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In This Issue

News

- [Avian Influenza Update](#)

Research

- [Effect of serum calcium status at calving on survival, health, and performance of postpartum Holstein cows and calves under certified organic management](#)
- [Associations between housing and management practices and the prevalence of lameness, hock lesions, and thin cows on US dairy operations.](#)
- [Short communication: Associations between feed push-up frequency, feeding and lying behavior, and milk yield and composition of dairy cows](#)
- [Rapid assessment of bovine colostrum quality: How reliable are transmission infrared spectroscopy and digital](#)

Avian Influenza Update

Mohamed El-Gazzar, DVM, MAM, PhD, DACPV

The United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) announced on March 5, 2017 the detection of H7 Highly Pathogenic Avian Influenza (HPAI) in the state of Tennessee. The affected flock is a Broiler Breeder, 30 to 45 weeks of age, located on an 8 house farm (~10,000 birds in each house) in Lincoln County, located in South Central Tennessee, 2 miles from Alabama border. On Thursday March 2nd, mortality increased to 132 dead in one house. On Friday March 4th, mortality jumped up to 500. Positive samples from only one house out of 8 were determined to be H7 by Tennessee NAHLN and confirmed by National Veterinary Services Laboratories (NVSL) late Saturday. By Sunday March 6th afternoon, all houses had been depopulated and onsite burial operations were underway. A control zone of 10 miles (not 10 Kilometers) was immediately started and the initial surveillance of commercial and noncommercial poultry premises within this zone (which extends into the state of Alabama) is near completion. No further positive samples within the zone have been detected thus far.

On March 7th, USDA's NVSL confirmed that the complete subtype of the Tennessee virus is H7N9 based on the full genome sequence of all 8 influenza genomic segments. They also emphasized that based on the sequence the virus is of North American (NA) lineage and **"is NOT the same as the China H7N9 virus that has impacted poultry and infected humans in Asia"**. As NVSL explains, while the Tennessee and China viruses have the same designated subtype, they belong to genetically distinct lineages. What is referred to as the North American lineage is the genetic lineage that can be found in migratory wild birds of North America. Wild birds are suspected to be the source of this outbreak as well. While there is no identified direct link between wild birds and this particular farm in Tennessee so far, the H7 NA lineage was detected in wild birds multiple times this year. We don't know how this virus could have jumped from wild to domestic birds, but it is important to note that Low Pathogenic Avian Influenza (LPAI) can transform into HPAI after they circulate in domestic poultry.

On March 9th, the Tennessee State Veterinarian confirmed another H7N9 influenza case in a commercial chicken breeder flock in Giles County, Tennessee, which is the county immediately to the east of Lincoln County, where the initial H7N9 virus was detected. However, this case in Giles County is Low Pathogenic Influenza (LPAI). No mortality or clinical signs were reported and it was detected during a routing surveillance testing. This

[and optical refractometers?](#)

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[Department of Veterinary Preventive Medicine](#)

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<http://vet.osu.edu/extension>

flock is operated by a different company from the company operating the farm on which the first case was detected, and no direct link was identified between the two cases. I'm not entirely sure at this point if the H7N9 virus in Giles county genetic sequence is similar to the virus from Lincoln county or not, but my understanding of the currently available information indicates that these two viruses are similar or may even be identical. This could be evidence of the virus circulating in the domestic bird population as LPAI before turning into HPAI. This is similar to the Indiana H7 HPAI outbreak of last year.

Meanwhile, another reportable influenza virus was detected in a commercial turkey flock in the state of Wisconsin. A 6-house farm containing 84,000 market turkey toms with 3 houses at 16 weeks of age and 3 houses at 6 weeks of age was confirmed to be positive for H5N2 North American Lineage virus, which is different from the 2015 virus. This virus was classified as LPAI, mild signs of depression prompted the testing of the flock. But because it's an H5 virus, and has the capacity to transform into a HPAI, it is reportable to international organizations. This flock will not be depopulated, it will be sent to the processing plant through a controlled marketing process. The flock will be tested using PCR weekly to ensure the cessation of viral shedding before they are moved to the processing plant.

For the second year in a row, an influenza virus was able to jump from wild birds to commercial poultry population and turn into HPAI. In our view, this points to a significant weakness in our influenza surveillance systems. Our inability to detect these viruses while they are circulating in domestic poultry, allowing them to blindsides us and showing as HPAI outbreaks, invites a revision to our surveillance methodology. A review of "*Testing Protocols for Disease Surveillance in Poultry*" was written last year (<http://vet.osu.edu/sites/vet.osu.edu/files/documents/extension/Vol%2042%20No%205.pdf>) detailing the decision making process as it relates to improving surveillance methodology.

While surveillance and quick diagnosis are essential tools to detect the virus and limit the spread of the disease and eventually control the outbreak, it's the **BIOSECURITY** efforts that will prevent the infection from reaching your flock, whether it is commercial or noncommercial. Biosecurity can be defined as "**the sound sanitary practices that are used to stop the infectious agent from reaching the host**". Infectious agents are mostly microscopic in nature (cannot be seen by the naked eye). That means that it is very difficult to detect their movement and transmission from one place to another or from one individual to another. So the only option we have to stop their transmission is to put barriers in the face of these microbes to protect our poultry flocks, even though we can't see them. In case of Avian Influenza and other microscopic infectious disease agents, these "biosecurity" barriers can be physical or chemical. Examples of physical barriers include, fences, gates, enclosed poultry houses, or even washing and cleaning. On the other hand, chemical barriers include disinfectants and detergents that are used to kill these microbes.

Before understanding biosecurity practices and the logic behind them, one must understand the dynamics of disease transmission. Infectious diseases in bird populations can be transmitted by two main ways:

1. Direct transmission, which means the infectious agents are transmitted through direct physical contact between infected and uninfected susceptible individuals.
2. Indirect transmission, which means the infectious agents are transmitted through indirect transportation vehicles to reach the susceptible individuals. In case of diseases that affect birds including avian influenza, the indirect transportation vehicles could include:
 - Humans
 - Domestic animals including pets
 - Wild animals including varmints, rodents and insects
 - Physical objects including equipment
 - Feed
 - Water

- Environments, including shared pastures, water ponds, or even air.

Accordingly, we have to tailor our biosecurity practices “barriers” to stop both direct and indirect transmission.

1. Practices that aim to prevent direct transmission.

- Avoid contact between your flock and other birds, wild, domestic, or otherwise.
- Prevent your birds from mixing with other poultry or wild birds. Mixing of birds often happens around open water bodies and in open pasture.
- Whenever possible prevent mixing between species within the same flock, and between multiple ages within the same species.
- Try to acquire birds from National Poultry Improvement Plan (NPIP) disease free sources.
- If you bring new birds to your flock, quarantine the new birds for 1-3 weeks before mixing with the rest of the flock.
- If you show birds, attend fairs, or perform any activity where birds from different places come together in one place, quarantine the birds for 1-3 weeks before mixing back with the rest of the flock.

2. Practices that aim to prevent indirect transmission.

- It is highly recommended **NOT** to bring any visitors to your bird flock. They could be carriers of diseases on their clothes, shoes, hands or any objects they bring with them.
- It's recommended to have specific cloths and shoes dedicated to working with your birds.
- Additionally, using disposable coveralls, gloves, and shoe covers are highly recommended. They are relatively inexpensive, easy to dispose of and efficient in controlling the infection.
- Hands are the number one suspect when it comes to disease transmission. So, wash your hands before and after handling your birds, their feed, or their water.
- Wash your hands before and after handling any equipment, bedding material, housing material, or any object that comes in contact with the birds.
- Hand sanitizing stations (hand sanitizing gels or foams) should be in place and used every time the poultry house is entered or exited.
- Similarly, feet and foot wear play a very prominent role in transmitting diseases. Footbaths with freshly changed disinfectants (changed daily) should be in place and used every time the poultry house is entered or exited.
- In this link (<http://www.cfsph.iastate.edu/Disinfection/Assets/Disinfection101.pdf>) a very useful document by the Center for Food Security & Public Health from Iowa State University summarizing available disinfectants. Phenols (on page 13 of the document) are one of the few chemicals that can maintain its activity in hard water and organic matter. It's probably one of the most suitable choices to be used in footbaths.
- Don't bring your pets or allow them access to your birds.
- It is essential to house the birds in animal proof/bird proof houses.
- It is very important to have effective rodent and insect control program. Rodents and insects are notorious for transmitting not only poultry diseases but also human disease.

- Equipment, bedding material, housing material, or any object that comes in contact with the birds should be thoroughly cleaned and properly disinfected before using with your birds.
- Acquire your feed from trusted sources and properly store the feed in dry, cool, and clean places, shielded from access by other birds and animals, particularly rodents.
- Drinking water for birds should be the same quality as drinking water for humans. Surface water from rivers, ponds, or puddles is particularly dangerous as it often contains infectious disease agents from migratory wild birds.
- If possible, try to house your birds at a distance (1/2 mile) away from other poultry and wild bird gathering areas.

These practices should be adopted by anyone who owns, grows, or handles poultry. They also should be implemented at all times and in all situations. Obviously, different farms and different poultry houses, whether they are commercial or noncommercial, can adopt different ways to implement these practices. While you are using the concepts discussed in this article to design your own biosecurity program to fit your own situation keep the following goal in mind:

“On one hand, there is a worst case scenario when it comes to biosecurity, and that is a mixed species, mixed aged poultry flock that comingles with wild birds and other poultry flocks. On the other hand, there is the best case scenario which is single species, single age poultry flock, all-in-all-out, shower-in-shower-out facility. So, even if you can’t be in the best case scenario, you should do everything in your powers to be as close as possible to the best case scenario and you should do everything in your power to be as far as possible from the worst case scenario. When it comes to biosecurity, never say there is nothing that I can do to protect my birds, there is always something to do to improve your situation”.

Finally, if you experience any sudden disease signs or sudden mortality in your flock, please contact:

Animal Disease Diagnostic Laboratory
8995 East Main Street
Reynoldsburg, OH 43068-3399
Phone: (614) 728-6220
Email: animal@agri.ohio.gov

OR

Ohio Poultry Association
Phone: (614) 882-6111
Email: info@ohiopoultry.org

Research

Wilhelm, A. L., Maquivar, M. G., Bas, S., Brick, T. A., Weiss, W. P., Bothe, H., ...Schuenemann, G. M. (2017). **Effect of serum calcium status at calving on survival, health, and performance of postpartum Holstein cows and calves under certified organic management.** *Journal of Dairy Science*. Advance online publication. doi: 10.3168/jds.2016-11743

BACKGROUND: Sparse literature exists on the incidence of clinical or subclinical hypocalcemia (HYPO) of postpartum cows under certified organic management and on the effect of calcium status of dams at calving on survival, health, and performance of calves. Calves born from hypocalcemic cows have been reported to be at greater risk of developing diarrhea and respiratory events during the neonatal period compared with calves born from non-hypocalcemic (non-HYPO) cows. However, information on pre- and postpartum nutrition diets as well as colostrum management and diagnosis of health conditions was not available.

PURPOSE: The objective was to assess the effect of hypocalcemia of dams at calving on survival, health, and performance of lactating dairy cows and their calves under certified organic management.

RESULTS: The overall prevalence of HYPO was 14.6% (2.7% for primiparous and 30.8% for multiparous cows). Cows experiencing HYPO at calving had greater proportions of metritis and culling within 60 DIM compared with non-HYPO cows; however, milk yield and components as well as the proportion of pregnancy per artificial insemination at first service did not differ between groups. Although the proportion of stillbirth and serum total protein were not different, calves born from HYPO cows had a greater incidence of diarrhea than calves born from non-HYPO cows.

CONCLUSIONS: The authors concluded that findings show that hypocalcemia at calving had significant health implications for both dams and calves. When troubleshooting neonatal health problems is undertaken, the health status of the dams should also be assessed.

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Adams, A. E., Lombard, J. E., Fossler, C. P., Román-Muñiz, I. N., & Koprál, C. A. (2017). **Associations between housing and management practices and the prevalence of lameness, hock lesions, and thin cows on US dairy operations.** *Journal of Dairy Science*. Advance online publication. doi: 10.3168/jds.2016-11517

BACKGROUND: During the needs assessment phase of the NAHMS 2014 Dairy study, key industry stakeholders, including university, Extension, and dairy personnel, requested that the study include a national estimate of the prevalence of lameness because one was not available. In addition to providing a national estimate, it was requested that the study evaluate different management practices and housing types and their effects on lameness.

PURPOSE: The objective was to determine the association between different housing and management practices and estimate the prevalence of lameness, hock lesions, and thin cows on US dairy operations.

RESULTS: Many associations were identified between operation characteristics and the prevalence of lameness, hock lesions, and thin cows on US dairy operations. Lameness is a multifactorial disease and the findings suggest that cows housed on dirt or pasture, rather than concrete, had a lower prevalence of lameness. Hoof care was also important in reducing lameness: operations that treated lame cows within a day or week or had monthly or twice-monthly visits by the hoof trimmer also had lower lameness prevalence. Using sand as a bedding material for lactating cows protected against both lameness and hock lesions, with the prevalence being lower than on operations that used other bedding materials. The use of cow cooling methods was associated with a higher prevalence of lame cows but a lower prevalence of severely lame cows. Additionally, operations that used a nutritionist to balance rations for lactating cows had fewer thin cows than those on which the owner or other personnel balanced rations.

CONCLUSIONS: The prevalence of lameness and hock lesions in this study is lower than reported in studies over the past 5 to 10 years, but similar to studies published in 2016. The authors concluded that results from this study highlight management practices that may reduce the prevalence of lameness, hock lesions, and thin cows on operations in the United States.

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Miller-Cushon, E. K., & DeVries, T. J. (2017). **Short communication: Associations between feed push-up frequency, feeding and lying behavior, and milk yield and composition of dairy cows.** *Journal of Dairy Science*. Advance online publication. doi: 10.3168/jds.2016-12004

BACKGROUND: Feeding management factors have great potential to influence activity patterns and feeding behavior of dairy cows, which may have implications for performance. As cows sort their TMR, NDF content of the feed remaining in the bunk increases throughout the day, and the extent of this sorting is reduced by increasing frequency of feed delivery beyond once per day. No research to date has evaluated the effects of feed push-up frequency on feed sorting.

PURPOSE: The objectives were to assess the effects of feed push-up frequency on the behavioral patterns of lactating dairy cows housed in a tiestall system and to determine associations between behavior and milk yield and composition.

RESULTS: Feed push-up frequency had no effect on lying time [11.4 ± 0.37 h/d; mean \pm standard error (SE)], milk production (40.2 ± 1.28 kg/d) and composition (milk protein: $3.30 \pm 0.048\%$; milk fat: $3.81 \pm 0.077\%$), or feed sorting. Cows sorted against long particles ($78.0 \pm 2.2\%$) and for short ($102.6 \pm 0.6\%$) and fine ($108.4 \pm 0.9\%$) particles. Milk fat content decreased by 0.1 percentage points for every 10% increase in sorting against long particles and was not associated with lying behavior or other cow-level factors. Milk protein content decreased by 0.03 percentage points for every hour decrease in lying time and by 0.04 percentage points for every 10% increase in sorting against long particles.

CONCLUSIONS: The authors did not find that feed push-up frequency affected lying behavior or feed sorting, in contrast with previously reported effects of fresh feed delivery on the behavioral patterns of dairy cows. However, these results confirm previous findings that sorting against long forage particles in the ration is associated with reduced milk fat content. In addition, they found that milk protein content was positively associated with greater consumption of long forage particles in the ration and with lying time.

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Elsohaby, I., McClure, J. T., Cameron, M., Heider, L. C., & Keefe, G. P. (2017). **Rapid assessment of bovine colostrum quality: How reliable are transmission infrared spectroscopy and digital and optical refractometers?** *Journal of Dairy Science*. Advance online publication. doi: 10.3168/jds.2016-11824

BACKGROUND: Several methods have been developed to evaluate colostrum quality by measuring the colostral IgG concentration either directly or indirectly, but few of them are applicable to on-farm or field conditions. The radial immunodiffusion (RID) assay is regarded the most accurate reference method, but it is a laboratory-based method that requires 18 to 24 hours, high cost, lacks automation, and uses reagents with a short shelf-life. No known study has validated the use of IR spectroscopy (rapid on-farm method) for quantifying colostral IgG and assessing colostrum quality in dairy cows.

PURPOSE: The objectives were (1) to investigate the utility of previously built PLS models for quantifying colostral IgG concentration and assessing colostrum quality in dairy cows using IR spectroscopy, and (2) to determine and compare the diagnostic test characteristics of IR spectroscopy and digital and optical Brix refractometers for assessing colostrum quality.

RESULTS: Approximately half (48%) of the colostrum samples had RID IgG concentrations <50 g/L, which was the cut-point for poor quality. The correlation between RID and IR IgG concentrations was 0.88. The correlations between RID IgG concentration and Brix scores, as determined by the digital and optical refractometers, were 0.72 and 0.71, respectively. The optimal cutoff levels for distinguishing good- and poor-quality

colostrum using IR spectroscopy, and digital and optical Brix refractometers were at 35 g/L and 23% Brix, respectively. The IR spectroscopy showed higher sensitivity (90%) and specificity (86%) than the digital (74 and 80%, respectively) and optical (73 and 80%, respectively) Brix refractometers for assessment of colostrum quality, as compared with RID.

CONCLUSIONS: The authors concluded that IR spectroscopy and digital and optical Brix refractometers show potential for being effective management tools to be included in a colostrum-monitoring program. The IR spectroscopy can be used for rapid quantification of colostrum IgG levels and, thus, for assessment of colostrum quality at a cut-point of 35 g/L. The IR spectroscopy provided the most accurate assessment of colostrum quality compared with the digital or optical Brix refractometers; however, it is an expensive laboratory-based instrument. The Brix refractometers were less accurate, but can be used to assess colostrum quality on-farm, for which the authors recommend a cutoff level of 23% Brix. A compact, portable IR spectroscopy is available (not yet assessed), suggesting the real possibility of using the IR technique under field conditions.

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Calendar



A full calendar of all upcoming events and continuing education opportunities offered by the College of Veterinary Medicine is available on the website at <http://vet.osu.edu/>

[Dairy Cattle Welfare Council – Webinar Series](#)

(Webinars are free of charge, but you must register.)

- **“Monitoring Personnel Performance with Emphasis on Animal Welfare”**
 - Dr. Gustavo Schuenemann
 - March 15, 2017 at 4:00 p.m. EDT

Dr. Schuenemann will discuss how to monitor personnel and build effective teams with SOPs that have a positive impact on animal welfare.

- **“The Modern Dairy Maternity Ward”**
 - Dr. Donald Niles
 - April 4, 2017 at 4:00 p.m. EDT

Dr. Niles will cover important, practical considerations involved with creating maternity protocols and how animal welfare is integrated into the entire process. The focus will include maternity philosophy, maternity jobs, maternity performance, and pre-fresh care.

[Ohio Dairy Health and Management Certificate Program](#)

Module 10 – "Vaccinology and Immunology"

- May 4-5, 2017
- Hilton Garden Inn; Columbus, Ohio

Spots are always available for specific module plan

2nd Annual Dairy Cattle Welfare Symposium

Intersection of Best Practices and Sustainability

- June 1-3, 2017
- The Pfister Hotel; Milwaukee, Wisconsin

Early bird registration is now open at <http://dcwcouncil.org/>.

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