**COMMITTEE ON POULTRY AND OTHER AVIAN SPECIES**
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The Committee met on October 14, 2020 virtually, from 12:00 p.m. to 4:28 p.m., Eastern Standard Time (EST). There were 200 attendees in the morning session and 180 attendees in the afternoon session. Chair Yuko Sato presided, assisted by Melissa Yates, Vice Chair. Sato welcomed the Committee on Poultry and Other Avian Species (CPAS) members and summarized housekeeping items.

**2019 Resolutions:**
Two resolutions were brought forward during the business meeting and passed:

1. The United States Animal Health Association requests that the 116th United States Congress appropriate new, no-year, mandatory fiscal appropriations dedicated for low pathogenic avian influenza (LPAI) indemnity and compensation to ensure continued participation in National Poultry Improvement Plan H5/H7 LPAI programs. This new appropriation will support the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services' effort to provide a stable indemnity and compensation program for H5/H7 LPAI flocks.
2. The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services expedite the process to hire the best qualified Compartmentalization Veterinary Medical Officer and the National Poultry Improvement Plan (NPIP) Authorized Laboratory Coordinator for the positions located at the NPIP office.

**2020 Presentations and Reports**

**American Board of Veterinary Practitioners (AVBP) Current Diseases of Concern** was given by Steve McCarter, Tyson Foods. A summary of the report is included in these proceedings.

**Table Egg Layer Industry Report** was given by Eric Gingerich, Diamond V. A summary of the report is included in these proceedings.

**Turkey Industry Report** was given by Lindy Froebel, National Turkey Federation. A summary of the report is included in these proceedings.

**National Veterinary Services Laboratories (NVSL) Avian Influenza and Newcastle Disease Report** was given by Mia Kim Torchetti, USDA-APHIS-VS-NVSL. A summary of the report is included in these proceedings.

**NVSL Bacteriology Diagnostics Report** was given by Brenda Morningstar-Shaw, USDA-APHIS-VS-NVSL. A summary of the report is included in these proceedings.

**National Poultry Improvement Plan (NPIP) Update** was presented by Elena Behnke, USDA-APHIS-VS-NPIP. A summary of the report is included in these proceedings.

**Avian Influenza (AI) and Newcastle Disease Virus (NDV) Disease Subcommittee Report** was given by David Suarez, USDA-ARS-SEPRL. A summary of the report is included in these proceedings.

**North Carolina/South Carolina (NC/SC) Low Pathogenicity Avian Influenza - Highly Pathogenic Avian Influenza (LPAI-HPAI) H7N3 Event Overview** was given by Julie Helm and Mike Martin, Clemson University and North Carolina Department of Agriculture and Consumer Services. A summary of the report is included in these proceedings.

**Assessment of the Risk Associated with the Movement of Pullets Out of the Pullet Barn in a Control Area During an HPAI Outbreak in the United States** was presented by Carol Cardona and Marie Culhane, University of Minnesota. A summary of the report is included in these proceedings.

**American Association of Avian Pathologist (AAAP) Research Priorities Survey Update** was given by Eric Gingerich, Diamond V. A summary of the report is included in these proceedings.

**Live Bird Market System Report** was given by Fidelis Hegngi, USDA-APHIS-VS. A summary of the report is included in these proceedings.

**Committee Business:**

**Sub-Committee Report:** The Subcommittee on Avian Influenza/Newcastle Disease Report as presented by David Suarez was approved unanimously by the Committee.

**Old Committee Business:** None

**New Committee Business**: None

**Committee Recommendations:** None

**Committee Resolutions:** None

A motion to adjourn the meeting was initiated and seconded. There being no further business the Committee on Poultry and Other Avian Species (CPAS) adjourned at 4:28 p.m.

**American Board of Veterinary Practitioners (AVBP) Current Diseases of Concern**

Steve McCarter, Tyson Foods

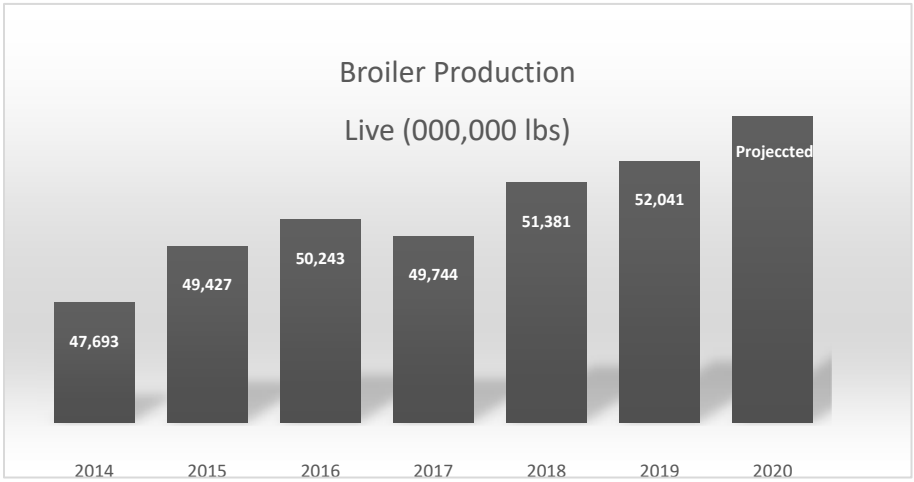
Percent in 2019 to 0.313 percent in 2020. The movement of many processing plants to New Poultry Inspection System (NPIS) is the most likely explanation for the decline.

**Key Broiler Disease Issues (*see below*)**: Among the major disease-related issues that broiler production veterinarians are concerned with, coccidiosis (specifically *E. maxima*) ranked first, and necrotic enteritis ranked second. These two diseases typically operate in tandem, and it's likely that restricted-use antibiotic programs (ranked first on SPECIFIC disease importance chart below) have only exacerbated their impact on the broiler industry. As of July 2019, over fifty percent of U.S. broilers were raised without a shared-class antibiotic or ionophore[1]. In addition, ionophore feed inclusion continues to decline each year since 2014[2]. "Chemical" coccidiostat and coccidiosis vaccine usage has doubled over the same period[2]. Marketing strategies and customer pressure are likely driving the move toward these methods of coccidiosis control. At the same time, the inclusion of a preventative antibiotic to control necrotic enteritis continues to decline. Seventy seven percent of broiler feed does not contain any growth promoting antibiotic compounds[2].

**Key Non-Disease Broiler Issues (*see below*)**: Every year since 2016, the survey indicated the highest ranked major non-disease issue among broiler veterinarians was restricted antibiotic-use programs. For the last two years, Poultry Welfare-Activists Threats ranked second in this category. Food safety regulations and lack of alternatives to antibiotics were also ranked highly.

*[1]Agristats report, 2019.*

[2]*2018 U.S. Broiler Health-Market Tracker, Rennier Associates, Inc.*




| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 *(Jan-Jul)* |
|---|---|---|---|---|---|---|---|---|
| **Average Age** | 46.81 | 47.27 | 47.82 | 47.13 | 47.04 | 47.16 | 47.02 | 47.39 |
| **Average Broiler Weight** | 6.01 | 6.12 | 6.24 | 6.22 | 6.27 | 6.27 | 6.27 | 6.38 |
| **Feed Ingredient Cost/Ton** | 342.55 | 287.69 | 249.90 | 235.69 | 228.90 | 239.37 | 235.18 | 232.67 |
| **First Week Mortality** | 1.15 | 1.28 | 1.39 | 1.41 | 1.41 | 1.55 | 1.55 | 1.61 |
| **Total Mortality** | 3.86 | 4.31 | 4.79 | 4.53 | 4.56 | 4.99 | 4.96 | 5.32 |
| **Mortality (3.6-4.4 lbs)** | 3.32 | 3.64 | 3.90 | 3.65 | 3.53 | 4.06 | 4.09 | 4.17 |
| **Mortality (4.4-5.2 lbs)** | 3.22 | 3.55 | 3.54 | 3.55 | 3.83 | 4.24 | 4.33 | 4.57 |
| **Mortality (5.2-6.0 lbs)** | 4.59 | 4.40 | 5.06 | 4.75 | 5.00 | 5.46 | 4.59 | 4.75 |
| **Mortality (6.0-6.8 lbs)** | 3.62 | 4.92 | 5.30 | 5.02 | 4.31 | 4.56 | 4.92 | 5.59 |
| **Mortality (6.8-7.5 lbs)** | 4.24 | 4.31 | 5.03 | 4.68 | 4.86 | 5.72 | 5.72 | 6.01 |
| **Mortality (7.5-8.5 lbs)** | 4.64 | 5.15 | 6.41 | 5.54 | 5.41 | 5.17 | 5.83 | 5.92 |
| **Mortality (>8.5 lbs)** | | | 5.41 | 5.43 | 5.52 | 5.95 | 5.76 | 6.25 |
| **WB Farm + Parts Condemns** | 0.501 | 0.541 | 0.569 | 0.525 | 0.491 | 0.416 | 0.348 | 0.313 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Septox Condemns** | 0.133 | 0.152 | 0.166 | 0.140 | 0.128 | 0.130 | 0.111 | 0.093 |
| **Airsac Condemns** | 0.084 | 0.089 | 0.092 | 0.099 | 0.086 | 0.066 | 0.046 | 0.036 |
| **IP Condemns** | 0.027 | 0.028 | 0.025 | 0.020 | 0.018 | 0.012 | 0.013 | 0.011 |
| **Leukosis Condemns** | 0.004 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 |
| **Birds Placed (B)** | 8.049 | 8.147 | 8.326 | 8.459 | 8.309 | 8.629 | 8.730 | 8.849 * |
| **Birds Produced (B)** | 7.738 | 7.796 | 7.927 | 8.076 | 7.930 | 8.198 | 8.297 | 8.378 * |
| **Pounds Produced (B)** | 46.535 | 47.693 | 49.427 | 50.243 | 49.744 | 51.381 | 52.041 | 53.415* |

* volume estimated for 12 months

**2020 Disease and Non-Disease Rankings**

As in previous years, the Association of Veterinarians in Broiler Production (AVBP) membership was polled concerning disease and non-disease issues. Major issues were ranked for both areas, and a further breakdown of specific disease and non-disease issues is included below.

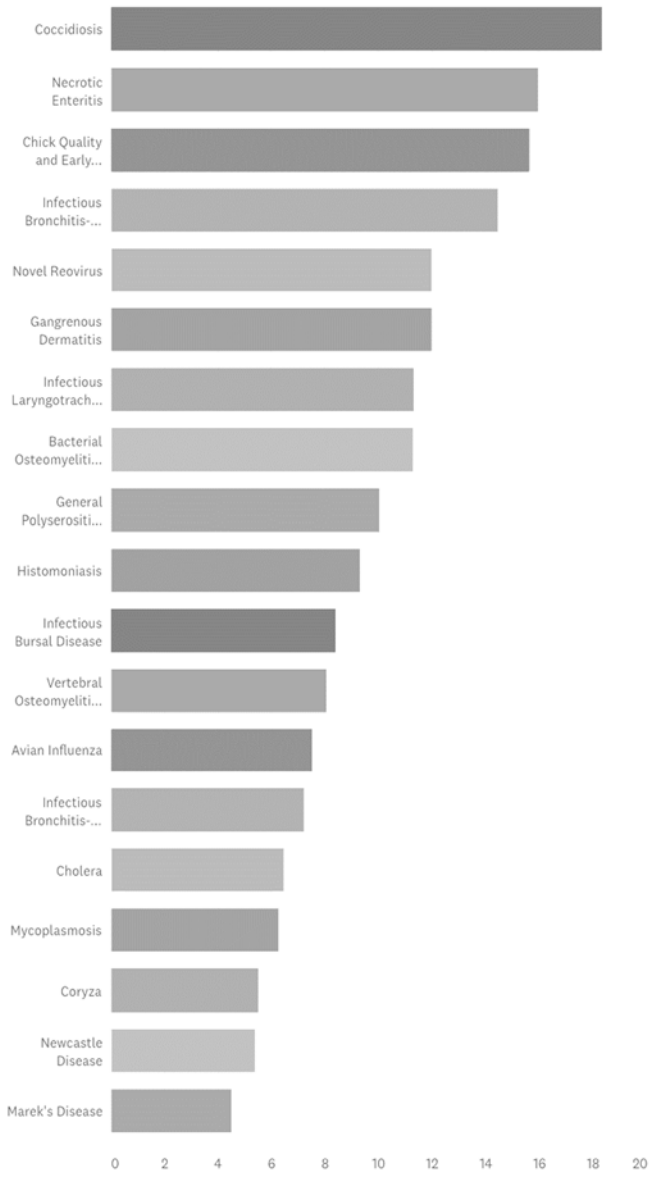
AVBP is comprised exclusively of veterinarians employed full-time by U.S. broiler companies. The veterinarians responding to the 2020 survey included most of the broilers in the United States.

| RANKING | 2020 Major DISEASE Categories |
|---|---|
| 1 | Coccidiosis |
| 2 | Necrotic Enteritis |
| 3 | Chick Quality and Early Mortality |
| 4 | Infectious Bronchitis |
| 5 | Gangrenous Dermatitis |
| 6 | Novel Reovirus |
| 7 | Bacterial osteomyelitis of the legs |
| 8 | General Polyserositis-E. coli |
| 9 | Infectious Laryngotracheitis |
| 10 | Infectious Bursal Disease |
| 11 | Vertebral Osteomyelitis/Kinkyback |
| 12 | Infectious Bronchitis (Kidney form) |
| 13 | Histomoniasis |
| 14 | Avian Influenza |
| 15 | Mycoplasma |
| 16 | Cholera |
| 17 | Newcastle Disease |

| RANKING | 2020 NON-DISEASE Categories |
|---|---|
| 1 | Restricted Antibiotic Usage-Customer Related |
| 2 | Poultry Welfare-Activist Threats |
| 3 | Increased Food Safety Regulations |
| 4 | Biosecurity Risks |
| 5 | FDA-Drug Availability |
| 6 | Lack of Efficacious Alternatives to Antibiotics |
| 7 | Vaccine Availability |
| 8 | Meat Quality |
| 9 | Exportation issues |
| 10 | Increased Environmental Regulation |

# Please rank these DISEASE issues in order of significance to you/your company?

Answered: 17 Skipped: 0



Rank the following NON-DISEASE categories in order of significance to you/your company?

Answered: 17 Skipped: 0

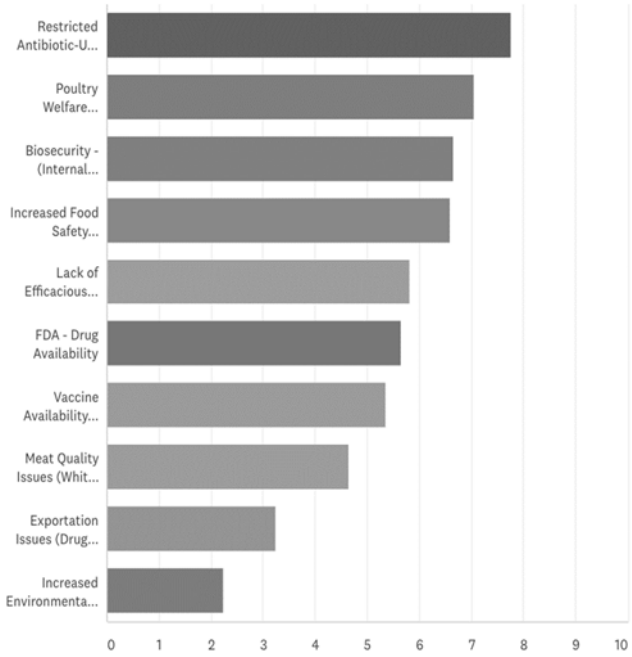



**Table Egg Layer Industry Report**

Eric Gingerich, Diamond V

In summary, overall layer health is good due to several factors as follows:

- Continued good supply of high-quality biologics.
- Readily available veterinary technical assistance from primary breeder, vaccine company, diagnostic laboratory, feed additive suppliers, and consulting veterinarians.
- Flock supervision by professional, well-trained flock service technicians.
- High quality nutrition provided by professional nutritionists.
- Housing is of good quality in general supplying feed, lights, air quality, water, and space in the needed quantities and quality.
- Use of sound biosecurity practices.
- Continual surveillance for foreign animal diseases or potentially highly pathogenic agents such as Newcastle and avian influenza by our state and federal laboratory system.

**2020 AVEP Disease Survey:**

A poll of the Association of Veterinarians in Egg Production (AVEP) was conducted within the last month. The members were asked to categorize a

list of common diseases of caged and cage-free pullets (20+ conditions listed) and caged and cage-free layers (30+ conditions listed) as to their importance in their area of service on a scale of 0 to 4 with the following categories:

- 0 = Little or no importance to flock health or profitability. Very little effort to control.
- 1 = Some importance to flock health or profitability. Moderate effort to control on some farms.
- 2 = Moderate importance to flock health or profitability. Moderate effort needed to control on most farms.
- 3 = High importance to flock health or profitability. Significant effort to control on some farms.
- 4 = Very high importance to flock health or profitability. Significant effort to control on most farms.

Twenty-seven out of thirty-nine (69%) targeted AVEP members answered the survey.

Starveouts and yolk infections of chicks during the first week continue to be of moderate importance indicating there is still work to be done in breeder hatch egg sanitation, hatchery, and brooding management.

| | **Caged Pullets** | **Cagefree Pullets** |
|---|---|---|
| Starveouts | 1.89 | 1.92 |
| Yolk infections | 1.96 | 1.65 |

The results showing the top ten diseases and conditions for the different classes of egg layers with their average ranking are shown below:

| **Caged Pullets** | **Cagefree Pullets** | **Caged Layers** | **Cagefree Layers** |
|---|---|---|---|
| 1 - Coccidiosis 2.51 | 1 – Piling 2.36 | 1 – E coli 2.42 | 1 – Cannibalism 3.08 |
| 2 tie - Inf bronchitis (IB) and Post Bacterin Hepatitis (PBH) 1.81 | 2 – Cocci 2.23 | 2 – Cannibalism 2.33 | 2 – E coli 2.73 |
| | 3 – IB 1.73 | 3 – IB 2.27 | 3 – Piling 2.35 |
| 4 – vILT (vaccinal infectious laryngotracheitis) 1.74 | 3 – NE 1.73 | 4 – Calcium Depletion 2.19 | 4 – IB 2.04 |
| 5 – Inf Bursal Disease (IBD) 1.59 | 5 – vILT 1.58 | 5 – Cocci 1.96 | 5 – Ascarids 1.96 |
| 6 - Necrotic enteritis (NE) 1.56 | 6 – IBD 1.50 | 6 – Focal Duodenal Necrosis (FDN) 1.74 | 6 – Cocci 1.81 |
| 7 – E coli 1.33 | 7 – E coli 1.40 | 7 tie – Inf coryza (IC), Mg, and NE 1.63 | 7 – IC 1.65 |
| 8 – Marek's (MD) 1.11 | 8 – PBH 1.35 | | 8 – Cal Dep 1.62 |

| | | | |
|---|---|---|---|
| 9 – Mycoplasma gallisepticum (Mg) 1.04 | 9 – Ascarids 1.31 | | 9 – Fowl Cholera 1.58 |
| 10 – Pox 0.89 | 10 tie – MD, Mg, Pox tie 0.92 | 10 – Calcium tetany 1.59 | 10 tie – NE, FDN 1.54 |

Coccidiosis and necrotic enteritis continue to be high on the lists of all classes of layers due to the hardy nature of coccidial oocysts once they are established in a house. Vaccination of caged pullets is a challenge due to difficulty in cycling sporulated vaccinal oocysts. Cagefree pullets and layers outbreaks are usually due to breakdowns in litter management which override coccidiostat and gut health medication programs. The lack of routine antibiotic medication usage in early lay leads to an increase in necrotic enteritis should coccidiosis be a problem.

Infectious bronchitis (IB) continues in the top ten for layers but False Layer Syndrome due to exposure to variant strain IB in very young pullets in the first two weeks has dropped off the top ten list. Early vaccination with the Ma5 Mass or GA 08 vaccines have greatly prevented the problem. Infections with variant IBVs during grow or lay results in reduced feed consumption, higher mortality due to secondary bacterial infections, and loss of shell quality.

Colibacillosis in layer flocks continues as highly important. The live E coli vaccine does a very good job of preventing the problem of early lay onset but immunity is short-lived and does not provide sufficient protection for the late lay onset problems. Some producers are beginning to administer the live vaccine in mid-lay as a booster vaccination. An increase in the usage of killed vaccines during grow is also foreseen as new products come into the market.

Piling of cagefree flocks continues to be a major problem involving environment management. Help on controlling this problem is sorely needed. Peckout mortality of cagefree layers continues as well as an important issue. Genetic predilection, lighting, and behavioral management is often at the root of the problem. Some pressure is on to move to intact beaks for some cagefree programs which may be a real challenge in some operations.

Infectious coryza caused by *Avibacterium paragallinarum* spread through Pennsylvania flocks like wildfire between late December through May 2019 affecting over 12 million layers, pullets, and broilers. Also, an outbreak in Arizona in multiple complexes which previously were coryza-free, occurred in early January 2019. In December 2019 and into January 2020, a large complex in Ohio experienced a serious outbreak. The ease of spread of this supposedly environmentally fragile organism in winter is troubling. Studies at the University of Pennsylvania shows the causative bacteria can survive in 43F and 77F water for up to seven days. Heat and drying need to be utilized on equipment to reduce its presence.

Post salmonella enteritidis (SE) Bacterin Hepatitis continues to be as an important cause of pullet mortality, especially in certain white egg strains.

The problem is seen very little in brown egg strain pullets. Vaccine companies are continuing to work to determine why this syndrome exists. Preventing overheating of vaccine prior to use may be a key to prevention.

The high ranking of infectious bursal disease in pullets is due to the subclinical form resulting in poor growth rate, body (weight uniformity, and response to vaccines not the acute mortality form.

The control of roundworms in egg layers got a boost as the product AquaSol (fenbendazole) was cleared for use in egg layers in production in 2018. Organic layers continue to be without a highly effective product to use for this condition.

**Survey of Food Safety, Foreign Animal Diseases, and Other Issues of Concern:**

The AVEP members were asked to rate their concerns on various topics according to the following scale:

- 0 = little importance, concern, or effort to prevent
- 1 = some importance, concern, or effort to prevent
- 2 = moderate importance, concern, or effort to prevent
- 3 = high importance, concern, or effort to prevent
- 4 = very high importance, concern, or effort to prevent

The results are summarized as follows:

| **Disease or Issue** | **Ave. Rating** | **Level of Concern** |
|---|---|---|
| Avian influenza | 2.46 | Moderate |
| Virulent Newcastle Disease | 1.62 | Some |
| Lack of approved, effective treatments/antibiotics | 3.07 | High |
| *Salmonella enteritidis* (SE)/FDA Egg Safety Rule compliance | 1.96 | Moderate |
| Group C or other non-SE serotypes resulting in egg recalls | 1.96 | Moderate |
| Lack of effective vaccines | 2.04 | Moderate |
| Lack of effective diagnostics | 1.46 | Low/Moderate |
| Welfare Issues | | |
| • Possibility of banning beak trimming | 2.22 | Moderate |
| • Inability to use maceration for of male chicks after hatched | 2.19 | Moderate |
| • Continued misuse of MAK carts for on-farm euthanasia of spent fowl | 2.59 | Moderate/High |
| • Lack of guidance regarding emergency depopulation of layers | 2.70 | High |
| • Cagefree management challenges | 2.56 | Moderate/High |

**Concerns and comments from AVEP members (a summary):**

- **Avian Influenza (AI) risk**
  - Most companies are still expending much effort and resources into prevention of AI. There are some however who have not made much effort.
- **Salmonella serotypes other than SE**:
  - The FDA SE plan inhibits surveillance of other serotypes hence little effort in controlling them is made as the risk is not known.
  - Clear guidance from FDA is lacking in this area
- **Lack of approved treatments:**
  - The availability of useful, economic treatments is sorely lacking.
  - Treatments for organic layers are expensive and often lack effectiveness.
  - The increase in bacterial problems such as infectious coryza, Spotty Liver Disease, fowl cholera, erysipelas, E coli, etc. makes the lack of effective treatments an increasingly important issue.
  - The ability to use chlortetracycline in the water by veterinary prescription should be allowed with not hesitancy.
- **Emergency depopulation procedures**:
  - We are not prepared for the next outbreak
  - I am still concerned there is not a satisfactory way to depopulate a large complex.
- **Cagefree management issues**:
  - I have real concerns with the rapid expansion into cagefree production and inadequate staffing with people with inadequate cagefree production knowledge.
  - End-of-lay excessive mortality is becoming an issue
  - Piling and peckout problems need to be solved
- **Use of Modified Atmosphere Killing (MAK) carts for euthanasia of spent fowl**:
  - A large effort is needed to standardize standard operating procedure (SOPs) for using MAK carts.
  - This is our weakest part of our industry
  - I think this is our greatest weakness in welfare.
  - I am looking forward to new technology in this area.
  - The biosecurity risk of using MAK carts is a concern.
- **Lack of appropriate vaccines**:
  - The vaccine companies are struggling to keep up with changes in providing effective infectious bronchitis vaccines due to changes in the virus in the field.
- **Prohibition of the use of maceration for male chick euthanasia**:
  - Until an acceptable, commercially viable, economic means of euthanizing male chicks is developed, maceration continues to give a humane means of male chick euthanasia in my opinion.

    - In-ovo sexing prior to nine days of incubation is not likely on a commercial basis.
- **Banning of beak trimming**:
    - At this point in the U.S., with the size and management ability of egg producers, banning of beak trimming would be a welfare disaster.
    - Many management changes will be needed to be able to successfully control mortality and feather losses if we do not beak trim flocks.
    - There has been little complaint from animal rights organizations on this issue since the implementation of infrared beak treatment.
    - Not beak trimming is not a welfare-friendly practice.
- **Avian influenza**:
    - Much more discussion is needed in how to detect low pathogenic avian influenza and how to control it if found.
    - The ability of infectious coryza to spread so easily in Pennsylvania does not give one much confidence in our biosecurity programs to deal with high or low path AI.
- **Other concerns**:
    - Spread of Egg Drop Syndrome outside of Pennsylvania
    - Focal Duodenal Necrosis
    - Controlling infectious bronchitis
    - False Layer Syndrome is still a problem in Canada
    - Poorly designed aviary and cagefree houses and equipment
    - Lack of qualified applicants for work on crews, in poultry houses, as flock supervisors, or as complex managers.

**Emerging Diseases**:

Regional or emerging diseases, those that are serious but only seen in a small region or number of flocks, are being seen mostly in cagefree, outdoor access/pastured layers. They are as follows:

- Spotty Liver Disease (SLD) – Flocks with this condition experience a five to 20% drop in egg production over a three to four-week period and have 0.5 to 5% mortality. Missouri and Arkansas have most of the cases although breaks have been seen in other high density cagefree, outdoor access areas. This is also a major problem in pastured flocks in Australia where the cause was determined to be due to *Campylobacter hepaticus*.
- Egg Drop Syndrome (EDS) – A fourth premise broke with this disease in Pennsylvania this past year resulting in 50% loss of production due to shell-less and poor shell quality eggs. This premise is associated with #3 positive premise as they use the same egg processor to pick up their eggs.
- Erysipelas – Several cases of high mortality have been seen in the last year in pastured layers (Pennsylvania and Georgia) with some flocks losing as much as 10% in a week. A case was also seen in two flocks in a multi-age, complex in caged layers. Attempts to treat

the disease with either chlortetracycline or live vaccine in has had mixed results.

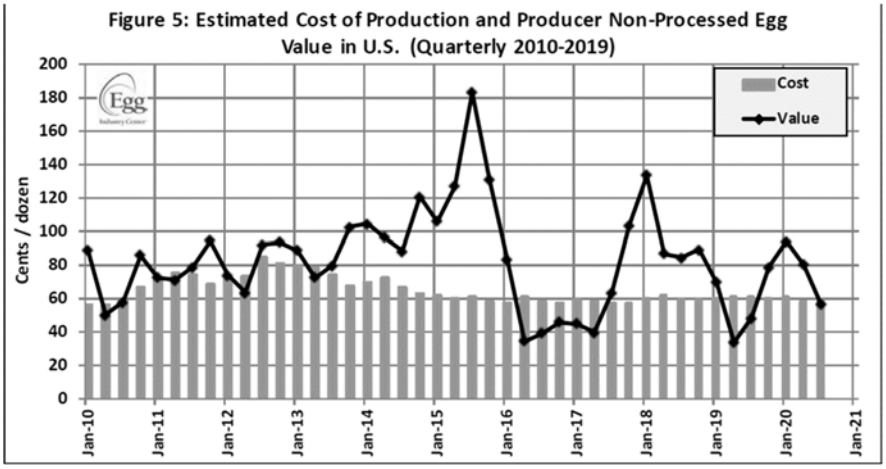
- Fowl Cholera – Appears to be on the increase as breaks have been seen this past year in areas where the disease has not been seen previously. One break occurred in a multi-age, caged complex. Treatment with vaccination in the face of the outbreak with the live vaccine by wingweb has met with success in some organic flocks. Antibiotic therapy in conventional flocks has also been successful in the short term but chronic mortality and suppression of production returns. Increasing the frequency of vaccination during grow and lay is being used preventatively. Hopefully, the release of a new SRP technology killed vaccine will aid our efforts in prevention by vaccination.
- Focal Ulcerative Dermatitis Syndrome (FUDS) – This syndrome continues to cause losses in not only brown cagefree flocks but also in white egg cagefree flocks in western Ohio. The causative agent that results in an ever-growing ulcer in the middle of the back is not known. The open wound leads to bacterial infections and very high mortality rates from 0.5 to 4% per week. The problem will persist in a flock for 5 to 20 weeks. There has been no association found with scratches, nervous birds, rodent activity, insect activity,
- Feed Refusal Syndrome – This problem is less serious this year compared to past years partially due more feed mills screening incoming ingredients for mycotoxins.
- Bedbugs – Cagefree operations that are infested with bedbugs in the Northeast and Midwest U.S. have been reported and concerns for house worker, bird movement, and other persons transfer of bedbugs to their dwellings is high. Some egg producers have been rejected by crews for consideration for moving their birds that have bedbugs.

**Egg Industry Economic Conditions**:

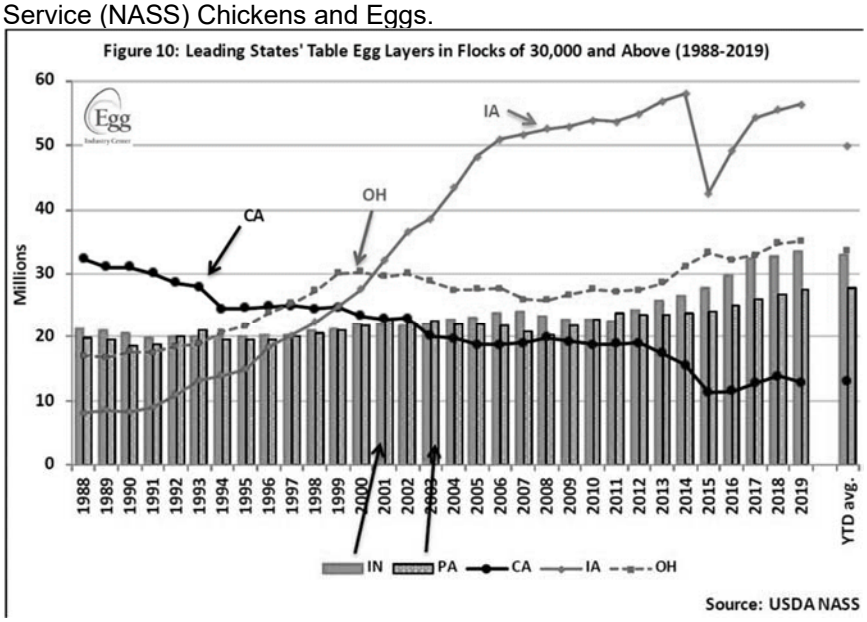
The egg industry has had a breakeven year compared to the past two years; profitable for the shell egg businesses but a loss for the breaking egg businesses.

**Graphs from the Egg Industry Center, September 2020**

With a farm cost of approximately 60 cents per dozen, 2020 has been profitable for the shell egg sector. The COVID-19 pandemic caused an upset in switching from foodservice and broken egg business to more shell egg demand by households. This led to profitability in the shell egg sector but high losses in the broken egg sector. Early selloff of layers occurred in Iowa in complexes producing for the broken egg business and has resulted in a return to profits for them.

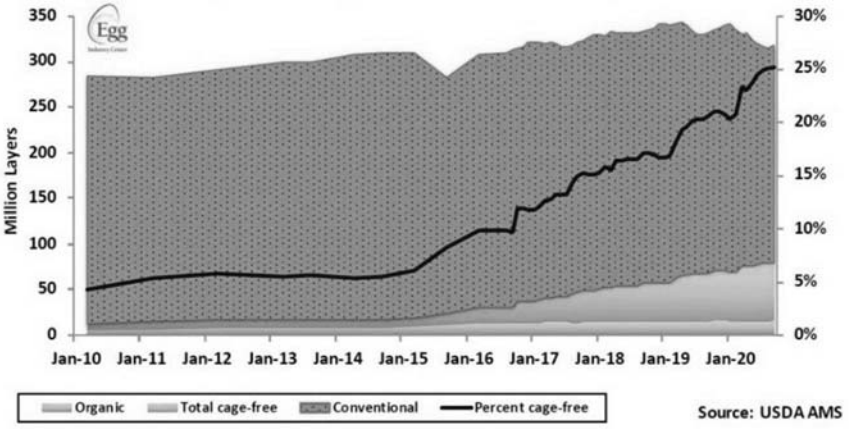



As can be seen in the graph below, Iowa lost a significant number of layers due to early selloff during the very low breaking egg prices. The other top states layer numbers have been relatively stable. As of August 2020, #1 Iowa (45.09 million layers) continues to hold the top spot of states in egg production by far over #2 Ohio (32.56 million), #3 Indiana (32.55 million), #4 Pennsylvania (26.14 million), and #6 California (12.58 million). Texas (#5) numbers are not reported by USDA starting this year as one company owns a vast majority of the flocks. Source: USDA National Agricultural Statistics Service (NASS) Chickens and Eggs.




As can be seen from this graph below, the number of caged layers declined with additional capacity in the cagefree sector. The industry will be hard pressed to meet the target of reaching 50% cagefree production by 2025 due to poor profits and lack of ability to invest in new or renovated facilities.

Figure 6: U.S. Cage-Free and Conventional Layers




**Turkey Industry Report**

Lindy Froebel, National Turkey Federation
Prepared by: Steven R. Clark, Huvepharma, Inc.

In preparation for this report to the USAHA Committee on Poultry and Other Avian Species, the subcommittee chairman, Dr. Clark, surveyed turkey industry professionals and veterinarians representing (n=26) the U.S. turkey production regarding the health status of turkeys produced in August 2019 through August 2020. The turkey industry reports several disease challenges for this 12 months varying by geographic regions within a state and across the United States. This report will list, Table 1, the challenges by disease and issues. Of particular interest in 2020 are issues with lack of efficacious drugs, colibacillosis, clostridial dermatitis, ornithobacterium rhinotracheale (ORT), salmonella, leg problems, Bordetella, and coccidiosis. The top-10 list for 2020 was near identical to 2019 with notable exception coccidiosis jump in rank to #5 from #8. Blackhead ranking also increased to #11 from #18 the prior year, and the number of reported cases decreased by 15%. Cases of Turkey Reovirus increased 12+% and dropped in rank to #19 from #9.

The “lack of approved efficacious drugs” continues to be the top health issue (Table 1). The withdrawal of the New Animal Drug Application (NADA) for enrofloxacin in 2005 for use in poultry leaves the industry with no adequate therapeutic response to colibacillosis (has ranked #2 since 2016), or fowl cholera (ranked #12 from #14). In July 2011, the sale of roxarsone was suspended; September 30, 2013, the Food and Drug Administration (FDA) marketing authorization NADA was withdrawn. The sponsor of Penicillin-100 Type A medicated article (in feed administration) withdrew the approval (NADA) June 30, 2015. Nitarsone (see blackhead) approval was withdrawn December 31, 2015. Issues over the use of antibiotics in animal agriculture remains a major concern for the turkey industry and for all of animal agriculture.

Clostridial Dermatitis (CD), also referred to as Cellulitis, remains a major disease issue across all geographic regions; as the survey average changed slightly to a score of 4.0 (from 3.7 in prior year) and stayed at #3 rank (from

#5 in 2018, #4 in 2017, #3 in 2016 and #2, 2008-2015). CD is most commonly seen in, but not limited to, commercial male turkeys nearing market age. *Clostridium septicum, C. perfringens* type A, or *C. sordelli* is isolated from fluid or affected tissue samples of affected or dead birds. Affected turkeys present with two or more of the following clinical signs: subcutaneous emphysema (crepitus); serous or serosanguineous subcutaneous fluid; vesicles on the skin, especially on the breast/inguinal area; moist, dark, wrinkled skin, especially breast/inguinal area; cellular necrosis (microscopic); organ involvement (spleen/liver); vesicles on the skin, and/or moist, dark, wrinkled skin, on the tail area. The affected flock will have mortality greater than or equal to 0.5 dead per 1,000-birds, fitting the individual bird definition, for two consecutive 24-hour periods. Opinions vary as to risk factors and potential causes of the problem. Some of the key areas to control CD include: early recognition; removal of mortality 2-3 times per day; medicating affected flocks with appropriate antimicrobials; promptly managing all water spills, wet litter, feed outages and do not compost litter within 200 feet of poultry barn. Vaccinating at-risk flocks with autogenous bacterins and toxoids has not proved as a viable option for the industry.

*Ornithobacterium rhinotracheale* (ORT) stayed at #4 ranking in 2020 and 2019 and 2016 (#3, 2017, 2018; #7, 2015), is a highly contagious respiratory disease in poultry caused by a gram-negative pleomorphic rod-shaped bacterium. It has been isolated from chickens, ducks, partridges, and guinea fowl. It was originally recognized in Europe and South Africa. ORT was first confirmed in the U.S. from turkeys in 1993. Horizontal transmission (such as, bird-to-bird, contaminated people and equipment) by direct and in-direct contact is the primary route of spread. However, vertical transmission is suspected (Hafez, 2000). In the fall of 1995, it was a major cause of respiratory disease in midwestern states and since has become endemic across most of the USA. Management systems, such as brood-and-move have increased the exposure of ORT-naive birds to ORT in the finisher barns, resulting in respiratory disease and mortality in some operations. Biosecurity procedures must be taken. Proper water sanitation can minimize the severity and spread. Vaccination is limited and results are varied (toxoids, bacterins). Bacterins are used in breeders. No commercial vaccine is approved. Limited application of controlled exposure efforts on individual flocks have shown value. ORT in turkeys is an identified critical research need.

Coccidiosis increased to #5 from #8 ranking in 2019 (#4, #6, #13 in 2018 – 2016, respectively) most likely reflects the industry increasing raised without antibiotics (RWA) and no antibiotics ever (NAE) market. RWA and NAE programs do not permit the use of ionophore anticoccidials and some programs prohibit FDA approved chemical anticoccidials, so anticoccidial programs consist of alternative phytogenics or vaccination. An effective coccidiosis control program in turkeys involves the use of anticoccidial medications and/or phytonutrients and/or live vaccines and the subsequent development of immunity. Table 4 summarizes the U.S. turkey production coccidia control products (n=260.0 million head, survey total) and ionophores represent the majority, 60% (62%, 2019; 44%, 2018; 55%, 2017) of heads for an average use of 7.0 (7.3, 7.7 and 7.5, 2019 - 2017) months during the 12-

month survey period. Chemical anticoccidials account for 28% (29%, 30% and 33%, 2019 - 2017) head and 5.5 (5.5, 4.6 and 4.5, 2019 - 2017) months. Coccidia vaccination was limited to 11% (10%, 10% and 7%, 2019 - 2017) head; the low incidence might be in part due to the limited availability of the only USDA approved commercial turkey coccidiosis live vaccine. Also, several colleagues are utilizing autogenous coccidiosis vaccination. Nutritional dietary supplementation with phytonutrients, reported at 23% (27%, 28% and 14%, 2019 - 2017) head, either via in-feed application or drinking water administration. Programs may utilize phytonutrients in addition to the current anticoccidial program, to potentiate the possible benefits, or as the sole supplement for coccidia control. Some phytonutrients have purported activity against coccidia. Phytonutrients consist of 'alternative' products including organic acids, yeast, phytonutrients from plant extracts (saponin, yucca, etc.) and essential oils (oregano, carvacrol, thymol, cinnamaldehyde, capsicum oleoresin, turmeric oleoresin). Essential oils may be natural extracts or synthetic nature-identical compounds.

Leg problems are ranked #7 in 2020 (#6, 9, 6, 6, 10 in 2018 – 2015, respectively) among the top concerns of the turkey industry. Leg problems are a common complaint, such as, spiral fractures of the tibia or femur. Leg problems may be defined as lameness, particularly in toms, several weeks prior to slaughter. Leg problems are attributed to various conditions (refer to Table 1), including, pododermatitis, fractured femurs, fractured tibia, osteomyelitis (OM), tibial dyschondroplasia (TDC), spondylolisthesis, "Shaky Leg", etc. The year 2017 - 2019 was particularly noted increased incidence of valgus and varus leg deformities across much of the U.S. industry due to undetermined etiology; the issue contributed to increased mortality in affected flocks. Issues were less prevalent in 2018. Bacterial chondronecrosis with osteomyelitis (BCO)-associated lameness, as described by Dr. Wideman, has been diagnosed in some cases. Leg problems can represent substantial production losses and welfare issues of turkeys.

*Bordetella avium* continues as a significant respiratory disease challenge in several geographic regions; bordetellosis ranked #8 and fluctuates between #5 and #8 the prior year 5-years. Bordetellosis, otherwise known as Turkey Coryza, is a highly infectious, acute upper respiratory tract disease of turkeys characterized by high morbidity and usually low mortality. Bordetella avium (BA) is a small, gram-negative, nonfermentative, motile, strictly aerobic bacillus. Other birds and older turkeys can be carriers but may not show clinical signs. Commercial vaccines are available but are not routinely used. Water sanitation and biosecurity are emphasized to control Bordetella.

Turkey arthritis reovirus (TARV) also called, turkey reovirus digital flexor tendon rupture (TR-DFTR), was recognized as a newly emerging disease in 2011. A unique reovirus has been isolated and identified as the cause of tenosynovitis and digital flexor tendon rupture in commercial turkeys. Clinical signs in young flocks are reportedly mild to nonexistent but can develop into lameness and/or abnormal gait in older flocks, starting at about 12 weeks of age. Affected flocks may also report an increased incidence of aortic ruptures and poor flock performance (weight gain, uniformity). Research continues into pathogenesis, virus characterization, diagnostics and epidemiology.

Research indicates that the turkey arthritis reovirus is distinct from the recently identified novel reovirus causing arthritis in chickens, and most similar to the turkey enteric reovirus. TR-DFTR was added to the survey in 2011 and dropped to #19 rank from #9 in 2019 and #17 in 2018 (Table 1) with >548 “definitive” and “suspect” cases or flocks (Table 2). In 2019 the NTF Reovirus Subcommittee released three documents to the industry, including the case definitions and nomenclature. Second, the Reovirus Diagnostic and Testing Reference Sheet listing contacts of 6 TARV researchers and the tests available. The third document was the results of an industry survey titled, Economic Impact of Turkey Arthritis Reovirus, reporting an average of 5.6 cent increased cost per pound for flocks affected by TARV compared to the companies’ surveyed production costs for unaffected flocks. TARV 2019 Survey reports approximately 2% incidence of all turkeys produced annually and primarily affects toms (approximately 5% incidence of toms produced annually). The severity of impact on the industry could be as high as $33.7 million with highly pathogenic strains of TARV.

Turkey Arthritis Reovirus (TARV) is a progressive condition that appears as early as 10-12 weeks of age in male, and sometimes female, commercial turkeys. Younger birds are occasionally affected. The disease does not appear to be transmitted from chickens. Signs are most severe when the birds reach 15-16 weeks of age. Clinical signs are characterized by reluctance to move, recumbency and limping on one or both legs. There is often uni- or bilateral swelling of the hock (intertarsal) joint. Morbidity can be as high as 40% and mortality is usually a result of culling or aortic rupture. Lesions observed in acutely affected birds at necropsy are uni- or bilateral enlargement (subcutaneous edema) of the hock joints, which contain increased volume of clear yellow to serosanguinous synovial fluid. Similar fluid can expand the sheath of the gastrocnemius and digital flexor tendons. In chronic cases there is bruising of the skin of the hock, with prominent periarticular fibrosis, edema and occasional large flecks of fibrin within the subcutis and tendon sheaths. In a small percentage of cases one can observe partial or complete rupture of the proximal gastrocnemius tendon or a digital flexor tendon with hemorrhage at the level of the rupture. Histological sections of gastrocnemius tendon and sheath reveal lymphocytic infiltrates in the subsynovium in acute cases, progressing to prominent subsynovial and peritendon fibrosis in chronic cases. Secondary bacterial infections (e.g., Staphylococcus) occasionally occur and are accompanied by heterophilic inflammation. Affected breeder companies have implemented an autogenous reovirus vaccination program to induce the maximum production of antibodies and resulting transfer of maternal antibodies. Historic results originally showed a significant reduction in associated clinical signs in those poults placed from vaccinated flocks. A commercial turkey lighting program of 4-8 hours of continuous dark in a 24-hour period has also been recommended. The combined efforts of breeder vaccination, commercial farm biosecurity and flock management once appeared to be controlling this disease. TR-DFTR is an identified critical research need.

Blackhead[1,2], also known as histomoniasis, increased to position #11 from #18 (#11, 8, 9, 13 in 2018 -2015, respectively). There were 82 reported cases of blackhead in 2020, down from 96 in 2019, and (Table 2) a decrease from the peak of 127 in 2018. Histomoniasis occurs regionally and seasonally in turkeys and can result in significant mortality. Dimetridazole was extremely efficacious and previously approved for use in turkeys for the prevention and treatment of blackhead; it was banned in 1987. The lack of any legal treatment for histomoniasis is of concern, especially in the case of valuable turkey breeder candidate flocks. Losses to blackhead have been severe in several areas of Europe, and sporadic cases are occurring in North America. Nitarsone FDA approval was withdrawn December 31, 2015, leaving the industry with no drugs approved with indications against histomoniasis. Nitarsone was approved for the prevention of histomoniasis (blackhead disease) in turkeys and chickens and was the only approved animal drug for this indication. Table 2a list some additional blackhead responses, including a two-question survey as to inciting factors that might be associated with a blackhead break. Of those 16 respondents reporting 82 blackhead cases in 2020, 23% (n=19) reported a coccidiosis diagnosis and 23% (n=19) reported a colibacillosis (*E. coli*) diagnosis prior to the blackhead break. Sixteen respondents equal to 62% of survey reported one or more cases of blackhead (54%, 63%, 2019; 74%, 2017). Of the 82 reported cases at least 11% (n=9) were destroyed to alleviate animal suffering and due to excess morbidity and mortality. Without efficacious approved pharmaceuticals, early diagnosis and start of interventions is considered part of controlling *Histomonas meleagridis* in field conditions; for this reason, a sound monitoring system using diagnostic tools, such as, polymerase chain reaction (PCR) and serology is needed, in particular on problem farms.

The turkey industry continues to work to reduce Salmonella (#6) colonization in birds. Poult enteritis of unknown etiologies has changed in importance, to position #10 (#12, 8, 10, 14 from 2019 – 2016). Turkey Coronavirus (TCV), as a defined cause of enteritis, was ranked #29 (#29, 30, 30, 31 from 2019 – 2016), with 27 reported cases, from 95 (2019) and 185 (2018) previous years (Table 2).

Protozoal Enteritis, attributed to flagellated protozoa, *Cochlosoma*, *Tetratrichomonas* and *Hexamita*, ranked #15, changed from #16; protozoal enteritis remained relatively unchanged over past years until 2016 and associated with the loss of nitarsone. Several types of protozoa are associated with enteric disease of turkeys. Protozoal enteritis can present with general signs, including dehydration, loss of appetite (off-feed), loose droppings (diarrhea) and watery intestinal contents. Flagellated protozoa include *Cochlosoma*, *Tetratrichomonas* and *Hexamita*. *Eimeria* and *Cryptosporidia* are non-flagellated protozoa. *Cochlosoma* and *Hexamita* are associated with enteritis, primarily in young turkeys, especially in the summer months. There are field reports of co-infections with *Cochlosoma* and

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[1] Clark, S. and E. Kimminau. Critical Review: Future Control of Blackhead Disease (Histomoniasis) in Poultry. Avian Diseases 61(3): 281-288. Sept 2017.

[2] Regmi, P.R., Shaw, A.L., Hungerford, L.L., Messenheimer, J.R., Zhou, T., Pillai, P., Omer, A., and Gilbert, J.M. Regulatory considerations for the approval of drugs against Histomoniasis (Blackhead Disease) in turkeys, chickens, and game birds in the United States. Avian Diseases. 60:725-730. 2016.

*Tetratrichomonas*, or *Cochlosoma* and *Hexamita*, or flagellated protozoa and *Eimeria*.

Late mortality ranked #9 health issue and changed from #10 the prior year. Late Mortality may be defined as mortality, in excess of 1.5% per week, in toms (males) 17-weeks and older; mortality is not diagnosed to a specific disease or cause. Excess cumulative mortality of 5 – 10% in toms prior to slaughter has been reported. Late mortality may be associated with physiologic or biomechanical deficiencies following early rapid growth in heavy toms achieving genetic potential; aggressive behavior noted in mature toms; cannibalism; leg problems and/or hypertension.

Round Worms (*ascaridia dissimilis*) ranked #14 and has positioned between #14 - #19 since 2015. The industry is concerned that reduced sensitivity to anthelmintics is an issue[3]. High worm burdens can be associated with necrotic enteritis (#16) and the cause of high mortality in flocks.

Turkey Hepatitis Reovirus (THRV) is a new disease issue added to this survey in 2020 and ranking #18. THRV affected flocks ranged in age from 7 to 46 days with a median age of 15.5 days. Mortality peaks and subsides in a week and the cumulative mortality is 3-8%. Dr. M. Lighty (2019, personal communication) describes THRV as “over the past two years, turkey companies in the United States have reported an increased incidence of viral hepatitis in poults caused by reovirus. This appears to be an emerging disease caused by a previously recognized pathogen. Gross lesions range from subtle mottling to multifocal white/gray/tan foci in the livers; mild hepatomegaly has also been noted in some cases. Histopathology on these livers shows severe multifocal hepatocellular necrosis with infiltration by macrophages, lymphocytes, plasma cells, and/or heterophils. Necrotic hepatocytes may fuse to form multinucleated syncytial cells and there is often marked fibrin accumulation in necrotic areas…. Morbidity and mortality due to reoviral hepatitis can be highly variable. Risk factors for development of the disease and the economic significance of this disease on the turkey industry are not fully understood at this time.” There are indications from the field that flocks developing hepatitis as poults can go on to develop turkey reoviral arthritis during grow out.

Heat stress ranked #22 in 2019 compared to #20 prior year. Tunnel ventilated barns allow growers to manage heat stress better than in years past. Poult Enteritis Mortality Syndrome (PEMS) ranked #30 versus #32 previously. Avian Metapneumovirus (AmPV) ranked #34 since 2017.

*Mycoplasma synoviae* (MS, infectious synovitis) infections, ranked #31 (#24, prior year), are one cause of synovitis. It may be present in flocks 10-12 weeks of age with typically low mortality and low morbidity. There were 21 cases of MS reported (Table 2). The primary breeders have remained free of *M. gallisepticum* (MG), *M. meleagridis* (MM) and MS. Sporadic, but increasingly frequent infections with Mycoplasma, both MG and MS, often in association with backyard poultry and broiler breeder flocks is an ongoing

[3] Collins JB, Jordan B, Baldwin L, Hebron C, Paras K, Vidyashankar AN, Kaplan RM. Resistance to fenbendazole in Ascaridia dissimilis, an important nematode parasite of turkeys. Poult Sci. 2019 Nov 1;98(11):5412-5415. doi: 10.3382/ps/pez379. PMID: 31328783.

concern, having the greatest impact when a breeder flock is infected and has to be destroyed. There were 31 cases of MG reported (Table 2).

The health of turkeys is a top priority of industry members, and the National Turkey Federation (NTF) works to support the industry in endeavors to promote advancements in turkey health. NTF's Turkey Health Task Force, established in 2017, along with NTF staff, has continued working to find innovative solutions for the top disease challenges facing the turkey industry. The task force has continued to focus its efforts on accelerating the development and approval of turkey health products and support research to improve turkey health. The actions of the task force aim to address disease challenges that have the greatest impact on the turkey industry. As part of this effort, NTF has previously worked to develop economic impact models for turkey-specific diseases with the help of the NTF Turkey Health and Welfare Committee and industry members throughout the production process along with APHIS Veterinary Services staff. NTF plans to continue these efforts and surveys are underway to better understand the impact of issues frequently identified in industry-wide surveys, including Clostridial Dermatitis and *Ornithobacterium rhinotracheale*. Currently, limited options for effective disease management are available to the turkey industry. NTF supports reduced regulatory barriers for new turkey health product approvals to assist the turkey industry in raising healthy turkeys to produce safe and nutritious turkey products.

The impact of SARS-CoV-2 (COVID-19) was felt throughout the country in 2020, and the turkey industry, like most industries, faced unprecedented situations. Because COVID-19 was a new virus first observed in humans in 2019, substantial knowledge gaps needed immediate attention to better understand the virus, including the susceptibility of animals to COVID-19, whether COVID-19 could be transmitted by food products and the ability of the virus to persist in the environment. While the virus is still not well understood, several research groups have worked to address concerns of COVID-19 in poultry products and further the understand the transmission of the virus. Initial research conducted by USDA, Agricultural Research Service (ARS) and the Food and Agriculture Organization (FAO) has indicated chickens, turkeys, ducks, quail and geese are not able to become infected with COVID-19. In addition, chicken eggs, commonly used to grow viruses for vaccine antigen, were unable to grow the virus. Further, current research suggests that contact with poultry and other livestock and consumption of meat and poultry productions are unlikely sources of COVID-19 transmission to humans.

Blackhead continues to be a top disease of concern for the turkey industry, as it results in significant mortality, and the pursuit to find efficacious preventative and control options for blackhead remain top priorities for the industry. In 2019, FDA provided the Turkey Health Task Force with a Minor Use in Major Species (MUMS) designation for control in the incidence of mortality in turkeys at high risk of developing blackhead associated with *Histomonas meleagradis* in flocks of turkeys where blackhead has been diagnosed. Although a product has not yet been identified to be submitted under the MUMS designation, NTF remains optimistic that benefits of MUMS

status can incentivize the prioritization of the development of new molecules to mitigate blackhead.

Turkey Arthritis Reovirus (TARV) and other related leg issues continue to be an industry-wide concern. In December, NTF published the results of an industry-wide survey on the economic impact of TARV. Though the average increase in production cost per pound for flocks affected by TARV reported was 5.6 cents in comparison to unaffected flocks, the virus increased costs as high as 15 cents per pound for TARV affected flocks. The report indicated the impact could be as high as $33.7 million dollars with highly pathogenic strains of TARV. Approximately 226 million pounds were affected with five percent of toms produced annually diagnosed with TARV. It is important to note that while the economic impact of TARV to the turkey industry is considerable, the impact of TARV on an individual turkey producer that may only have two flocks per year can be especially burdensome.

There is currently no treatment for TARV and the industry lacks reliable and cost-effective diagnostic tools to identify TARV in turkey flocks. Therefore, research and advancement for prevention and treatment options for TARV are of significant interest to the turkey industry. NTF hosted two meetings this year to facilitate conversations between members in live production, veterinarians, members of the allied industry and researchers to discuss opportunities to increase coordination efforts to mitigate TARV. As part of this effort, the group developed case definitions to improve consistency of reporting and an isolate nomenclature to streamline the naming of isolates and reduce on duplication of sequencing detailed below.

<u>National Turkey Federation Turkey Arthritis Reovirus Case Definitions:</u>

- Definitive diagnosis requires the veterinarian to fulfill these three criteria: (1) observation of typical gross lesions, (2) rule out other causes of lameness in turkeys (e.g., osteomyelitis, primary bacterial arthritis, muscle rupture, footpad dermatitis, Mycoplasma synovitis, dietary deficiencies) and (3) isolation of reovirus, referred to as turkey arthritis reovirus (TARV), from the gastrocnemius and/or digital flexor tendon in embryonated eggs or cell culture.
- Suspect diagnosis requires the veterinarian to fulfill these two criteria: (1) observation of typical gross lesions, (2) ruling out other causes of lameness in turkeys (e.g., osteomyelitis, primary bacterial arthritis, muscle rupture, footpad dermatitis, Mycoplasma synovitis, dietary deficiencies).

<u>National Turkey Federation Turkey Arthritis Reovirus Isolate Nomenclature:</u>

- Species (tk/ck) /U.S./State (bird location)/ Isolate ID/ Tissue (spelled out)/ Year
- Example: TRV/US/GA//UMN-1234/Tendon/ 2018

Highly Pathogenic Avian Influenza (HPAI) continues to be a focus for the U.S. poultry industry. Since the outbreak in 2015, detection, prevention and response across the industry has greatly improved. In March and April, 11 commercial turkey farms were affected by an outbreak of low pathogenic avian influenza (LPAI) in North and South Carolina. In addition, one

commercial turkey farm was affected by HPAI in South Carolina. Flocks were swiftly depopulated to control the spread of the disease. Following, thorough cleaning and disinfecting were conducted on the farms in addition to increased surveillance of commercial flocks in the surrounding areas. USDA published a set of 14 biosecurity principles of the National Poultry Improvement Plan (NPIP) in 2017 that serve as the basis for biosecurity at poultry facilities. Strict biosecurity remains important to prevent avian influenza outbreaks and routine testing is essential to identify flocks positive for avian influenza as early as possible.

In October, APHIS issued their final rule updating the NPIP to align with changes in the poultry industry and incorporate new scientific information and technologies into the NPIP. These updates were approved by representatives from across the poultry industry at the 2018 NPIP Biennial Conference, and a draft rule was published in December 2019. This is the final step in the rulemaking process. Among other important updates, of most interest to the turkey industry is the clarification of low pathogenic avian influenza (LPAI) regulations on indemnity and compensation. These sections amend the terms and definitions of H5/H7 LPAI infection (infected) and H5/H7 LPAI exposed. The new terms proposed were H5/H7 LPAI virus exposed (noninfectious) and H5/H7 LPAI virus actively infected (infectious). The revision to these terms does not change APHIS' response policies for LPAI events. Compensation for cleaning and disinfection (virus elimination) of premises, conveyances and materials that encountered poultry infected with or exposed to H5/H7 LPAI will continue to be determined using the current APHIS flat-rate virus elimination (VE) calculator. These revisions to terminology in the final rule do not pertain to the conditions for payment, nor how payment is calculated. APHIS is in the process of discontinuing the use of the indemnity calculator in favor of a different appraisal apparatus, and NTF has been working closely with the agency to make sure turkey is valued fairly.

Although not a major turkey health concern, *Salmonella* continues to be reported as a top priority for the turkey industry in this survey. NTF continues to assist the turkey industry in efforts to reduce *Salmonella* throughout turkey production and processing. In the last year, NTF has hosted three meetings for industry members focused on *Salmonella.* As part of the discussions on reduction strategies, NTF updated its *Salmonella* Risk Mitigation Practices document that details best practices to be considered at all sectors of the supply chain, including breeder and hatchery, commercial production and processing operations. This document is located on EatTurkey.org. While this document is not all encompassing and every intervention may not be appropriate in all operations, the best practices included are potential strategies for reducing *Salmonella.* However, there is still a need for the development of interventions to mitigate *Salmonella*, and NTF continues to support research with the objectives of improving the understanding of *Salmonella* and products that reduce colonization of *Salmonella* in turkeys.

The approval of new anticoccidials remains a significant need for the turkey industry. There currently is one commercial vaccine available and the number of chemical anticoccidials approved and available for turkeys on the market are limited. The lack of efficacious options is a challenge for the

industry as a whole but is especially burdensome for antibiotic free production.

Autogenous biologics play an integral role in the disease prevention and control programs of turkey producers. In addition, autogenous biologics are frequently a component of food safety programs because of their effectiveness at reducing the colonization in turkeys of pathogens associated with foodborne illness. Veterinarians work with live production specialists and farmers to supervise the day-to-day management of disease for turkey flocks, and therefore have most adequate knowledge of health needs of the animals for which they oversee. Members of the Turkey Health Task Force and NTF staff continue to advocate for policies that accelerate the approval of safe and effective biologics to assist the turkey industry with managing important pathogens. Center for Veterinary Biologics (CVB) published Draft Veterinary Services Memorandum No. 800.69 Draft No. 638 in June that would extend the isolate approval length for autogenous biologics from two years to up to six years. NTF supported the extension on the use of autogenous isolates on a justifiable basis when previous use of the autogenous biologic was deemed beneficial to flock health by the veterinarian, and to NTF's knowledge there is no scientific basis for concern related to the proposed option for autogenous isolate extensions. A final draft is expected in late 2020 or early 2021.

FDA released the annual antimicrobial sales and distribution data for 2018. Though there was a slight increase (nine percent) in the sales and distribution of medically important antimicrobials from 2017 through 2018, the overall decrease from 2015 remains significant at 38 percent. Tetracyclines, which represent the largest volume of these domestic sales (3,974,179 kg in 2018), increased by 12 percent from 2017 through 2018. Of the 2018 domestic sales and distribution of medically important antimicrobials approved for use in food-producing animals tetracyclines accounted for 66 percent, penicillins for 12 percent, macrolides for eight percent, sulfas for five percent, aminoglycosides for five percent, lincosamides for two percent, cephalosporins for one percent and fluoroquinolones for less than one percent. NTF continues to support the judicious use of antimicrobials to manage turkey health issues.

FDA is currently evaluating the interpretation of zero-day withdrawal times assigned to new animal drugs. Since the 1980s, FDA has assumed that poultry spent at least six hours withdrawn from drugs prior to slaughter due to transit process and additional times for other livestock. However, FDA sought comments to determine if its assumptions are correct based on current industry practices. Based on a survey conducted to understand current industry practices, NTF submitted comments noting that six hours is an appropriate zero-day withdrawal period especially given that government sampling of turkey products consistently shows virtually no violative residues in turkey meat produced in the United States. Determination by FDA on the interpretation of zero-day withdrawal times is expected in the next year.

NTF remains in regular contact with officials at FDA to monitor the timeline of several key CVM items including, those listed below, and to communicate needs of the turkey industry.

- A concept paper on updating the medically important drugs listed in Appendix A of FDA's Guidance for Industry #152 is anticipated this fall. The paper is expected to detail FDA's proposed process for updating the list of drugs and how the drugs would fall using this process.
- A concept paper on the duration of use for animal drugs is projected to publish in early fall for comment.
- A coordinated publication on antibiotic use is anticipated to be out by the end of 2020. This publication would include industry data from Randy Singer like the information reported in 2019.
- A package of four guidance documents should be released from FDA related to data necessary for drug approvals. NTF continues to be a vocal advocate supporting flexibility on this issue.

In 2020, APHIS made $10 million available for the National Animal Disease Preparedness and Response Program (NADPRP). The NADPRP sought proposals for projects that will advance capabilities and capacities related to rapid large-scale animal depopulation and carcass disposal in a high-consequence animal disease outbreak or enhance U.S. livestock biosecurity. NTF continues to work with members and executives from state associations on application efforts to secure funding for projects that address turkey industry needs as part of this important program. In addition, $5 million was made available for the strengthening of the National Animal Health Laboratory Network (NAHLN). NTF, along with most other major animal-related commodity organizations as a part of the Animal Agriculture Coalition (AAC), pioneered the Animal Pest, Disease and Disaster Prevention and Response Program (APAD) in 2016 that was fully funded in the 2018 Farm Bill. This program is an important for disease prevention and response preparedness, especially for foreign disease threats to the U.S. poultry and livestock industries.

In 2019, turkey production decreased from 7,598,289.00 to 7,432,801.00 pounds (live weight) and decreased to 229,000,000 head with an average live weight of 32.22 lbs. In 2018, 244,750,000 head were produced with an average live weight of 31.12 lbs. Per capita consumption for turkey products decreased from 16.2 in 2018 to 16.0 in 2019. (Reference: National Turkey Federation Sourcebook, pending publication October 2019).

**Table 1.** Turkey health survey (August 2019 - 2020) of professionals in US turkey production ranking current disease issues (1= no issue to 5 = severe problem). n=26.

| Issue | Score Average (1-5) | Score Mode (1-5) |
|---|---|---|
| Lack of approved, efficacious drugs | 4.5 | 5 |
| Colibacillosis | 4.2 | 5 |
| Clostridial Dermatitis (Cellulitis) | 4.0 | 5 |
| *Ornithobacterium rhinotracheale* (ORT) | 3.8 | 3 |
| Coccidiosis | 3.6 | 5 |

| | | |
|---|---|---|
| Salmonella | 3.5 | 4 |
| Leg Problems | 3.2 | 4 |
| *Bordetella avium* | 3.2 | 3 |
| Late Mortality | 3.1 | 4 |
| Poult Enteritis of unknown etiologies | 2.9 | 2 |
| Blackhead (Histomoniasis) | 2.8 | 1 |
| Cholera | 2.8 | 3 |
| Cannibalism | 2.7 | 3 |
| Round Worms (*Ascaridia dissimilis*) | 2.6 | 3 |
| Protozoal Enteritis (Flagellated) | 2.6 | 1 |
| Necrotic enteritis | 2.6 | 3 |
| Tibial Dyschondroplasia (TDC, Osteochondrosis) | 2.5 | 2 |
| THRV (Turkey Hepatitis Reovirus) | 2.5 | 1 |
| TR-DFTR (Turkey Reovirus Digital Flexor Tendon Rupture) | 2.5 | 1 |
| Avian Influenza | 2.4 | 1 |
| Breast Blisters and Breast Buttons | 2.3 | 3 |
| Heat stress | 2.2 | 2 |
| Bleeders (aortic, hepatic ruptures) | 2.0 | 1 |
| Osteomyelitis (OM) | 1.9 | 2 |
| Newcastle Disease Virus (NDV) | 1.9 | 1 |
| Shaky Leg Syndrome | 1.8 | 2 |
| Turkey Coronavirus | 1.8 | 1 |
| *Mycoplasma gallisepticum* (MG) | 1.7 | 1 |
| Fractures | 1.7 | 1 |
| PEMS (Poult Enteritis Mortality Syndrome) | 1.6 | 1 |
| *Mycoplasma synoviae* (MS) | 1.6 | 1 |
| H3N2 (H1N1) Swine Influenza | 1.4 | 1 |
| Erysipelas | 1.4 | 1 |
| Avian Metapneumovirus | 1.2 | 1 |
| Spondylolisthesis (Kinky-Back) | 1.2 | 1 |
| *Mycoplasma meleagridis* (MM) | 1.1 | 1 |

**Table 2**. Turkey health survey (August 2019 - 2020) of professionals in U.S. turkey production reporting cases of diseases. n=26.

| **Cases (##) of** | **2020** | **2019** | **2018** | **2017** | **2016** | **2015** | **2014** |
|---|---|---|---|---|---|---|---|
| Blackhead (Histomoniasis) | 82 | 96 | 127 | 109 | 101 | 55 | 61 |
| *Mycoplasma synoviae* (MS) | 21 | 25 | 35 | 33 | 20 | 24 | 41 |
| Turkey Coronavirus (TCV) | 27 | 95 | 185 | 12 | 6 | 119 | 43 |
| Turkey Reovirus Digital Flexor Tendon Rupture | 548 | 486 | 234 | 182 | 31 | 146 | 150 |
| *Mycoplasma gallispecticum (MG)* | 31 | 30 | 50 | 52 | 29 | 31 | 17 |

**Table 2a**. Turkey Blackhead (Histomoniasis) survey (August 2019 - 2020) of professionals in U.S. turkey production.

| | n= | % |
|---|---|---|
| How many cases (##) of Blackhead (Histomoniasis) did you confirm in last 12-months (since Aug.)? | 82 | - |
| How many blackhead flocks/barns destroyed? | 9 | 11% |
| How many respondents? | 26 | - |
| How many respondents reported blackhead? | 16 | 62% |
| **How many cases of Blackhead (Histomoniasis) diagnosed ...** | | |
| … coccidiosis prior to Blackhead break? | 19 | 23% |
| … colibacillosis (*E. coli*) prior to Blackhead break? | 19 | 23% |

**Table 3.** In-feed and In-water FDA approved medications for turkeys. ^ = Not currently marketed. G = Includes label claim for improved weight, gain and feed conversion. ® All trademarks or trade names are property of their respective owners. *CAUTION: Federal law restricts medicated feed containing this veterinary feed directive (VFD) drug to use by or on the order of a licensed veterinarian. *Extralabel Drug Use (EDLU) is not permitted in feed. **CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian. Species can vary, observe label indications. ® ™ All trademarks or trade names are property of their respective owners.

| VFD Medications | Non VFD Medications |
|---|---|
| Albamix (Novobiocin)^ | Albac® (Bacitracin Zinc)^G |
| Aureomycin® (Chlortetracycline) | Amprol® (Amprolium) |
| ChlorMax® (Chlortetracycline) | Avatec® (Lasalocid) |
| Deracin® (Chlortetracycline) | BMD® (Bacitracin Methylene Disalicylate)G |
| Neo-Oxy® (Neomycin + Oxytetracycline) | Clinacox® (Diclazuril)^ |
| Neo-Terramycin® (Neomycin + Oxytetracycline) | Coban® (Monensin) |
| Pennchlor® (Chlortetracycline) | Coyden® (Clopidol)^C |
| Pennox® (Oxytetracycline) | Flavomycin® (Bambermycin)G |
| Pharmastatin (Nystatin)^ | PMD® (Bacitracin Methylene Disalicylate)G |
| RofenAid® (Sulfadimethoxine + Ormetoprim) | Safe-Guard® (Fenbendazole) |
| Terramycin® (Oxytetracycline) | Stenorol® (Halofuginone)^ |
| | Topmax™ (Ractopamine)^ |
| | Zoamix® (Zoalene) |

| Prescription Medications* | Non Script Medications |
|---|---|
| Chloronex® (Chlortetracycline) | Amprol (Amprolium) |

| | |
|---|---|
| CTC Soluble (Chlortetracycline)<br>Di-Methox® 12.5% (Sulfadimethoxine)^<br>Gallimycin® PFC (Erythromycin)^<br>NeoMed® 325 Soluble Powder (Neomycin Sulfate)<br>Neo-Sol® (Neomycin Sulfate)<br>Oxytet® Soluble (Oxytetracycline)<br>PenAqua Sol-G® (Penicillin G Potassium)<br>Pennchlor 64® (Chlortetracycline)<br>Pennox 343® (Oxytetracycline)<br>PoultrySulfa® (Sulfamerazine, Sulfamethazine, Sulfaquinoxaline)^<br>R-PEN® (Penicillin G Potassium)<br>SpecLINX-50 (Lincomycin + Spectinomycin)<br>Sulmet® (Sodium Sulfamethazine)<br>Sul-Q-Nox® 31.92% (Sulfaquinoxalone)<br>Tetra-Bac® 324 (Tetracycline)<br>TetraMed® 324 HCA (Tetracycline)<br>Tetroxy® HCA Soluble (Oxytetracycline)<br>Tet-Sol™ 324 Soluble (Tetracycline)<br>Tylan® Soluble (Tylosin Tartrate)<br>Tylovet® Soluble (Tylosin Tartrate) | BMD® Soluble (Bacitracin Methylene-Disalicylate)[G] |

Table 4. Turkey health survey (August 2019 – August 2020) of professionals in U.S. turkey production coccidia control programs (n=260.0 million head).

| Program | How many months (average) | How many head (count divided by total survey count)? |
|---|---|---|
| Ionophore | 7.0 | 60% |
| Chemical | 5.5 | 28% |
| Alternative (Phytonutrients) | 4.7 | 23% |
| Vaccine | 5.5 | 11% |

**National Veterinary Services Laboratories (NVSL) Avian Influenza and Newcastle Disease Report**

Mia Kim Torchetti, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), NVSL

Dr. Torchetti gave an update on avian influenza (AI) and Newcastle Disease Virus (NDV) findings from NVSL.

**National Veterinary Services Laboratories (NVSL) Bacteriology Diagnostics Report**

Brenda Morningstar-Shaw, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), NVSL

**Poultry *Salmonella*, *Mycoplasma*, and *Pasteurella* Diagnostics at the National Veterinary Services Laboratories (NVSL) January 1-December 31, 2019**

Brenda Morningstar-Shaw, Kristina Lantz, Linda Cox, Karen LeCount, K. Toot, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), NVSL

***Salmonella* serotyping**

The Bacterial Identification section within the Diagnostic Bacteriology and Pathobiology Laboratory of the National Veterinary Services Laboratories (NVSL) routinely performs serotyping of *Salmonella* isolates submitted by private, state, and federal laboratories as well as veterinarians, researchers and other animal health officials. This report summarizes *Salmonella* serotyping submissions to the NVSL from January 1 through December 31, 2019, originating from poultry.

*Salmonella* isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (flock monitoring programs, environmental sources, feed). Serotyping data from isolates submitted for research purposes are not included in the summary.

*Salmonella* serotyping at the NVSL is an ISO 17025 accredited test. Salmonellae are typed via classical serotyping using polyvalent and single factor antisera to determine the O and H antigens and/or via molecular typing using the xMAP *Salmonella* serotyping assay. Approximately 60% of the sera used at the NVSL are produced in-house as previously described (Ewing, 1986). The remaining antisera are purchased from commercial vendors. All sera are subject to extensive quality control testing prior to use. *Salmonella* antigenic formulae are determined as previously described (Ewing, 1986) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont, 2007). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I.

From January 1 to December 31, 2019, 10,613 isolates were received for *Salmonella* serotyping. Of those, 3,011 isolates were from chicken sources and 788 isolates were from turkey sources. The most commonly isolated serotypes from chicken and turkey are listed in Tables 1 and 2 respectively.

The NVSL provided a *Salmonella* Group D proficiency test (PT) to 100 individuals from 85 different laboratories. The purpose of the PT was to assess the ability of laboratories to detect or isolate *Salmonella* Group D and/or *Salmonella* Enteritidis from simulated environmental samples. The test consisted of ten lyophilized cultures containing various combinations of *Salmonella* and common contaminants typically found in environmental swabs. The 2019 test included *Salmonella* serotypes Anatum, Enteritidis, I 9, 12:nonmotile, and Heidelberg. Contaminant bacteria included *Citrobacter amalonaticus, Citrobacter freundii, Enterobacter cloacae, Enterobacter* species*, Klebsiella pneumoniae, Providencia rettgeri* and *Pseudomonas*

*aeruginosa*. Laboratories were instructed to test the samples according to the procedures used in their laboratories. The NVSL randomly retained approximately ten percent of the test kits for quality assurance (QA) purposes. All were tested blindly with no discrepancies. The results of the proficiency test are shown in Table 3.

***Salmonella* Enteritidis**

From January 1 to December 31, 2019, 3,011 *Salmonella* isolates were received from chickens and their environment for identification of serotype. This was a 36% decrease in chicken submissions from 2018. *Salmonella* Enteritidis was isolated in 12% of these isolates and remains in the top five serotypes observed in both clinical and non-clinical submissions. A summary of the number of *S.* Enteritidis isolates identified from chicken during the previous five years is shown in Table 4.

***Salmonella* Pullorum and Gallinarum**

The NVSL received 159 samples for *Salmonella* Pullorum and Gallinarum serological testing in 2019. No isolates of *Salmonella* Pullorum or Gallinarum were identified or confirmed at the laboratory in 2019. The NVSL provided 3,835 mL of *S*. Pullorum tube antigen, a four percent decrease from 2018; 3,325 mL of *S*. Pullorum stained microtiter antigen, a 43% increase from 2018; and 536 mL of control antisera, a 21% increase from 2018, to testing laboratories between January 1 and December 31, 2019.

***Pasteurella***

The NVSL received 130 isolates for *Pasteurella multocida* Gel-Diffusion Precipitin testing, which was a 22% decrease from 2018. Twenty-four isolates were identified as type 3 in 2019, making up 18.5% of all isolates tested as compared to 30% of the isolates in 2018. A summary of the results is provided in Table 5. Additionally, 107 isolates were received for *P. multocida* DNA fingerprinting, which was a decrease of 37% from 2018. The NVSL supplied 73 mL of *P. multocida* typing sera and 2 cultures to testing laboratories.

***Mycoplasma***

The NVSL received 116 samples for avian *Mycoplasma* hemagglutination inhibition testing in 2019. In addition, 772 mL of *Mycoplasma* control antisera and 355 mL of *Mycoplasma* hemagglutination antigen were supplied to testing laboratories. Information on *Mycoplasma* reagents provided is shown in Tables 6 and 7.

**Table 1: Most common serotypes in 2019: Chicken**

| **Clinical** | | **Non-Clinical** | |
|---|---|---|---|
| **Serotype** | **No. Isolates** | **Serotype** | **No. Isolates** |
| Enteritidis | 154 | Mbandaka | 404 |
| Kentucky | 99 | Senftenberg | 303 |
| Typhimurium | 31 | Tennessee | 229 |
| Infantis | 12 | Kentucky | 220 |
| I 4,[5],12:i:- | 11 | Enteritidis | 216 |
| All others | 72 | All others | 1,260 |
| **Total** | **379** | **Total** | **2,632** |

**Table 2: Most common serotypes in 2019: Turkeys**

| Clinical | | Non-Clinical | |
|---|---|---|---|
| **Serotype** | **No. Isolates** | **Serotype** | **No. Isolates** |
| Senftenberg | 36 | Ouakam | 130 |
| Ouakam | 29 | Albany | 80 |
| Typhimurium | 26 | Alachua | 40 |
| Albany | 25 | Senftenberg/Kentucky | 39 |
| Infantis | 23 | Litchfield/Uganda | 23 |
| All others | 125 | All others | 150 |
| **Total** | **264** | **Total** | **524** |

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

| | **2015** | **2016** | **2017** | **2018** | **2019** |
|---|---|---|---|---|---|
| **Participants** | 94 | 98 | 101 | 98 | 100 |
| **Mean Score** | 98% | 97% | 95% | 98% | 97.8% |
| **Below Passing** | 1 | 0 | 1 | 3 | 0 |

**Table 4: Number of *Salmonella* Enteritidis isolates in chicken per calendar year at the NVSL**

| | **2015** | **2016** | **2017** | **2018** | **2019** |
|---|---|---|---|---|---|
| **No. chicken isolates** | 4,593 | 3,539 | 4,397 | 4,742 | 3,011 |
| **No. chicken SE isolates** | 513 | 342 | 358 | 418 | 370 |
| **SE percent of all isolates** | 11% | 9.7% | 8% | 9% | 12% |

**Table 5: Somatic types of *Pasteurella multocida* observed at the NVSL per calendar year**

| | **2015** | **2016** | **2017** | **2018** | **2019** |
|---|---|---|---|---|---|
| Type 1 | 18 | 34 | 37 | 35 | 25 |
| Type 3 | 4 | 8 | 14 | 51 | 24 |
| Type 3,4 | 28 | 22 | 14 | 0 | 14 |
| All other | 99 | 122 | 118 | 81 | 67 |
| **TOTAL** | **149** | **186** | **183** | **167** | **130** |

**Table 6: *Mycoplasma* antisera (mL) provided by NVSL per calendar year**

| **Antisera** | **2015** | **2016** | **2017** | **2018** | **2019** |
|---|---|---|---|---|---|
| *M. gallisepticum* | 290 | 192 | 376 | 236 | 282 |
| *M. meleagridis* | 68 | 42 | 58 | 48 | 46 |
| *M. synoviae* | 260 | 172 | 362 | 192 | 178 |
| Negative | 250 | 322 | 340 | 262 | 266 |
| **Total** | 868 | 728 | 1,136 | 738 | 772 |

**Table 7: *Mycoplasma* antigen (mL) provided by NVSL per calendar year**

| **Antigen** | **2015** | **2016** | **2017** | **2018** | **2019** |
|---|---|---|---|---|---|
| *M. gallisepticum* | 70 | 275 | 290 | 145 | 165 |
| *M. meleagridis* | 45 | 80 | 90 | 45 | 25 |

| | | | | | |
|---|---|---|---|---|---|
| *M. synoviae* | 205 | 215 | 235 | 125 | 165 |
| **Total** | 320 | 570 | 615 | 315 | 355 |

**References**

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

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

**National Poultry Improvement Plan (NPIP) Update**

Elena Behnke, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), NPIP

The National Poultry Improvement Plan is a Federal-State-Industry cooperative program. There are 50 Official State Agencies, one U.S. Territory Official Agency and 96 Authorized Laboratories. Official NPIP disease monitoring classifications include: U.S. Pullorum Typhoid Clean, U.S. Mycoplasma Gallisepticum Clean and Monitored, U.S. Mycoplasma Synoviae Clean and Monitored, U.S. Mycoplasma Meleagridis Clean, U.S. Salmonella Enteritidis Clean and Monitored, U.S. Sanitation Monitored, U.S. Salmonella Monitored, U.S. Avian Influenza Clean, U.S. Avian Influenza Clean Compartment, U.S. H5/H7 Avian Influenza Clean, and U.S. H5/H7 Avian Influenza Clean Compartment for poultry breeding flocks, and U.S. H5/H7 Avian Influenza Monitored for commercial (production) poultry flocks.

Pullorum-Typhoid Status: There were no isolations of *Salmonella* pullorum in commercial poultry in FY2016, FY2017, FY2018, FY2019 or FY2020. There were no isolations of *Salmonella* pullorum in backyard birds in FY2016, FY2017, FY2018, FY2019 or FY2020. There have been no isolations of Salmonella *gallinarum* since 1987 in any type of poultry in the U.S. U.S. Pullorum-Typhoid Clean participating hatcheries include: 273 egg and meat-type chicken hatcheries, 49 turkey hatcheries, and 833 waterfowl, exhibition poultry and game bird hatcheries.

**NPIP U.S. Pullorum-Typhoid Clean Participating Breeding Flocks and Number of Birds are listed below:**

- **Egg-Type Chickens**
  - 270 Flocks with 6,874,107 birds
- **Meat-Type Chickens**
  - 6,000 Flocks with 118,447,921 birds
- **Turkeys**
  - 472 Flocks with 4,283,033 birds
- **Waterfowl, Exhibition Poultry, and Game Birds**
  - 5,854 Flocks with 2,170,070 birds
- **Meat-Type Waterfowl**
  - 115 Flocks with 343,202 birds

**Avian Influenza Status:**

From October 2019-September 2020, there were a total of 12 confirmed cases of H7 low pathogenicity avian influenza (LPAI) in the Carolinas, in three adjacent counties:

- 2 in Anson County, NC
- 9 in Union County, NC
- 1 in Chesterfield, SC

**Table 1: 2020 NPIP U.S. Avian Influenza Clean and U.S. H5/H7 Clean Participating Breeding Flocks; and U.S. H5/H7 Avian Influenza Monitored Participating Commercial Flocks:**

| Subpart | Flocks | Birds | Tests |
|---|---|---|---|
| **Egg-Type Chicken Breeders** | 311 | 8,473,245 | 26,933 |
| **Table-Egg Layers-Commercial** | 5,598 | 484,560,627 | 109,436 |
| **Meat-Type Chicken Breeders** | 7,749 | 135,163,348 | 569,688 |
| **Meat-Type Chickens-Commercial** | 101,376 | 7,998,737,505 | 121,088,119 |
| **Turkey Breeders** | 872 | 7,694,772 | 38,426 |
| **Turkeys-Commercial** | 12,000 | 160,879,697 | 138,090 |
| **Waterfowl, Upland Game birds, Exhibition Poultry** | 4466 | 2,001,850 | 93,250 |
| **Upland Game birds, Waterfowl, Raised for Release Upland Game birds, Raised for Release Waterfowl-Commercial** | 3,147 | 56,272,365 | 44,793 |
| **Total** | **124,719** | **8,853,783,409** | **122,108,735** |

**Table 2: 2020 MG, MS, and MM positive breeding flocks:**

| ***Mycoplasma* gallisepticum*, Mycoplasma* synoviae*,* and *Mycoplasma* meleagridis positive breeding flocks - National Poultry Improvement Plan FY2020** | | | | |
|---|---|---|---|---|
| | WEGBY | Egg-Type | Meat-Type | Turkeys |
| *M. gallisepticum* | 20 | 1 | 8 | 1 |
| *M. synoviae* | 19 | 2 | 59 | 1 |
| *M. meleagridis* | 0 | 0 | 0 | 0 |

**Avian Influenza (AI) and Newcastle Disease Virus (NDV) Subcommittee Report, Southeast Poultry Research Laboratory (SEPRL) Report**

David Suarez, USDA, Agricultural Research Service (ARS), SEPRL

The subcommittee report intends to summarize major events related to avian influenza and Newcastle disease virus worldwide. The information is derived from a variety of sources including the World Organization of Animal Health (OIE), the Food and Agriculture Organization (FAO), Promed, information from scientific meetings and from published and unpublished research.

Newcastle disease remains an ongoing disease threat around the world and remains endemic in many countries around the world. Notable outbreaks of genotype VII occurred in Russia throughout 2019. These outbreaks were mostly in chicken flocks spread throughout the country, but one outbreak in geese was also reported. Vaccination for Newcastle disease is practiced widely, but there are notable exceptions in Europe where five of 25 countries do not routinely vaccinate. For the countries that vaccinate in Europe, the use of live attenuated vaccines in Europe remain the norm with LaSota vaccines and more attenuated genotype II vaccines like B1, C2, VGGA, clone 30 being most commonly used. The genotype I vaccine Ulster is also commonly used vaccine in some countries in Europe.

Avian influenza continues to be of zoonotic concern. The number of cases for both H5Nx and H7N9 have been decreasing in the last few years and no reports of H5 or H7 human infections were reported in 2020. Low pathogenic H9N2 continues to be a concern and four cases in China and Hong Kong have been reported in the last year. Because historically human H9N2 infections cause only mild respiratory disease, it is likely that most H9N2 cases are not identified and the true number of human infections is likely much higher, which is supported by serologic studies. The decrease in human cases may also be affected by the COVID-19 outbreak whose control measures may have impacted new human infections.

H9N2 avian influenza continues to be endemic and highly adapted to poultry in Asia, the Middle East, parts of Africa and parts of Europe. New outbreaks in Nigeria and Oman were reported. Japan also reported detection of H9N2 in illegally imported meat, which raises concern about poultry products spreading the virus from endemic countries. Vaccination is commonly used for control, but antigenic variants make it difficult to effectively vaccinate for the disease. Despite being widespread and costly to poultry producers, H9N2, because it remains a low pathogenic virus, is not reportable to OIE.

H7 highly pathogenic avian influenza (HPAI) outbreaks continue throughout the world. Although China has not reported to OIE new H7N9 outbreaks in 2020, the virus is still considered to be endemic in China despite the widespread use of vaccination. China has even updated their reverse genetics vaccine from RE-1 to RE-2 in late 2018 to deal with antigenic drift of the virus. The H7N3 outbreak in Mexico is also considered to be ongoing despite lack of reporting to OIE. Vaccination is also being used as a control tool in Mexico. Two new outbreaks of H7 HPAI were reported in 2020, including H7N3 in the USA (details reported by other speakers) and H7N7 in Australia. The Australian outbreak that occurred in late July 2020 was in

commercial free range layer operations on three farms with around 105,000 birds being affected. The outbreak appears to be under control.

The goose Guangdong lineage of H5 HPAI remains the largest threat around the world. Outbreaks from Asia in China, India, Taiwan, Afghanistan, Philippines, Saudi Arabia, Israel, and North Korea in both poultry and non-poultry were reported. Other countries, including Indonesia, Pakistan and Bangladesh, are also considered as being endemic in poultry. A variety of subtypes including H5N1, H5N2, H5N5, H5N6, and H5N8 were identified showing that viruses continue to reassort and multiple antigenic variants are present. Because of delays in reporting sequence, a complete picture of the antigenic variants present are not known. Because of the overall trend of decreased reporting, it is unclear how many countries have H5 HPAI in the region. Of note is the detection in the Philippines, which has not had a report of H5 HPAI for a number of years. The situation in Taiwan is also notable because of reports of three different H5 HPAI viruses. A H5N2 virus continues to persist that can be traced back to Mexican H5N2-like vaccine virus introduced in 2003, H5N2 goose Guangdong lineage virus that persisted from introduction of H5N8 in 2015, and the most recent introduction of H5N5 in 2020.

Europe has had a number of detections of goose Guangdong lineage H5N8 that started in late 2019 and winter 2020. This was the first detection of H5N8 in Europe since 2017. Detections of virus in wild birds and in poultry were reported. Epidemiology suggests wild bird introduction to poultry with some local spread. The most serious outbreaks were in Hungary which reported detections of virus on 273 farms. More than 4.7 million birds died or were culled to control the outbreak. The outbreak involved a large number of domestic ducks, domestic geese, turkeys and chickens with the outbreak starting in January and continuing until May. Other sizable poultry outbreaks occurred in Bulgaria and Poland and sporadic detections in Czech Republic, Germany, Slovakia, Kazakhstan, Ukraine, and Russia were reported. The outbreaks in Russia started in August 2020 in both wild birds and backyard poultry. They have concerns that these detections may predict the spread of the virus to Western Europe in the coming Fall and Winter months. They recommend increased vigilance for introductions of the virus.

Africa continues to have several hotspots of infection. Egypt continues to have several variants of goose Guangdong lineage virus including H5N1 and H5N8 and they also have H9N2 virus. Since 2017 a number of sub-Saharan African countries have had outbreaks of H5N1, H5N6, or H5N8 HPAI, and it is unclear which countries are still dealing with the disease except for Nigeria which has reported H5N6 in poultry in 2020. South Africa also continues to deal with a number of outbreaks both in poultry and in wild birds of H5N8 HPAI. South Africa reported outbreaks as recently as July 2020 and continues to struggle with the disease.

**North Carolina/South Carolina LPAI-HPAI H7N3 Event Overview**

Julie Helm, Clemson University
Michael Martin, North Carolina Department of Agriculture and Consumer Services

In March and April of 2020, North Carolina (NC) and South Carolina (SC) responded to a H7N3 low pathogenic avian influenza (LPAI) and highly pathogenic avian influenza (HPAI) event just as COVID-19 human cases began to increase. In total, there were 12 commercial turkey farms with LPAI and one commercial turkey farm with HPAI. The 12 LPAI cases included two breeder farms (one pre-lay flock in the dark house and one young laying flock) and ten meat turkey farms consisting of over 304,000 birds. Eleven of the 12 flocks were asymptomatic, with the young laying flock reporting a decrease in egg production. The one HPAI case was a commercial meat turkey farm located in SC with over 32,000 birds.

The 11 LPAI NC cases were located in two adjacent counties, which were densely populated with commercial broiler, broiler breeder, turkey, turkey breeder and table egg farms. The two SC cases were located in one county adjacent to the NC cases, which was sparsely populated with mainly turkey and broiler breeder farms and one each of a broiler and table egg layer farm. Most of the cases were from a single commercial integrator, but the integrator also had the most farms located in this area; and there was no difference in incidence between all the turkey integrators in the region.

The H7N3 LPAI virus was from the North American wild bird lineage. The virus was not associated with any previous U.S. poultry events. Initial sequencing did suggest that this virus was at risk of mutating from LPAI into HPAI and USDA rapidly approved both NC and SC to depopulate these flocks, which facilitated a rapid response from the beginning of the event.

Foam was primary method of depopulation used during the event. After receiving USDA approval for indemnity and compensation and having water available on farm, depopulation conducted by state and industry personnel was completed within 24 hours. In North Carolina, burial was not allowed for dead birds, so dead birds, litter, and feed were composted in-house. In South Carolina, dead birds were allowed to be buried in approved mass burial sites on the farms. The manure, litter and feed were composted in the barns initially and after the first heat treatment cycle was moved and turned outside on the property to complete the second heat cycle. Allowing the compost to move out of the barns after the first heat cycle was completed helped to start the cleaning process earlier.

The first three farms that tested positive for Avian Influenza on March 11, 2020 all were in North Carolina. These flocks included two meat turkey flocks tested as part of routine NPIP pre-slaughter sampling and one turkey breeder flock that had a slight drop in egg production in two of seven houses on the farm. The three flocks were from different integrators with no common feed supply, different methods of dead disposal, and were separated by at least eight km distance between farms. No epidemiological links have tied these three farms together at the time of this report.

Two of the NC LPAI surveillance zones dropped down into SC and the first SC LPAI farm was found on zone testing. More NC LPAI farms were found from March 13 to April 1 through zone testing and routine NPIP pre-movement testing. Commercial farms located within the LPAI zones were tested twice: initially when the zone was established and then again 14-21 days later. The SC zone was released on April 2, most of the NC zones were released by April 5, and the last zone released on April 17.

On April 6 early Monday morning, a turkey supervisor reported that he received a call from his SC grower about increased mortality and respiratory signs overnight and was on his way out to a farm to collect samples. This was a 12-week-old tom turkey farm with only one house out of five showing signs. This farm was previously the Contact Farm (the same grower) from first SC LPAI farm. Once his first farm was detected as positive, the grower did not go back to his second farm and he had separate personnel working the two farms. This farm had been tested three times prior on March 15, 19 and 31. The March 15 and 31 dates were mimicking the LPAI zone testing just north of this location and the middle testing date was the company collecting additional samples on their own as they were very concerned that this farm would also be positive for LPAI. The samples collected on April 6 were presumptive positive on AI matrix and H7 PCR in the SC National Animal Health Laboratory Network (NAHLN) laboratory from all five houses. Four dead birds were also submitted for necropsy and tested PCR presumptive positive for H7. Samples from the farm and necropsy were sent to the National Veterinary Services Laboratory (NVSL) in Ames, Iowa for confirmation. There was a pond located on the property about 150 yards from the main driveway and a few wild waterfowl birds were seen and heard on the pond, but the grower reported that these wild birds were never near the houses. Depopulation was approved by USDA and was performed the next day with about 2,500 birds either dead or too sick to move in that one clinical house. NVSL worked very late into the night and reported to SC that both LPAI and HPAI H7N3 viruses were in that one house. There was LPAI virus isolated in three other houses. The last house had no virus isolated, but there had H7 PCR detection with a high Ct. value.

SC transitioned from a LPAI response to a HPAI response. The established LPAI zone became a Control Area with increased weekly testing. A minimum of three weeks of testing is required, but SC did an additional fourth week of zone testing. All Control Area zone testing was negative. LPAI movement documents, procedures and testing transitioned into USDA's Emergency Management Response System (EMRS) permitting in order to move approved birds and eggs out of the zone. SC established the Gateway Permitting with the industry and receiving states and used the Secure Poultry Supply Plans to move hatchery chicks and 1 flock of broilers located in the zone.

After the flock in South Carolina was identified as positive for HPAI, SC performed contact premises testing and changed their enhanced testing zone from 10 km to 20 km for a single testing cycle. North Carolina had already been testing aggressively based on the sequencing of the isolate, epi-linked testing, and density of the poultry operations and had no farms with 10km of the HPAI farm, so no additional testing was performed.

In both states with all the farms, wet cleaning and disinfection procedures were used for the houses and equipment, with a cleaning inspection in between. Environmental swabs were collected and tested negative on all the farms.

An epidemiology survey was conducted with USDA taking the lead. A questionnaire was created and vetted through the states and industry. Data

was collected based on Case/Control and Observational Cross-Sectional epidemiological models. Results are still pending as of this report.

Lessons learned for NC and SC: First, communications in general were very good between federal, state, and industry personnel and industry felt they were well informed by states via regularly scheduled conference calls. Second, states have been actively collaborating including the Southern Animal Health Association (SAHA) to improve response capabilities for LPAI and have been actively learning and collaborating with industry on preparation and response procedures based on other avian influenza events in the U.S. There is a need to work with federal resources more to improve communications about preparedness at the state and industry level. Third, another area of improvement would be to have more training for state employees on the positions of site manager and case manager and have a clearer delineation of biosecurity oversight. Ongoing EMRS training is always needed as well. Fourth, North and South Carolina did collaborate well over the development of LPAI conveyance documents for the event.

North Carolina had some specific lessons learned based on the event. First, the LPAI plan needed significant updating. NC was unable to attend planning meetings conducted by SAHA and so ended up looking to the SC plan, SAHA plan standardization, and USDA guidance documents during the event. NC has been updating their LPAI since the event and is near completion. Second, NC had requested some federal resources during the event and in future events will get clarity on specific site needs for those resources and request more details on resource maintenance to avoid operational delays. Third, NC will seek better clarity of responsibilities for a state based and state disease response in contrast to federal needs to validate finances. Lack of a clear delineation of responsibilities during the event between state and federal personnel contributed to inconsistent messaging in field operations and delays in release of farms from quarantine.

South Carolina also had some specific lessons learned on the event. First, the best lesson was that our recently updated LPAI plan worked very well with only a few updates during the LPAI event. The SC LPAI plan also helped to transition into a HPAI response. The Southern Animal Health Association (SAHA) LPAI planning and collaboration in 2018 was invaluable for this event. After the 2017 LPAI event, Dr. Tony Frazier in Alabama had the foresight to call in all his neighboring states and eventually all the SAHA states to come together as a region to try to get the LPAI plans as similar as possible, specifically with testing requirements. A critical product that came out of these meetings was a LPAI testing matrix for zones and movement, which allowed easier movement of birds and eggs out of the zone and interstate to these same states. South Carolina's State Veterinarian would make an initial call to the other receiving State Veterinarians reporting that SC was initiating the LPAI plan and using the SAHA AI testing matrix and would they still accept birds or eggs coming out of the zone – and they did. The lesson is so valuable that regional planning needs to continue, especially after any AI events. Second, developing a method to update commercial farm data continuously (perhaps during NPIP inspections and audits) rather than at the beginning of an incident. The companies were very responsive in

cleaning up their farm lists, but it still caused delays. It seemed that USDA had even older farm data in EMRS and their perception of farm populations and AI surveillance testing was not the same as what SC knew was occurring at the state level. USDA recommended more testing than SC felt was necessary, as there was concern that additional testing could present a biosecurity risk and spread the virus to more farms.

Third, at the state level, a big problem is retrieving all the AI testing data from SC farms that is conducted in other out of state laboratories in a timely manner. Out of state NAHLN and NPIP laboratories who are testing SC flocks need to message testing data directly to the SC database electronically so that all AI surveillance can be readily accessible, especially in situations like this and will reduce days of gathering information when you are busy doing other activities. Fourth, using the established Federal/National Premises Identification Number (PIN) as the unique farm identifier for each farm provided better communication between the state, industry and USDA. Fifth, the commercial company employees are part of the SC responder team and collect their own farm samples and conducts an annual training for new company hires on routine NPIP and AI Event sampling and farm biosecurity. Sampling instructions to the companies went through many revisions for LPAI and then HPAI and need to remember to keep it as simple and consistent as possible. There were concerns reported that the company responders may not be sampling properly, such as not targeting dead and sick birds and not collecting throughout the whole house. Response training with all of the company responders will be planned on a routine schedule. Sixth, SC feels there is a need to update the minimum requirements for composting manure, litter and feed not containing bird carcasses. Normally this process is managed as both minimum time and temperature for two heat treatment cycles by reaching the minimum temperature for minimum days within a 14-day period for each cycle. When the compost does not include bird carcasses in it, the minimum temperatures are reached sooner. SC believes this should be changed from time and temperature to be a minimum time at temperature for each cycle with the temperature driving the timing of the heat cycle. In the first LPAI farm, we were able to complete the first heat cycle and move the compost out of house after ten days versus waiting for 14 days, which allowed the grower to begin clean activities sooner. SC would like to see more research on composting manure not containing bird carcasses. Seventh, a good tip for state counterparts – in your flock plans, be sure to include due dates for the different activities that need to be completed (such as cleaning and disinfection), so that growers do not lose focus on the houses and start to plant corn. This will reduce delays in releasing the zone, since everyone is waiting for the last house to be disinfected.

A human pandemic (SARS-CoV-2, COVID-19) occurring at the same time created significant challenges in the response for the event. Getting resources such as biosecurity supplies for field operations or laboratory supplies for testing was more time consuming and there was a risk of running out of operations materials. Testing needed to be balanced to facilitate rapid testing needs while optimizing laboratory supplies. In the field, it was more challenging to access hotel and restaurants, communications between the

Incident Command System (ICS) was mostly virtual contributing to unclear separation of responsibilities, and concerns with staff interacting with on site with other people given the human pandemic. Some engagement was limited, especially associated with messaging to backyard flock owners. Although some staff felt that the intense work pressures provided some normalcy during the human pandemic, many felt isolated and concerned about quarantine from family.

**Assessment of the Risk Associated with the Movement of Pullets out of the Pullet Barn in a Control Area During a Highly Pathogenic Avian Influenza (HPAI) Outbreak in the United States**

Carol Cardona and Marie Culhane, University of Minnesota, Center of Veterinary Medicine (CVM)

**Overall Conclusion of the Pullets Out of the Barn Risk Assessment**

The objective of this assessment was to estimate the risk that the movement of pullets out of a pullet barn (e.g., to the driveway of the pullet premises, not to a specific location), from a premises located within a Control Area during an HPAI outbreak in the poultry industry in the U.S., will result in the movement of infectious but undetected birds and the likely number of infectious birds at the time of movement.

The assessment considered relevant current industry practices and current biosecurity measures as well as outbreak-specific measures from the SPS Plan, in particular the PMIP and additional load-out mitigation measures. The assessment focused on the risk pathways for HPAI infection of pullets on premises located within an HPAI Control Area via components of local area spread, people and vehicles, and load-out processes. Many of these pathways do not involve the movement of live birds, and rather relate to the likelihood of infection of live birds that will then move and the potential for missed detection prior to movement. Qualitatively compiling the assessed risks and likelihoods of the pathways analyzed yields the estimated risk of moving HPAI infected but undetected pullets out of the barn **(Figure 30).**

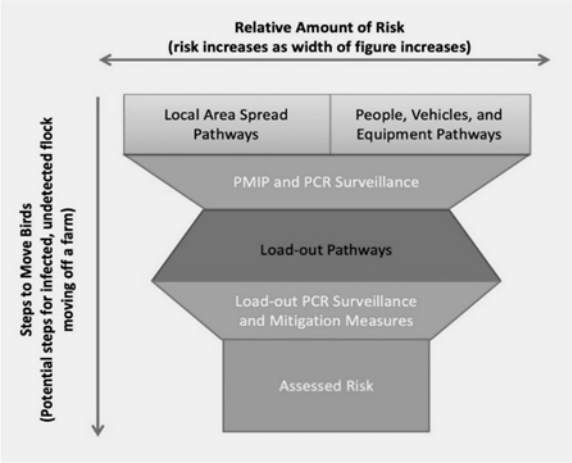


**Figure 30:** Diagrammatic representation of the assessed risk with the relative amount of risk increasing as the width of the figure increases (the risk

of component parts is not to scale). The risk assessment is based on consideration of the steps needed to move pullets off a farm and the pathways that could lead to infection of a flock, the subsequent likelihood of detection of the infected flock, and potential movement of an infected but undetected flock.

The evaluation of the major risk pathways identified resulted in the following conclusions:

**Local Area Spread Pathways**

- **Insects.** The likelihood of a pullet premises becoming infected with HPAI virus via insect transmission varies with distance and with source premises infection status. The estimated likelihood ratings range from negligible to moderate, with a higher likelihood of infection closer to a known infected premises. For premises located closer than 1.5 km to an infected flock, there are too many variables to accurately assess the risk of becoming infected with HPAI via insect transmission.
- **Aerosols.** The likelihood of a pullet premises becoming infected with HPAI virus via bioaerosol transmission varies with distance and with viral load at the source premises. Literature review and most previous outbreak reports indicated that aerosol transmission was not an important factor at distances more than 1.5 km from an infected flock. However, there is some evidence of aerosol transmission over short distances and both expert opinion and exploratory dispersion modeling indicate possible risk of transmission beyond 2 km. Thus, the likelihood of a pullet premises becoming infected via bioaerosol transmission is rated as follows:
  - *Low* to *Extremely high* if ≤3 km from an infected poultry premises
  - *Negligible* to *Low* if >3 km from an infected poultry premises
- **Wild Birds.** The likelihood of HPAI virus spread to a pullet premises via wild birds depends upon the type of wild birds and exposure to the wild birds. With an effective Pre-Movement Isolation Period (PMIP), the likelihood of HPAI infection via wild aquatic birds and via non-passerine non- aquatic birds is *low,* as these birds and their waste are unlikely to access or be tracked into a pullet barn. Given that passerine birds may access the inside of pullet barns (even during a PMIP) and have been shown to be capable of shedding the virus, the likelihood of HPAI infection via passerine birds in the farm vicinity was assessed as *low* to *moderate.*

**People, Vehicles, and Equipment Pathways**

- **Live-haul Routes.** The risk of HPAI virus spread to pullet premises near poultry live- haul routes via feathers, feces, and other fomites depends on both distance and source flock. For trucks hauling birds that had an effective PMIP and negative rRT-PCR test results, the risk is estimated to be *negligible* to *low* no matter the distance. In

contrast, for trucks hauling birds that had no PMIP and no diagnostic tests (e.g., from premises outside the Control Area), the risk ranges from *low* to *high,* with premises within 100 meters of the live-haul route at highest risk.

- **Feed Delivery and Emergency Operational Visits.** Operational visits will be limited during PMIP; however, delivery of feed during this period is likely, and the potential for emergency maintenance visits also exists. The likelihood of a pullet flock becoming infected with HPAI via feed delivery and emergency operational visits during PMIP was assessed as *negligible* to *moderate,* as follows:
  - *Negligible* to *low* via contaminated feed
  - *Low* via feed delivery (i.e., contaminated driver and/or vehicle)
  - *Low* to *moderate* via other emergency operational visits (i.e., emergency personnel or their vehicle)
- **People and their Vehicles.** Provided PMIP measures for people are strictly followed (e.g., people wear LOS-specific clothing and footwear, no vaccination crews are allowed on-site during a PMIP) we rate the likelihood of a pullet flock becoming infected with HPAI via people and their vehicles entering the premises during the PMIP as *low*.
- **Shared Equipment (other than load-out equipment).** Previous outbreaks have demonstrated that shared equipment poses a disease transmission risk; however, during the PMIP, no off-site equipment will be pre-staged and only feed delivery and emergency operational visits may continue. Thus, we rated the likelihood of a pullet flock becoming infected with HPAI virus via shared equipment as *low*.
- **Dead Bird Disposal.** The risks of HPAI introduction associated with off-site dead bird disposal methods, such as rendering, are well documented, and off-site disposal of mortality must be discontinued during PMIP. However, the risky practice of off-site dead bird disposal may still occur outside of a PMIP.
- For on-farm dead bird disposal, given that many scavenger species can biologically or mechanically carry HPAI virus and have home ranges large enough to contain adjacent poultry farms, we assessed the likelihood of HPAI introduction to a pullet farm during the PMIP as *low* to *moderate.*
- Off-site dead bird disposal methods prior to a PMIP may possibly result in premises contamination. However, the implementation of a PMIP does reduce the likelihood that such contamination will be tracked inside a pullet barn during the PMIP. We thus assessed the likelihood of a pullet flock becoming infected as a result of HPAI virus introduction to the flock via off-site dead bird disposal that takes place prior to the PMIP as *moderate.*
- **Garbage Management.** There is potentiWoarkin g Draft l for HPAI virus associated with garbage management to be tracked into a poultry house, and thus we assessed the likelihood of a pullet flock

becoming infected with HPAI virus due to garbage management without a PMIP to be *moderate* to *high.* During a PMIP, no off-site movement of garbage is allowed, and thus we assessed the likelihood of a pullet flock becoming infected with HPAI virus due to garbage management during a PMIP as *low*.

**Load-out Pathways**

- **Load-out Operations.** Assuming PMIP enhanced biosecurity and testing measures are strictly implemented, and that additional load-out mitigation measures are in place for the duration of the load-out process, the risk that a pullet flock will become infected with HPAI virus via load-out operations and that this will result in an infected but undetected movement off the premises is estimated to range between *low* and *high*.

**Overall Risk**

It is concluded that the risk of moving infected but undetected pullets out of a pullet barn from within a Control Area during an HPAI outbreak ranges between low and extremely high, provided that all applicable preventive measures from the SPS Plan, in particular the PMIP and additional load-out mitigation measures, are strictly followed. The likelihood of moving a large number of infectious pullets (>80 birds) is rated to be low.

In using the results of this risk assessment, it should be remembered that:

- This assessment is based on current (January 2019) information and will need to be reviewed and revised as circumstances warrant.
- The assessment does not replace the judgment of on-scene officials with first-hand knowledge of the outbreak situation and the premises in question.

This document was developed through the Continuity of Business / Secure Food Supply Plans / Secure Poultry Supply project initiative. Related documents can be found at: https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/sa_emergency_management/ct_fadprep_continuity_of_business

**American Association of Avian Pathologists (AAAP) Research Priorities Survey Update**

Eric Gingerich, Diamond V

In June of 2020, the AAAP Research Priorities Committee conducted its second survey of the broiler, turkey, and egg layer production veterinarians as well as the Association of Primary Breeder Veterinarians to find the top research priorities for health/diseases, vaccines and pharmaceuticals, diagnostic tools, food safety, poultry welfare, and management/environmental concerns.

Dr. Natalie Armour, AAAP Research Priorities Committee chair prepared a presentation given at the 2020 annual meeting of AAAP. This presentation is summarized here.

**Veterinarians in Production Surveys**

Three surveys were sent to the three associations of veterinarians in production – Broiler, Turkey, and Layer. The electronic surveys contained 87,

49, and 63 research needs statements respectively for the Broiler, Layer, and Turkey veterinarians. The categories of the statements were as follows:

- Health & Disease
- Vaccines & Pharmaceuticals
- Diagnostic Tools
- Food Safety
- Animal Welfare
- Management & Environment

The research priorities statements were sourced from the leadership of the associations of vets in production.

The participants were asked to score each statement on a scale of 1 to 5:

- 1 = no need
- 2 = little need
- 3 = moderate need
- 4 = high need
- 5 = very high need.

The Veterinarians in Broiler Production had 35 veterinarians respond for a 90% response rate. Their top 10 research priorities were as follows:

1. (Tie) Salmonella – Production and processing interventions
1. (Tie) Salmonella – Methods to quantify the impact of control methods
3. Campylobacter – Production and processing interventions
4. (Tie) Autogenous vaccines – Efficient isolate selection
4. (Tie) Reovirus – Improved current & emerging strains
4. (Tie) Bronchitis – Improved live vaccines
4. (Tie) GI Health – Non-antibiotic interventions
8. Autogenous Vaccines – Production efficiency
9. Woody Breast – Causes & interventions
10. (Tie) Campylobacter – Vaccines for breeders and broilers
10. (Tie) Histomoniasis – Treatment & prevention

The Veterinarians in Egg Production had 38 veterinarians respond for a 95% response rate. Their top 10 research priorities were as follows:

1. In-ovo sexing – Develop & apply
2. Coryza – Safe and effective mass applied live vaccine
3. Bronchitis – DMV/1639 prevention strategies
4. (Tie) Euthanasia – Safe & effective whole house CO2 gassing
4. (Tie) Bronchitis – Safe & effective vaccines for variant strains
5. Bronchitis – DMV/1639 effect on hens exposed in lay
6. (Tie) Colibacillosis – Effective non-antibiotic treatments
6. (Tie) Colibacillosis – Vaccine control strategies
6. (Tie) Various – Treatments with zero-day withdrawal for eggs
10. Bronchitis – False Layer Syndrome prevention

The Veterinarians in Turkey Production had 23 veterinarians respond for an 85% response rate. Their top 10 research priorities were as follows:

1. Reovirus – Diagnostic tools for surveillance & strain ID

2. Reovirus – Epidemiology & emergence of novel strains
3. Salmonella – Interventions for processing & products
4. Reovirus – Rapid test for detection in the hatchery
5. Reovirus – Alternative vaccine technologies
6. Reovirus – Efficacious inactivated vaccines
7. Salmonella – Interventions at each production stage
8. Salmonella – Quantify impact of control interventions
9. (Tie) Salmonella – Epidemiology & control emerging serotypes
9. (Tie) Coccidiosis – Non-antibiotic anticoccidials & vaccines
9. (Tie) Histomoniasis – Treatment & prevention

**AAAP Committees Research Priorities Lists**

12 different AAAP Committees were asked to provide a list of 1 to 5 research needs. The 12 committees were as follows:

1. Animal Welfare
2. Diseases of Public Health Significance
3. Enteric Diseases
4. Drugs and Therapeutics
5. Epidemiology
6. Food Safety
7. Outreach
8. Legislative Advisory (LAC)
9. Respiratory Diseases
10. Small Flock
11. Toxic, Infectious, Miscellaneous, and Emerging Diseases (TIME)
12. Tumor Virus

Their results will be reported later when the report is published.

**Federal Agencies Research Priorities**

Six Federal Agencies were identified, and each was asked to submit 1 to 5 research priorities under the headings of 1) Health/Disease, 2) Vaccines & Pharmaceuticals, 3) Diagnostic Tools, and 4) Food Safety.
The six agencies were as follows:

1. CDC-One Health Office
2. FDA-CVM
3. APHIS-VS
4. NVSL
5. USDA-CVB
6. USDA-Forest Service

Their list of top priorities is as follows:
Health/Disease

- AI and Newcastle
    - Infectivity & pathogenesis on non H5/H7 types
    - Mitigate risk in the poultry/wild bird interface
- Re-emerging pathogens
    - Surveillance

    - Control

Vaccines & Pharmaceuticals

- Newcastle vaccine potency testing
- Salmonella vaccines
- Histomoniasis treatments
- Coccidiosis treatments
- Colibacillosis treatments

Diagnostic Tools

- AI serology
- Newcastle RRT-PCR
- Salmonella isolation and serology
- Emerging pathogen diagnosis

Food Safety

- Salmonella and Campylobacter
    - Backyard and commercial concerns
    - Epidemiology & sources
    - Interventions (vaccines, treatments, etc.)

**Overall Summary**

The four top diseases and the classes involved were as follows:

1. Salmonella – Broiler, Turkey, Backyard
2. Reovirus – Turkey, Broiler
3. Bronchitis – Layer, Broiler
4. Histomoniasis – Broiler, Turkey

The next four important diseases/practices in broilers:

1. Campylobacter
2. GI health
3. Autogenous vaccines
4. Woody breast

The next three important diseases/practices in layers:

1. In-ovo sexing
2. Infectious coryza
3. Euthanasia

The top three diseases affecting all poultry:

1. Avian influenza
2. Newcastle
3. Emerging pathogens

Dr. Armour is planning to publish the survey results in their entirety soon.

**REPORT OF THE WORKING GROUP ON LIVE BIRD MARKETING SYSTEM (LBMS) AVIAN INFLUENZA PROGRAM FY2020**

Fidelis N. Hegngi, MD

On October 20, 2004, Veterinary Services (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 the LBMS. The LBMS Uniform standards have been revised in 2008, 2012, 2016, and currently in 2020. The standards are currently being implemented.

State participation is voluntary; participating States will enact regulations necessary for compliance of their live bird markets (LBMs), producers, and distributors. All LBMs, producers, and distributors that supply the markets must be registered or licensed with the State and must allow Federal and State inspectors access to their facilities, birds, and records. These facilities must also have written biosecurity protocols in place. USDA-APHIS coordinates and administers the program. USDA-APHIS provides personnel and resources to assist States with implementation and compliance with program requirements.

The LBM Working Group held its annual business meeting in February 2020 in Atlanta, Georgia. More than 79 participants representing 25 States attended the meeting including APHIS field, district, and headquarters staff; State Department of Agriculture representatives; and LBMS industry stakeholders. Participants discussed the program's progress, shared ideas for continued program implementation, and agreed on further advancement of the program.

The working group also discussed:

1) Fiscal Year (FY) 2020 Avian Health line item budget update.
2) An update on Initial State Response and Containment Plan (ISRCP) indemnity and compensation procedures.
3) Pennsylvania Non-commercial mixed duck flock AI Incidents – H7N3 LPAI Overview, Challenges and Lessons Learned.
4) Connecticut Live Bird Market AI Incident– H7N3 LPAI Overview, Challenges and Lessons Learned.
5) Minnesota NPIP Biosecurity Plan Audits.
6) 2016 LBMS Uniform Standards –Suggested Proposed Changes and Additions to the 2020 Uniform Standards.
7) An update on National Veterinary Services Laboratory Surveillance Testing: Current Nationwide Findings and Status of Current AI and Newcastle Disease (ND) Diagnostics.
8) vND: Lesson Learned from an Epidemiologist.
9) USA Poultry & Egg Export Council (USAPEEC) 2020 President's Report: Year in Review.
10) Risk Analysis of H2N2 Persistence in the Northeast Live Bird Marketing System.
11) H1 avian influenza detection at an auction site in GA**.**
12) Live Avian Imports – what are the risk of disease introductions.

13) An update on the National Poultry Improvement (NPIP) Program.
14) NPIP authorized laboratories system and compartmentalization update.
15) USDA Southeast Poultry Research Laboratory (SEPRL) Update on vND and Avian Influenza.
16) CDC – *Salmonella* Outbreaks Linked to Contact with Backyard Poultry.
17) Discussion on Outreach and Education Projects: Defend the Flock (DTF) – Combined campaign; Background/Goals/Outreach materials; Webinar/Launch/Partnering; Calendar Replacements Social media vND response
18) Plans for 2020 LBMS Continuing Education Training Course at the School of Vet Medicine, University of California, Davis, CA.
19) Role of Wild Waterfowl in the Ecology of Avian Influenza.
20) Transmission of avian influenza virus among wild and domesticated animals**.**

In FY 2020, USDA reached a milestone in its' Defend the Flock campaign: releasing a full suite of resources for poultry owners and handlers. These materials will help anyone who owns or works with poultry to practice good biosecurity every day, every time in order to protect our nation's flocks from infectious disease. These materials include:

- A series of 15 checklists, each based on a different biosecurity principle
- Recordings of the Defend the Flock webinars with APHIS veterinarians and other experts
- Graphics for use in social media
- Videos
- Newsletters
- Information that can be shared on websites and newsletters

Most resources are available in multiple languages, including English, Spanish, Chinese, Vietnamese, and Tagalog, as well as accessible versions for individuals with disabilities. USDA also recently announced the return of the annual calendar – order copies of the 2021 Defend the Flock calendar online today. Defend the Flock materials and information are available at www.aphis.usda.gov/animalhealth/defendtheflock.

LBMS surveillance remained a high USDA priority in FY 2020. There was no detection of AI in the U.S. LBMS.