.
- Function both as a standard surveillance and emergency taskforce system.
- Expandable system that will handle multiple surveillance programs and test data.
- Improve the quality of data from the source (the field).
- Share all necessary data collected in the field amongst all approved organizations without the need for manual data entry.
- Assure better chain of custody control and documentation from both the legal and diagnostic perspectives.

The scope of the project includes designing and implementing an electronic system that will allow more efficient, accurate, and consistent data collection and distribution to all involved programs. Specifically, the project will equip 15 CDFA and USDA field collectors in Garden Grove, CA, with computer hardware and software for field sample collection. These devices will facilitate rapid, accurate, and consistent collection of samples and data. These devices will also share collected information, as needed, with the diagnostic labs (CAHFS and NVSL) and will send required data to the primary information systems within CDFA and USDA. To assist in data entry and to further improve data quality, bar coding will be implemented as identifiers for samples collected and for cases submitted. Tablet computers, web applications, and digital paper solutions are also being tested as part of the project. In addition, standardized messaging and terminology are being implemented including: Health Level Seven (HL7), Logical Observation Identifiers Names and Codes (LOINC), and Systematized Nomenclature of Medicine (SNOMED).

As of late October, initial testing of the design has been completed and deployment is planned for December 2005. At the end of this project, a report will be circulated that will include the final project outcome and lessons learned.

The project presentation will explain how the design and tools could be applied to other routine and emergency surveillance programs, the likely cost to bring on a department of agriculture from a different state, a new diagnostic laboratory, and the costs to equip field collectors.

Report of the Avian Influenza and Newcastle Disease Subcommittee, International AI Situation, Assessment of Threat to US industry; Migratory Waterfowl and AI Inactivation in Meat by D.E. Swayne, D.L. Suarez, E. Spackman, and M. Pantin-Jackwood of USDA ARS Southeastern Poultry Research Laboratory, Athens, GA

The 6th International Symposium will be held at the University of Cambridge, United Kingdom, April 3-6, 2006. Ilaria Capua, Ian Brown and David Swayne have organized the symposium. The program will include a variety of invited and attendee submitted oral presentations and posters. A heavy attendance is anticipated. Registration is available on line at <http://www.defra.gov.uk/corporate/vla/aboutus/aboutus-ai-intro.htm>.

Outbreaks continue of H5N1 high pathogenicity avian influenza (HPAI) in Asia during 2005. Reports of additional poultry cases have occurred in China, Indonesia, Vietnam and Thailand. The virus is now endemic in

smallholder and scavenger poultry in many parts of Asia where infections in domestic ducks are as high as 70%. New outbreak countries have included Russia, Mongolia, Kazakstan, Turkey, Croatia, and Romania. An infected parrot in quarantine was reported in the United Kingdom. The major development has been the infection of some migratory bird species with mortality. In addition, outbreaks in poultry within some countries have been linked to migratory bird movements. The majority of the poultry infections have involved backyard or outdoor reared chickens, turkeys and ducks. The threat of introduction of the virus to the USA has increased with the wider distribution of the virus in Asia and Europe. Natural and regulatory barriers have made introduction via migratory birds, legal commerce and human movement a very low risk. However, illegal commerce in live birds (captive wild and poultry) or untreated products poses the greatest threat for introduction. The virus is labile and easily inactivated by heat. Cooking at a minimal temperature of 70C will inactivate virus in meat in less than 1 minute.

Dr. Mary Pantin-Jackwood of USDA ARS Southeastern Poultry Research Laboratory (SEPRL), Athens, GA gave an update on Avian Influenza Research at SEPRL

Pathogenicity studies in ducks

Ducks and other wild aquatic birds are the natural reservoir of influenza type A viruses, which usually are nonpathogenic in these birds. However, since late 2002, H5N1 outbreaks in Asia, and recently in Mongolia, Russia, Kazakhstan, the Urals, Romania, and Croatia, have resulted in mortality among waterfowl in recreational parks, domestic flocks, and wild migratory birds. We studied the pathogenicity and transmission potential in ducks of these new viruses by inoculating 2-week-old and 5-week-old white Pekin ducks with one of four Asian origin H5N1 highly pathogenic AI viruses. Young ducks inoculated with A/Vietnam/1203/04, A/Crow/Thailand/04 and A/Egret/HK/757.2/02 developed acute disease, including severe neurological dysfunction and death. These viruses killed 7 out of 8 two-week-old ducks but only 2 out of 8 of the five-week-old ducks. The brain, heart, pancreas, skeletal muscle, and adrenal glands were the most consistently affected organs and viral antigen was most often detected in the parenchyma of these organs. A fourth virus, A/Prachinburi/6231/04, killed 3 out of 8 two-week-old ducks, producing mild depression but not inducing neurological signs. In older ducks, this virus did not produce clinical signs but did affect weight gain. All four viruses studied were excreted in large quantities from respiratory, and to lesser extent, intestinal tracts. These results confirm that some of the circulating H5N1 isolates are capable of causing disease in ducks, with three of the four isolates studied inducing severe neurological signs and death, mainly in young birds. Subclinical infection or mild disease in adult ducks would not preclude the potential for carrying these viruses over long distances. This, and the increase of virus excretion found with these viruses, may suggest a more significant role of waterfowl in spreading these highly pathogenic AI viruses.

Vaccine studie

An evaluation of protection for chickens to challenge with recent Asian H5N1 HPAI using vaccines made from North American origin AIV isolates is underway.

Free-flying bird surveillance and wild bird isolate AIV characterization projects with the Ohio State University, Southeastern Cooperative Wildlife Disease Study and University of Alaska Museum of Natural History have continued. Eurasian lineage strains have been rarely identified in shore birds from the Eastern flyway.

Dr. Mary Pantin-Jackwood of USDA ARS Southeastern Poultry Research Laboratory (SEPRL) presented a report on behalf of Dr. David Suarez of USDA ARS SEPRL, Athens, GA on Rapid Diagnostics For Avian Influenza and Newcastle Disease Virus

The use of real-time RT-PCR (RRT-PCR) diagnostics has provided a rapid and sensitive diagnostic tool for avian influenza virus and Newcastle disease virus, and it is widely available in the National Animal Health Diagnostic Network (NAHLN). Improvements to the test are still being developed to improve the utility of the test, increase the sensitivity, and provide increased quality control. With cooperation with APHIS and a commercial company, two major improvements to the RRT-PCR test have been recently developed. The first is the incorporation of an internal positive control that is designed to identify false negative reactions. By adding an internal control RNA template in a multiplex format, both the target RNA (AI or NDV) and the internal control can be amplified in the same reaction tube, and the results can be viewed with different channels of a real-time PCR machine. The test is designed so that if no target template is identified (a negative sample), then the internal positive control will be positive. If both the target and the internal control are negative, then further testing will need to be done to determine if PCR inhibitors are present or if the reaction was set up improperly. The internal positive control provides assurance that the test was performed correctly.

The second major improvement is the use of dried down reagents to simplify testing and increase quality control. Currently, every NAHLN lab must order primers, probes, and other reagents from their own supplier. Each laboratory must also perform its own quality control measures to assure the test is being performed properly. Because of variations between suppliers and even from the same supplier, differences in performance are likely between different laboratories. Working with a commercial company, the primers, probes, buffer, MgCl, and internal control were all lyophilized into a bead. The bead format simplifies testing by reducing the number of reagents that must be pipetted into the master mix. The dried down beads also provide for increased stability of the reagents, allow for convenient testing of small numbers of samples, and allow for more strenuous quality control of the reagents to be performed. With some optimization of the buffers and cycling times, the sensitivity of the bead format is also slightly better than that using the wet reagents. The beads are being included as part of the official APHIS protocol, and should be available commercially or through NVSL in the near future.

Dr. Nina Marano of DHHS CDC, Atlanta, GA gave a report, co-authored by Dr. Nancy Cox and Dr. Tim Uyeki on the human-bird interface with Avian Influenza. An abstract was not provided in time for submission of these proceedings. Dr. Marano's presentation covered the possible mechanisms for adaptation of avian strains of AI to humans, the limited potential for such strains to transmit back to birds once adapted to humans, activities in place to detect infected humans entering the US, and efforts the US industry could consider to protect their workers.

Dr. Spangler Klopp, Townsends, Inc., Georgetown, DE delivered a presentation entitled The USDA National Organic Program (NOP) Requirement for Outdoor Access of Certified Organic Poultry is a Deterrent to Control of Poultry Diseases including Avian Influenza (AI)

The American public expressed a desire for organic foods and a formal certification program for such foods. The NOP was formed to meet this need and became regulation in October 2001. There are many distinctive and unique requirements for the production and processing of organic foods including poultry.

One section of the NOP (205.239, a, 1) requires USDA certified organic poultry have "access to the outdoors" during their production life. This outdoor access enhances the likelihood that such poultry will have direct contact with migratory and wild birds as well as other animals. This requirement for outdoor access by a department of the official agricultural agency of this country, USDA, seems incongruous at best.

Disease control is a priority for certified organic poultry as well as conventionally reared poultry. Contagious disease does not recognize boundaries of any type. In over 50 years of progress, the poultry industries of this country have moved their flocks inside and this action has contributed significantly to the improvement in health of the nation's chicken and turkey flocks.

AI has been a long-standing threat to the health of our poultry and now takes on new potential public health and media perception identities. Migratory and wild birds are known carriers of AI virus and as such contact between them and domestic poultry must be prevented.

For this reason, I propose one and only one change to section 205.239, a, 1. That change is to eliminate 4 words; "Access to the outdoors" as a requirement for production of USDA certified organic poultry. Protection of our nation's poultry, both conventional and organic, is just too critical to compromise!

Dr. Klopp proposed a Resolution urging USDA to amend the National Organic Program, by deleting the requirement for access to the outdoors. An amendment by Dr. Nancy Halpern of the New Jersey Department of Agriculture clarifying the point that this change would make outdoor access optional, and not prohibit outdoor access, due to the likely resistance a prohibition would encounter in the organic community, was passed. An amendment by Dr. Y. M. Saif of The Ohio State University to specify that, in the event of an outbreak of highly pathogenic AI, outdoor access could be prohibited, was also passed. The amended Resolution was passed.

Dr Fidelis Hegngi and Ms. Madeline Fletcher of USDA APHIS VS presented an Update on Exotic Newcastle Disease National Surveillance and Outreach Efforts

Overview of Expenditures

In fiscal year (FY) 2003, the U.S. Department of Agriculture (USDA) received \$4.4 million in Commodity Credit Corporation (CCC) funds to develop and distribute outreach and education materials (Biosecurity for the Birds campaign) and \$2.0 million for the "fee-for-service" program, administered by the National Veterinary

Services Laboratories (NVSL) for direct payments to approved laboratories to conduct diagnostic workups for END.

Accomplishments

- Of the targeted 30,000 sample allocations to participating laboratories, the program has tested 16,675 specimens for Newcastle disease since late 2003 from 26 states (AL, AR, AK, CO, CT, FL, GA, IA, LO, MD, MI, MN, MO, MS, NC, NJ, NM, NY, NV, OH, OK, PA, SC, VA, WA, WI). There were no positives reported. The testing has provided data for syndromic surveillance and locations of non-commercial poultry premises.
- The partnership with State and Federal laboratories has increased state laboratory capacity and expanded the expertise nationally. Thirty laboratories in 29 states are approved to conduct END testing under the program. The testing aids in documenting the END-free status in the United States.
- Biosecurity For the Birds outreach and education effort began an advertising campaign in July 2004 and ran through December 2004. It resumed again in July and is continuing through May 2006. To date the campaign has reached a circulation of over 125 million. Radio advertising and expanded Internet advertising are being done as well.
- A major initiative has been the advertising program with feed manufacturers with information placed on feed sacks (generally 100 pounds and under).
- Emphasis has been on advertising in rural cooperative publications and community newspapers with a focus on reaching ethnic audiences including Hispanic, Vietnamese, Filipino, Amish and Native American audiences.
- Materials developed as part of the campaign include brochures, posters, giveaways, displays, a website (www.aphis.usda.gov/vs/birdbiosecurity).
- Materials have been distributed at State and county fairs, poultry shows, veterinary conferences, universities, 4H groups, etc. The campaign has supported exhibits at conventions and annual meetings and at the International Poultry Congress 2005. Materials distributed to all 50 states and numerous countries.
- Targeted outreach provided to stakeholders including veterinarians and hatcheries, Hispanic diocese churches and bird clubs. A special CD was developed for bird clubs.
- A video entitled Backyard Biosecurity, Practices to Keep Your Birds Healthy was developed and produced. Over 3500 have been distributed.
- A video news feature was produced and distributed by USDA's Office of Communications – numerous stations across the country picked it up.
- Most materials developed in Spanish, and the video was translated into Hmong.
- A National Poultry Improvement Plan targeted mailing to 3000 people was done in the spring and a mailing to over 125,000 small flock producers is underway.

Future Initiatives

- Find ways to continue to fund the END program including "fee-for-service"; cooperative agreements for sample collection in states; outreach and education targeted and tailored to noncommercial poultry.
- Continue to build partnership with stakeholders.

These reports completed the session on Avian Influenza and Newcastle Disease

Dr. Lindsey Garber of USDA APHIS VS Centers for Epidemiology and Animal Health gave a report on the National Animal Health Monitoring System (NAHMS) Poultry 2004 Study

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) help provide information to improve management practices that affect bird health, 2) assist animal health officials and industry members in identifying research needs, and 3) provide owners of small-production or backyard flocks with information on avian influenza (AI), exotic Newcastle disease (END) and effective biosecurity practices.

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 2 flocks within one mile of commercial operations. Over one-third of commercial operations had no backyard flocks located within one mile. Gamefowl breeder flocks were larger, used more health care and biosecurity practices, and moved more frequently compared to backyard flocks.

For the live poultry market component, 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. One objective of the live poultry market component of Poultry 2004 was to identify potential risk factors for markets persistently positive for LPAI versus persistently negative markets. Data collection from live poultry markets throughout the U.S. has been completed. Data analysis is ongoing and a report is expected in Spring 2006.

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

Dr. Spangler Klopp, Townsends, Inc., Georgetown, DE provided the report for the National Animal Health Surveillance Steering Committee (NAHSSC)

NAHSSC is, as the name says, a steering committee for USDA disease surveillance in animals throughout the United States. The committee is comprised of 14 members from different areas of perspective - APHIS, university, state veterinarians and producer (pork, cattle and poultry) personnel.

The Steering Committee focuses heavily on the National Surveillance Unit (NSU), but will "steer" the National Animal Health Surveillance System (NAHSS), which includes NAHMS. Additionally, the steering committee will be a source of expertise for APHIS-VS personnel in the development of surveillance systems for the three major disease types of diseases, Foreign Animal Diseases, Emerging Diseases and PD.

Currently, Avian Influenza (AI) and exotic Newcastle Disease (END) are the diseases of concern for poultry. As the poultry representative, my intention is to consult with other broiler veterinarians and particularly turkey and table egg veterinarians since those segments of the industry are not currently represented on the committee. BSE, classical swine fever (hog cholera) and foot and mouth disease are examples of diseases of other animals that are of concern. NAHSS will not involve endemic poultry diseases such as IBD, cholera, etc. as this agency does not have authority or the desire to do so. In conducting surveillance activities, NAHSS will utilize the expertise of NPIP with its long history of disease surveillance that will soon include AI. The intent is to maximize cooperation and communication.

A great deal of the change in NAHSS results from concerns about protection of the food supply from both terrorists and natural phenomena. This focus gives the Undersecretary of Agriculture access to information from the Department of Homeland Security (DHS) that was previously unavailable. Accordingly, access of marketing and food service groups to this information will be restricted from FOIA and available only on the basis of "need to know."

Dr. John A. Smith, Baldwin, GA gave the Update on the US Poultry & Egg Association (USPEA) Research Grants Program on behalf of Dr. Charles Beard and Dr. Elizabeth Krushinskie of USPEA. The primary mission of this program is the funding of selected research proposals. Since inception of the program in 1969, almost \$20 million have been distributed to researchers over the United States. Proposals applying for funding are reviewed twice a year and recommended by a Research Advisory Committee (RAC) that is a group of thirteen industry-employed individuals who are turkey, broiler or layer veterinarians, nutritionists, food safety experts, environmental engineers, poultry production and processing specialists. Beginning in 1996, the annual research allocation has exceeded \$1 million each year. Because of other demands on the funds and recent lower capital earnings, this level of funding is currently being adjusted down.

The greatest amount of funds has been directed toward the subject area of Diseases, which has received over \$7 million. Food Safety has received over \$3 million, as has Poultry Production. Waste Management has received about \$2.5 million. There is overlap in the subject categories assigned to the projects so these numbers should not be interpreted as absolute. For example, a project could impact both production and diseases or diseases and food safety. Grant funds are intended to assist researchers (usually university or government staff) in addressing the problems of the poultry industry, preferably providing information that can be put to use rather than providing basic knowledge. Basic research is funded but with the intention that it lead to the resolution or prevention of a real problem. Over time, approximately 30% of proposals have been funded. No consideration is given the geographic location or institutional affiliation of the grant applicants. The research proposals stand on their own merit and receive a thorough discussion and confidential scoring by the members of the RAC after an assigned expert in the subject area presents the proposal to the Committee as its "in-depth reviewer". The members of the RAC are appointed by the Association and serve as uncompensated volunteers for the Association. More information on the deadlines for the submission of research proposals and the accessing of summaries of completed projects may be obtained at www.poultryegg.org by clicking on "Research". The summaries may be retrieved by the use of keywords.

This research funding program by the US Poultry & Egg Association is a good example of how an industry can help itself by obtaining important information it needs while funding the education of graduate students and post-docs in poultry related subject areas. It is definitely a mutually beneficial relationship.

Dr. Daniel J. King of USDA ARS SEPRL, Athens, GA led a discussion on a section of 9 CFR Chapter 1, Part 94, Section 94.6, dealing with importation of raw carcasses of game birds from areas considered to have Exotic Newcastle Disease.

Current regulations on importation of carcasses, parts or products of carcasses, and eggs (other than hatching eggs) of poultry, game birds, or other birds from regions where exotic Newcastle disease (END) or highly pathogenic avian influenza subtype H5N1 is considered to exist appear to allow entry of raw carcasses of game birds with feathers attached. The relevant section of 9CFR, Chapter 1, Part 94, Section 94.6 (pages 495-499 in the January 1, 2005 revision) states in paragraph (b) (1) "Carcasses of game birds may be imported if eviscerated, with heads and feet removed. Viscera, heads, and feet removed from game birds are ineligible for entry into the United States." Dr. Glen L. Snider, AQI-VMO with USDA PPQ further indicates that Wildlife Services and Veterinary Services require some if not all of the feathers to be left intact on the carcass (typically a wing or the cape) as a means of identification of the game bird species. The remainder of Section 94.6 [paragraphs (b) (2) through (5)] describes numerous requirements for cooking, processing, and handling of other poultry products originating from, being processed in, or even passing through areas considered to be infected with END. There are at least two serious loopholes in this regulation that threaten the US poultry industries. First, both of the referenced viruses can reside in tissues other than heads, feet, and viscera. While removing the heads and viscera eliminates some of the most dangerous materials, a raw, feathered carcass from an infected bird could still carry infectious amounts of virus. Secondly, the reason for singling out H5N1 is unclear; any highly pathogenic avian influenza virus should be cause for exclusion of raw carcasses. While the opening paragraph singles out H5N1 highly pathogenic avian influenza, the remainder of section 94.6 refers only to END.

Dr. King proposed a Resolution urging USDA to amend 9 CFR 94.6 to close this loophole in the importation regulations, and require game bird carcasses and parts to be imported under the same regulations as for poultry and poultry products. The Resolution also calls for clarification of the prohibition to include not only END and H5N1 AI, but also any subtype of highly pathogenic AI. The Committee approved the Resolution and forwarded it to the Committee on Nominations and Resolutions.

A delegation from Pennsylvania, including Dr. Sherrill Davison of the University of Pennsylvania and Dr. Paul Knepley of the Pennsylvania Department of Agriculture presented some concerns in their state with the individual bird identification studies attendant to the low pathogenicity H5/H7 AI program in the live bird marketing system.

Compilation of the Pennsylvania Live Bird Market Industry Concerns Related to Current Individual Bird Identification Studies

The following is a compilation of concerns raised by participants in Pennsylvania's poultry industry who have been involved with the ongoing individual bird identification project conducted for the USDA through KADIX by Dr. Ernie Zirkle. One portion of the study that currently is being conducted involves tagging of individual birds in the hatchery using a tag similar to a tag used in clothing manufacturing. A second method of stick-on tags applied to birds at the time of load out is also being evaluated.

Introduction

The LBM-related industry in Pennsylvania believes that their concerns are not being accurately represented to the Poultry Identification Working Group of the National Animal Identification System (NAIS) or to the USDA. This is unfortunate because the LBM producers, like the game bird producers, represent a unique group that does not fit into the true commercial production group or the individual bird fancier group. Their participation in the discussions being held by the Poultry Identification Working Group is important to your goal of achieving an equitable and achievable system of bird identification. The current report's suggestion that Pennsylvania LBM producers and wholesalers are supportive of the current approaches to individual bird identification is very misleading.

Current Study

The purpose of the current study was to evaluate procedures for individually tagging birds destined for the LBM system. This proposal included tagging individual birds at the hatchery or at the farm at the time of load-out. Many concerns have been voiced regarding this proposal that have not adequately been addressed at this time. The basic questions remain: who would perform the tagging, what would the cost be, who would bear that cost, are these tagging procedures humane, and would this tagging system be a useful tool to reduce the incidence of AI in the LBM system? There is concern that much potentially vital data related to humane issues, procedural feasibility and economics has not been recorded including timing of the procedure, ambient temperatures, required personnel numbers, and regular employee and additional assistant wages.

Initial studies to evaluate tagging, conducted in 2003, were not designed and were not expected to answer economic questions. A long-term project (6 months to a year) involving whole flocks was suggested for the purpose of obtaining realistic and reliable economic information. Specific recommendations regarding the study included maintaining detailed records concerning the time and cost of labor, cost of actual tags, and required record keeping for hatchery tagging. Follow-up on those flocks throughout grow-out was also recommended, including information on morbidity and mortality, feed and water consumption, tag retention, and additional labor requirements relating to tagged birds, such as additional load out time due to tags catching on cages. Similar follow-up studies were recommended at the wholesale markets. Some specific issues to examine at the wholesale level include administrative costs and truck driver time spent on record keeping. Similar issues exist at the retail level as well, with additional concerns regarding tag disposal costs and tag and record keeping related labor costs.

One disturbing concern affects multiple sections of the LBMs. Since most of the profits of the LBM system are at the retail level and profit margins are very thin at the hatchery, grow out, and wholesale levels, the costs of tagging must be passed along to the consumer. Some authorized LBM dealers have suggested that not only would they have increased direct costs from individual bird identification, but that they could lose business due to an increase in "black market" bird entry into the LBMs as illegal, untagged birds become relatively less expensive than legitimate, tagged, tested birds.

If studies on these issues are completed, more accurate economic data would be available to determine if individual bird tagging would unduly burden a particular segment of the system. The identification system must be economically, logistically, and equitably viable for all of the segments of the LBM system. Concerns have been raised that any system that is not economically equitable across the industry may result in the disruption of business for certain Pennsylvania producers and affect interstate commerce. The current study was not designed to answer these economic questions and does not adequately evaluate many of the concerns of the Pennsylvania industry.

Avian Influenza Reduction

The NAIS has species-specific subcommittees to investigate methods to identify animals in such a way that permits 48 hours trace back to the farm of origin. The driving force for trace back would be a disease of regulatory and/or public health significance: in the case of the LBMs, Avian Influenza. The Northeast LBM system is a unique system involving movement of millions of birds a year that has had a low incidence of Avian Influenza (AI) virus circulating primarily within its retail segment. An animal identification system for birds being marketed through these channels would satisfy the requirements of NAIS and has been suggested by some as a tool to reduce the incidence of AI throughout the system.

"With the increased human health threat and the possibility of a pandemic caused by H5N1 AI, the LBMs need to eradicate AI to maintain a viable system and to protect both animal and human health. History has

proven that multiple species commingling with a perpetual inventory coupled with an illegitimate supply is a formula for AI disaster.” The retail markets are currently the focal point of AI infection and they should continue to be targeted for control. The proven model of increased inspection, testing, cleaning, and disinfection of test positive markets by NJ and NY state officials has been very successful in recent years using regulations already in place. The focus should continue to be on activities that will yield the greatest benefit. The hiring of additional market inspectors to enforce the current regulations, for example, would strengthen the already successful model of AI control.

While some regulatory agents have indicated that individual bird tagging will assist them in identifying non-tested birds in LBMs, the current hatchery tag retention rates of 80%-95% raise significant concerns, as noted by a committee member:

“Another issue is that Ernie states that a 95% tag retention rate is the goal, but if 1 in 20 birds is expected not to have a tag, and someone at the LBM wants to ‘blend in’ untagged (maybe untested/undocumented) birds of similar color and size to a group with better than average good tag retention, that would be a great opportunity. It has been said repeatedly at these meetings that the ‘LBMs are not to be trusted’ to tag birds on arrival, so why should they be trusted not to blend untagged birds into groups of tagged birds? The NY regulatory folks have said they will just assume that an untagged bird grouped with the others of similar appearance originated from the same place as the tagged birds. So, the trace back will go to the tagged bird sources, just like the trace backs now go to the birds identified with the proper lab reports/records.”

Most feel that the best way to reduce AI in the LBM system will not be individual bird tagging, but will require a combination of tactics. Increased penalties for positive markets, increased surveillance for untested birds entering markets, market owner and worker education programs, USDA market inspections of pathogen control and sanitation, and increased unannounced state inspections of markets would all be potential tools to use. Other more innovative ideas have also been discussed. For example, one ID subcommittee member suggested that each wholesaler could use a uniquely colored crate so that regulatory officials could easily visualize the bird source. If the bird identification did not match the wholesaler’s records, then further investigation would be warranted.

As one committee member said, “I think that there are definitely opportunities for ‘out of the box’ thinking for mass application (topical spray or ingested in feed or water) of some sort of unique identifiable substance that can be detected in/on the birds at the LBM, but probably other ‘minds’ with knowledge of novel techniques of chemical signatures would have to be sought out.” Another suggestion has been to require periodic emptying and cleaning of all retail market simultaneously (“market holiday”). Another suggestion was made to develop local or state regulations for the design of retail stores including such requirements as being fully cleanable with walls, ceilings, and floors that can be disinfected.

An additional way to manage AI within the LBM system that has been suggested is to assess the risk associated with different populations of birds in the system. Since the sources and types of birds for these markets are varied, each group’s risk of introducing AI into the LBM system is also different. An ID subcommittee member’s explanation of this idea: “There was a comment that I made at the last meeting that I don’t think was captured in the minutes quite as intended (page 4 of minutes 6905), and that is to consider different ‘tiers’ of ID based on relative risk of the flock based on age, management, etc. For example, the young broiler type chickens (and possible guineas, etc.) that are placed on a farm at a day of age and raised as a single age entity within a closed house (all in, eventually all out by usually about 7 weeks or at most 10 or 12 weeks of age, then down-time before new chicks placed) would be a low risk that could go with lot ID from the farm. (If someone wants to tag them individually once they reach the market as an unbroken lot-fine). However, birds from the next higher risk situation (older birds-spent breeders/layers from a ‘commercial type’ enterprise) might need more stringent lot ID or individual ID. Those from the highest risk situation (older birds, moved and commingled more than once with different ages/multiple species) would probably require individual ID. In this way, I think the highest labor and time-consuming intervention (individually applied ID) could be targeted to the lower volume, yet highest risk birds going into the LBM.”

AI risk based LBM system Outline (from an ID subcommittee member, including introduction and concerns)
Goal=Identify the flocks/premises/situations that should have highest priority for identification schemes (further research, development, and application)

- 1) AI is an infectious (viral) disease with relatively short incubation and viral shedding time, and relatively poor persistence in the environment—assuming no additions of susceptible (naïve) birds to perpetuate the cycle of shedding.
- 2) There is no vertical transmission, no latent carrier state, and no chronic persistence within a given animal/bird or closed flock.
- 3) The major known reservoirs of AI are some LBMs (most poultry adapted strains) and free-living aquatic birds (most not poultry adapted strains).
- 4) AI is not like tuberculosis, TSEs, Salmonella spp. including pullorum/typhoid and SE, MG/MS etc. and most other diseases of current regulatory significance.
- 5) Chain of possession if very important: 1-7 days (hours to 14 days) prior to a bird sample collection that yields a positive virus detection test result is where trace back may be meaningful.
- 6) Trace back to parent flocks, hatchery, through most grow-out on single species, single age, total confinement with down time before placement is not meaningful
- 7) ID tag does not record chain of possession (but records 1 link if dated and linked to a lab report representing a point in time); neither can be determined without the records that go along with purchase, movement, etc.
- 8) Apply the tag at a meaningful point to help trace; less time elapsed between application and arrival at market=better retention, less degradation.
- 9) Environmental C and D with inspection and test does not equate with virus-free; problems with sampling the total environment and sensitivity of virus detection tests allow for false negative results.
- 10) Therefore, considerations of 'best management practices' at source farms (and along the supply chain and end market) to lower risk of introduction/persistence of AIV are likely meaningful.

Possible scoring/relative ranking systems (lowest to highest risk):

Option 1

Score 1=Single species, single age, downtime before placement, less than 12 weeks of age at load out (examples: most broiler chicken premises but may include other species placed at day of age in similar management to broiler).

Score 2=Single species, single age, down time before placement, greater than 12 weeks of age at load out (examples: single flock layer breeder or broiler breeder, single flock commercial layer, some turkey premises)

Score 3=Single species, multiple ages, down time before placement, greater than 12 weeks of age at load out (examples: some multiple flock breeder premises, some commercial layers, some turkey premises)

Score 4=Single species, multiple ages, continuous production facility, greater than 12 weeks of age at load out (examples: most commercial layer chickens, some breeder chickens, some game birds, some turkey, some guinea fowl, some hobby/backyard).

Score 5=Multiple species, multiple ages, continuous production facility, closed flock (examples: many game birds, many ducks, some hobby/backyard).

Score 6=Multiple species, multiple ages, down time, commingling of groups or individuals from multiple outside sources (examples: most auction markets, some dealers)

Score 7=Multiple species, multiple ages, continuous production/stocking, commingling of groups or individuals from multiple outside sources (examples: some hobby/backyard, live markets, some dealers.)

All of the above assume that the housing is total confinement. If not total confinement (e.g. access/exposure to outdoors) add 1 point to each score.

Option 2

Score "x" points for each of the following:

Multiage=1 point

Multispecies=1 point

Greater than 12 weeks of age=1 point

Continuous stocking/production=1 point

Not total confinement (access/exposure to outdoors)=1 point

Commingling of birds from different sources onto primary premise (not a closed flock)=4 points

Concentrate on those with scores greater than or equal to 3. Investigate tagging/ID schemes that work for these types of flocks near the point of embarkation from primary premise/point of commingling as a priority for the next phase.

In addition to the general concerns about individual bird identification, there have been many specific concerns about the different tagging methods.

Hatchery Tagging Concerns:

Several trials have been performed with hatchery tagging. The complete follow-up period has not yet elapsed, but retention rates have been unacceptable (less than 95%) in all groups to date.

Comments from Individual Stakeholders Regarding Hatchery Tagging:

“Apart from the other hatchery logistic issues that were voiced, the tag on a day old chick is unwieldy for the chick at best, and an animal welfare public relations nightmare at worst. I work on chick quality issues all of the time, and another non-aseptic procedure that causes a break in the skin at day-of-age is just one more opportunity for bacterial septicemia problems. The hold-up to placement on the farm is another huge stress. These last 4 sentences argue against application of tags at day of age, when a bird is most vulnerable to these interventions, and relative bird to tag size is at its smallest.”

From a large supplier of birds to the LBMs:

“The tagging trials were performed on white cockerel roasters and Temple red broilers. Both trials didn't seem to have a significant negative effect on mortality. Chicks seemed to tolerate the neck tags satisfactorily. Retention rates were 95% and 93% or less respectively. From group discussions, these rates are not acceptable. My concern is more related to humane issues both with the application method and the ability for the tags to get caught in equipment and other chick's tags. At market age, the tags were not consistently visible, making handling of birds a necessity for identification. Hatchery logistics are of great concern also. If this would become the preferred method of identification and large quantities of birds would require tagging, application time would be excessive resulting in higher mortality, impossible delivery schedules, and overlapping facility requirements. Expense for this method is significant and probably understated in its analysis”

Comments from individual stakeholders:

1. “Concern has been voiced that discussions around identification of birds entering the live bird marketing system appear to revolve exclusively around application of tags to chicks at one day of age. If you would, please consider the magnitude of this task. Estimates are that there are approximately 25,000,000 birds marketed annually through the live bird markets of New York and New Jersey. Of these 25 million birds approximately 60% are broilers and approximately 90% of these are produced in Pennsylvania. To meet this demand would require approximately 260,000 birds be individually tagged per week. The best current estimate is that with the system currently being investigated approximately 417 birds can be tagged per man-hour worked. This would mean that approximately 625 man-hours per week would be required to apply these tags. At an average hatchery labor rate of \$12.00 per hour the expenditure per week would be \$7500 or \$0.03 per chick. This labor cost added to the cost of the tag and record-keeping cost would increase the price of a day old chick by over 25%. The question is who is going to bear this cost – the hatcheries and growers in Pennsylvania?”

2. “If we take the scenario of tagging the birds in the hatchery, there are concerns about infection, tag retention, and animal welfare. The one item that looms pretty large on our horizon of concern would be the intense labor demands (30-50 man-hours) for only one day a week or so, and the cost of securing this volume of part-time yet quality labor.”

3. “If you are going down the road that all these chicks need to be tagged at the hatchery (it seems you are), then there needs to be some serious thought put into logistics and throughput, etc. Small hatcheries are not going to add wings onto their buildings to accommodate roving bands of 10-20 taggers. Mid sized hatcheries won't want to deal with the labor nor the long process time. Primary breeders don't even want to admit any of their birds end up there but a significant number of them end up in the LBM. The processing goal should be the same as current hatchery practice - the chicks should be on the farms with feed and water the morning or afternoon of the day

they come out of the hatchers. Tagging times of 300-1000 chicks per hour per person will not work. Most birds going to the LBM also must be feather or vent sexed.”

“The old Marek's injectors that hatcheries went away from as being too cumbersome, labor-intensive and expensive from were capable of delivering 2000 -5000 chicks/hour/person. I recently talked to Gene Burkett from Merial-Select who used to supply and maintain these injectors. I suggested to him that they try to think of a way to convert one of these machines so that it could deliver a tag to a chick. I think the tag would have to be a barbed tag that would only penetrate the skin of the chick's neck once. Operator safety would be a concern since you would not want to embed one of the tags into your finger. It was not uncommon for Marek's injectors to self-inject themselves. Gene said he would talk to one of their equipment/maintenance guys about the tagging. He mentioned that they would not be eager to spend any serious amount of time on a project due to a limited market. There are 110 hatcheries in the US and maybe 20% of them produce chicks that end up in a LBM. Does USDA/FDA/CDC have any funds they could channel into developing an efficient chick-tagging machine? This tagging program is going to put a multi-million dollar tax on the smallest segment of the US poultry industry that profits mostly small farmers & small businessmen and serves a mostly inner-city, minority market. Somebody in government should be willing to fund this especially since there is a potential impact on human health.”

Responses to above stakeholder concerns:

Worker safety: The response concerning worker safety is that the garment industry has not had problems with worker safety. The comparability of placing a tag on a piece of clothing and placing the same tag on live birds is not valid.

Delayed chick placement: Concerns about the delay in chick transport from the hatchery to the farm and the potential detrimental effect has been the following. “Mortality data generated by 150,000 tagged chicks thus far (but still incomplete and not published) is within normal range. No chicks have been delayed transport to the farm, from the hatchery, by more than two hours.” Those birds may not have been delayed but this is a small number of birds and does not reflect the reality of the delay that will occur when a larger number of birds are tagged.

Welfare concerns: The response that has been given to the issue of welfare of the birds relates to a study conducted by Cook College. “The studies conducted by Cook College determined that bird pecking rates, feed consumption, feed conversion, feed utilization and mortality when comparing neck tagged birds to an untagged control group were statistically insignificant.”

A small trial such as this has very limited value. In laboratory studies, and their applicability to the field are always questioned because the birds have ready access to the feed, the equipment (waters and feeders) are not similar to the commercial setting, air quality, litter and competition amongst flock mates is not similar. The conditions in the laboratory do not have the stressors seen in a commercial setting. This is why a large-scale project on a few farms and following these birds through the system was suggested.

Increased probability of infection of chicks: Avery Dennison, manufacturer of the tagging system, has developed an applicator needle specifically designed with a syringe type point and a semi-automated applicator that can be equipped with an alcohol disinfectant spray. Needles utilized in the pilot studies were bathed in disinfectant between each trial. Why was this not used in the trials if it has been developed? It is not an easy task to develop a system that can work in a hatchery situation and not create unhygienic situation. It has taken numerous years to get to the point of reduced infection related to vaccination of chicks in the hatchery. Applying tags is a step back for the industry and the welfare of the bird.

Back Tagging at Load Out Concerns:

A major concern has been raised about the potential increase in mortality due to overheating caused by the additional load out time required for tag application especially in particularly hot or humid weather. Feasibility of stick on tagging in extreme heat, humidity, cold, or precipitation has not been assessed. It is unclear how such conditions would affect the application and retention of tags, the humane issues, or the well being of the human taggers.

From a large supplier of birds to the LBMs:

“Although I have not been personally involved in back-tagging trials, I am aware of the hurdles of this method. For tags to be applied at load out, crews would need to manage the application. I have asked our crew if they would apply tags and they responded positively. Logistically, applying tags to trailer loads of birds would be a

formidable hurdle. Time constraints for loading, especially during the summer months would require a much larger workforce to accomplish the task. As with all labor-intensive jobs, quality help is very hard to find and retain. Procurement of tags and distribution to the crews on a timely basis would at best be difficult. I am told retention rates are acceptable with this method. My major concern would be bird load outs during hot weather. Every year we incur losses from heat stress at load out. If time of loading is increased to accommodate tagging, large losses would occur and birds would be un-saleable. Tagging on farm is not feasible from both time and seasonal viability aspects.”

One producer involved with load out tagging recounted the following scenario:

“I have met with Ernie and his wife twice to try to put sticky tags on the chicken’s backs. The first time it was pretty much a disaster. The tags were getting jammed in the applicator. The second time we met and tagged we did just a small amount of birds to see if the sticker guns would work and they seemed to work much better for some unknown reason but it was still pretty labor intensive and we didn’t really get any good data. Ernie indicated to me we would get together in the very near future again to do a larger amount of birds and gather some useful data. We have been part of the flock monitoring system in PA for several years now and have never has a positive sample. I think we have to somehow ID larger lots of birds. A major concern I do have is that we come up with something that is practical and reasonable to implement. I think that we all need to be honest with one another and not try to fudge the numbers because of the nature of the live birds markets, you’ll just create a huge underground system that will be very hard to monitor or control.”

Conclusions

It is proposed that reduction of AI and the requirement of NAIS for traceability be evaluated as separate issues. Individual bird identification will not achieve the desired effect of reducing the incidence of AI or traceability in the live bird market system due to poor retention rates and unclear regulatory response to untagged birds in the markets, and the logistics and economics are an undue burden on those already complying with current regulations. A proven model for successful reduction of AI in the LBMs is increased surveillance of the retail markets. Improvement of that system is suggested as a more cost effective method for reduction of the incidence of AI in the retail markets.

The economic burden placed on the system by individual bird tagging is not fully known but will include increased costs of tags, tagging, printing, labor, and record keeping. The costs should be equitably distributed throughout the system, but there are significant concerns about undue financial burden on one portion of the system. Given the structure of the LBMs, the economic burden of tagging will most likely have a disproportionately detrimental effect on the producer and potentially put some producers out of business. Placing additional regulations and control measures on the AI monitored flocks which are already bearing the costs of engaging in legitimate commerce with the LBMs would be an unfair burden to doing business. Additionally, tagging at the hatchery level would not even capture the AI unmonitored segment of the system, leaving the highest risk birds untagged.

Resources should be spent on efforts focused on those who do not comply with the regulations already in place. We should not continue to waste resources on the large, legal segment of the industry simply because it is the most visible and the easiest to control. Additional regulations on this segment of the industry do not assist us in reaching the goal of eradication of AI in the LBM system.

“The poultry industry is in favor of promoting a safe food supply and the legitimate industry is willing to do its part to ensure it. What has been proposed thus far does not appear to be a viable means for identification and does not have industry support. Other options must be researched and developed to meet this need using all available resources. Supporting a method which will not accomplish its goal is just “window dressing” and deludes us into believing we have a fixed a problem, when, in reality, we have not. The extraordinary expense of these individual tagging systems is money that would be better spent on improving existing methods of AI control, including testing, inspections, closures, cleaning and disinfection, and regulatory activities until an acceptable identification system is developed.”

The Pennsylvania LBM-related industry is willing to work with government to resolve the issue of AI in the LBM system and to develop a practical means of trace back. The Pennsylvania producers and wholesalers who have worked on this project believe individual bird tagging will not achieve the desired effect to reduce the incidence of AI and will not allow for reliable and accurate traceability of birds in the LBM system.

A proposal for an alternative method to satisfy the requirement of the NAIS for traceability of birds through the LBM system was discussed.

There are numerous challenges associated with the strategy of individual bird identification for the Live Bird Marketing System (LBMS) that include: effectiveness for the goal of LPAI eradication, retention rates, economic, logistic, humane, enforcement, and bio-security concerns. Pennsylvania has produced a document detailing a number of these challenges in addition to those that will be identified by the current Kadix study.

An alternative strategy, that may find significantly more acceptance with stakeholders in Pennsylvania, would involve crate tracking with RFID technology combined with electronic reporting systems. This type of approach has the potential to achieve 100% retention rates of RFID crate labels, while greatly reducing falsification problems associated with current paper record keeping systems. Although this strategy may successfully establish a tracking system for the LBMS, traceability alone does not necessarily lead to the successful eradication of LPAI from the LBMS.

It is recommended that funding be made available for states involved in the North East LBMS for cooperative agreements to evaluate the economic feasibility, logistics, and effectiveness of crate tracking with RFID technology combined with electronic reporting systems. Cooperators should include the USDA APHIS VS; respective state Departments of Agriculture of NJ, NY, and PA; Cornell University, Rutgers University-Cook College, The Pennsylvania State University, and the University of Pennsylvania and an engineer with expertise in RFID technology.

In the North East LBMS, LPAI-positive retail markets are currently allowed a short window (3-5 days) to sell down bird inventory followed by a cleaning and disinfection procedure which is then followed by environmental testing. From the time an LPAI-positive bird is disclosed until the retail market is back in full operation is generally 5 days or less. Utilizing this strategy, LPAI prevalence in this sector has gone from historic levels of approximately 43% to less than 5%. USDA APHIS VS, New York, and New Jersey are to be commended for this significant accomplishment.

Pennsylvania has a modest LBM retail sector (5 establishments) that has remained LPAI-free for over thirteen years. Pennsylvania has utilized the same strategy as New York and New Jersey, but also incorporates a 21-day minimum downtime for any positive retail market.

The Pennsylvania group believes this significant downtime creates an economic incentive for the market place to avoid high-risk birds. Retail markets in Pennsylvania that otherwise would be willing to buy "back door" birds lose their interest under this regulatory environment. By expanding the downtime, the Pennsylvania group believes LPAI can potentially be eradicated from the LBMS prior to a bird identification system being implemented, as evidenced by Pennsylvania's successful 13-year track record. An additional potential benefit of this regulatory strategy is that expensive and time-consuming investigations into illegal bird movement may be greatly reduced.

It is recommended that continued funding and support for frequent, regular LPAI surveillance be maintained for the LBM retail sector. If current regulatory strategies do not lead to eradication of LPAI from the LBM System, consideration should be given to establishing a "down-time" protocol for individual markets that test positive.

The Committee accepted these proposed recommendations as information, and the Committee instructed the Chair to forward and refer these concerns and recommendations to the Live Bird Market Working Group for their consideration.

Mr. Paul Brennan of Perdue University proposed a Resolution to USDA-APHIS-VS and OMB urging them to approve and implement the NPIP H5/H7 LPAI Program for Commercial Birds. The Committee approved the resolution and forwarded it to the Committee on Nominations and Resolutions.

Mr. Paul Brennan also offered a proposed Resolution to USDA-APHIS-VS urging them to seek funding for indemnity at full market value for birds destroyed in the cooperative program for H5/H7 LPAI in the Live Bird Marketing System. This proposal was defeated as a resolution, but was subsequently passed as a recommendation.

The Recommendation urges USDA-APHIS-VS to have a provision of indemnity for birds destroyed under the provisions of the cooperative state-federal-industry control program for low pathogenicity Avian Influenza in the Live Bird Marketing System

The continued circulation of H7N2 Low Pathogenicity Avian Influenza (LPAI) in the northeastern Live Bird Marketing System (LBMS) is a present and grave danger to the poultry industry of the United States and to public health. The presence of this and other subtypes of AI in this system have resulted in numerous incursions of AI into the commercial poultry industries of the eastern seaboard, including most recently the outbreaks in the Virginia broiler and turkey industries, a Connecticut table egg operation, and the outbreak in broilers on the Delmarva Peninsula. These outbreaks result in tremendous costs for containment and eradication, and even more costly disruptions in international trade. Recent experiences in the Netherlands and Asia point out the dangers to public health attendant to allowing a virus such as this to circulate in a dense urban population. Finally, this virus continues to accumulate basic amino acids at the hemagglutinin cleavage site, creating a growing concern for the eventual emergence of a highly pathogenic virus.

A cooperative state-federal-industry control program has been devised and funded to meet this threat. One of the most serious remaining obstacles to the success of this program is the provision of full indemnity for destruction of infected birds in various segments of the system. Lack of adequate indemnity only encourages efforts to evade the control system, seriously delaying attainment of the objective of eradication of this disease threat. The Committee on Transmissible Diseases of Poultry and Other Avian Species of the United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Service, to obtain provision of indemnity at full market value for birds destroyed pursuant to the objectives of the Cooperative State-Federal-Industry Program for the Control of Low Pathogenicity H5/H7 Avian Influenza in the Live Bird Marketing System.