

OHIO STATE UNIVERSITY EXTENSION



OHIO VETERINARY NEWSLETTER

March 31, 2017

Veterinary Extension

Vol 43, No 3

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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. On

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March 14th, Alabama announced investigation of 3 potential cases of H7 in Jackson, Lauderdale, and Madison counties in north Alabama, all low pathogenic, one in a commercial breeder and two in noncommercial flocks. Latter on March 16th a second case of H7 HPAI was confirmed in another broiler breeder flock just one mile away from the index case in Tennessee with high mortality. On March 18th a commercial breeder flock was confirmed to be H7 positive in Christian County, Kentucky with no clinical signs suggesting that it is low pathogenic. Then two more cases were confirmed in Pickens and Madison counties in Alabama on March 22nd. And finally on March 22nd a flock of commercial poultry in Cullman County has tested positive for H7 with no clinical signs.

All in all, we had two highly pathogenic H7 cases, both in Tennessee, 1 mile apart. Also, we had several low pathogenic H7 cases in commercial and noncommercial poultry in Tennessee, Alabama, and Kentucky, in addition to one detection of H7 in wild birds in Kentucky. These findings highly suggest that we have a low pathogenic virus given the chance to circulate in domestic poultry until it was transformed into a highly pathogenic virus. 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 a 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.

Research

Thompson, N. M., Widmar, N. O., Schutz, M. M., Cole, J. B., & Wolf, C. A. (2017). **Economic considerations of breeding for polled dairy cows versus dehorning in the United States.** *Journal of Dairy Science*. Advance online publication. doi: 10.3168/jds.2016-12099

BACKGROUND: The use of polled genetics eliminates the need for dehorning. In dairy cattle, intense selection for production attributes with little to no selection for polledness has made polled sires rare and often inferior in terms of production relative to their horned counterparts. No previous research has quantified the costs and benefits of this strategy compared with conventional dehorning methods.

PURPOSE: The purpose was to determine the economic benefit of using polled genetics if the gap in genetic merit between polled and horned cattle were to disappear.

RESULTS: The expected costs of the four traditional dehorning methods evaluated in this study ranged from \$6 to \$25/head, with a mean expected cost around \$12 to \$13/head. The expected costs of incorporating polled genetics into a breeding program ranged from \$0 to \$26/head depending on the additional cost, or premium, associated with polled relative to horned genetics. Estimated breakeven premiums associated with polled genetics indicate that, on average, producers could spend up to \$5.95/head and \$11.90/head more for heterozygous and homozygous polled genetics, respectively,

compared with conventional horned genetics (or \$2.08 and \$4.17/straw of semen at an assumed average conception rate of 35%).

CONCLUSIONS: Given the parameters outlined, sensitivity to individual farm semen and dehorning costs are likely to swamp these differences. Beyond on-farm costs, industry-wide discussion may be warranted surrounding the public's acceptance and attitude toward polled genetics versus dehorning or disbudding of calves. The authors concluded that the value of avoiding dehorning may be larger for the industry, and perhaps some individual farms, than initially suggested if additional value is put on calf comfort and possible worker aversion to dehorning. If public perception of dehorning influences market access, the expected costs of dehorning may be large but that cost is unknown at present.

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De Vries, A. (2017). **Economic trade-offs between genetic improvement and longevity in dairy cattle.** *Journal of Dairy Science.* Advance online publication. doi: 10.3168/jds.2016-11847

BACKGROUND: The trade-off between increasing longevity and the opportunity cost of genetic improvement foregone in the herd, in combination with reproductive technologies, is complex and the problem of finding the optimum balance has not been solved. This review and analysis are limited to the direct trade-off between genetically improved heifers and cow longevity.

PURPOSE: The objectives are to describe genetic trends and genetic lag in dairy cattle in the United States to identify the opportunity cost of genetic improvement foregone and present data on longevity. Second, to review literature on the direct trade-off between longevity and genetic improvement, identify shortcomings, present some additional illustrative calculations, and draw conclusions.

RESULTS: Data from the Council on Dairy Cattle Breeding show that the estimated breeding value of the trait productive life has increased for 50 yr but the actual time cows spend in the herd has not increased. The average annual herd cull rate remains at approximately 36% and cow longevity is approximately 59 mo. The annual increase in average estimated breeding value of the economic index lifetime net merit of Holstein sires is accelerating from \$40/yr when the sire entered AI around 2002 to \$171/yr for sires that entered AI around 2012. The expectation is therefore that heifers born in 2015 are approximately \$50 more profitable per lactation than heifers born in 2014. Asset replacement theory shows that assets should be replaced sooner when the challenging asset is technically improved. Few studies have investigated the direct effects of genetic improvement on optimal cull rates. A 35-yr-old study found that the economically optimal cull rates were in the range of 25 to 27%, compared with the lowest possible involuntary cull rate of 20%. Only a small effect was observed of using the best surviving dams to generate the replacement heifer calves. Genetic improvement from sires had little effect on the optimal cull rate. Another study that optimized culling decisions for individual cows also showed that the effect of changes in genetic improvement of milk revenue minus feed cost on herd longevity was relatively small. Reduced involuntary cull rates improved profitability, but also increased optimal voluntary culling. Finally, an economically optimal culling model with prices from 2015 confirmed that optimal annual cull rates were insensitive to heifer prices and therefore insensitive to genetic improvement in heifers.

CONCLUSIONS: The author concluded that the evidence collected suggests that the major way to capture the recently accelerating genetic improvement in sires is not by greatly increasing cow culling and hence reducing longevity. Genetic improvement is important but does not warrant short cow longevity. Economic cow longevity continues to depend more on cow depreciation than on accelerated genetic improvements in heifers. This is confirmed by old and new studies.

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Salfer, J. A., Minegishi, K., Lazarus, W., Berning, E., & Endres, M. I. (2017). **Finances and returns for robotic dairies**. *Journal of Dairy Science*. Advance online publication. doi: 10.3168/jds.2016-11976

BACKGROUND: Robotic milkers are attractive because smaller farms want a more desirable lifestyle and larger farms have difficulty finding high-quality milking labor. Previous simulations and observational studies have shown that automatic milking systems (AMS) are less profitable than conventional milking systems (CMS). However, labor wage rates have increased and AMS technology has improved in the past few years.

PURPOSE: The purpose was to look at profitability of automatic milking systems compared to conventional milking systems in light of improvements in AMS technology and increased cost of labor. They developed partial budget simulations to model profitability of AMS compared with parlor systems for 120-, 240-, and 1,500-cow farms.

RESULTS: Both the 120-cow and 240-cow AMS were more profitable than the parlor systems. However, the 1,500-cow parlor system was more profitable than the AMS. Breakeven labor analysis of the 1,500-cow system showed that at a wage inflation rate of 1% and a 0.91 kg/d lower milk production with the AMS system, the breakeven labor rate was \$27.02/h. If the farm is able to achieve similar milk production between the two systems and wage inflation averages 3% over the 30-yr time horizon, the breakeven wage rate drops to \$17.11/h. The major management factors that influenced the net annual impact were changes in milking labor cost and milk production. Another significant factor affecting net annual impact was the economic life of the AMS. An economic life of 13 yr or longer was required for an AMS to have a consistently positive net annual impact (depending on milk production per cow and labor cost). For every 227-kg increase in daily milk production per AMS, net annual income increased approximately \$4,100. Cost-effective ways to optimize milk per AMS are to minimize attaching and milking times and to optimize milking settings.

CONCLUSIONS: The authors concluded that the main management factors affecting whether AMS is more profitable than CMS are increased milk production per cow and labor savings. Another major factor is years of economically useful life. To maximize profit, AMS users should optimize milk production per robot. To compare the relative return of AMS versus CMS, producers need to understand how their management style and preferences and economies of scale and future wage inflation affect potential future net income.

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Bach, A., & Cabrera, V. (2017). **Robotic milking: Feeding strategies and economic returns**. *Journal of Dairy Science*. Advance online publication. doi: 10.3168/jds.2016-11694

BACKGROUND: Cows milked in conventional milking parlors are kept under a structured, consistent, and social milking and feeding routine using a TMR. In herds using robotic milkers, a fraction of the nutrients is provided during milking, as a means to attract cows into the milking system, with the remainder coming in the feed bunk as a partial mixed ration. This presents challenges and opportunities for feeding cows.

PURPOSE: The purpose was to summarize and discuss the literature regarding feeding cows in an automatic milking system (AMS) in an attempt to overcome the challenges and capture the opportunities of an AMS by considering behavioral, nutritional, and economic aspects.

RESULTS: Uneven milk frequency has been associated with milk losses and increased risk of mastitis, but most importantly, it is a lost opportunity for milking the cow and generating profit. On the other hand, the opportunity from AMS resides in the possibility of milking more frequently and feeding cows more precisely or more closely to their nutrient needs on an individual basis, potentially resulting in a more profitable production system. But, feeding cows in the parlor or AMS has many challenges. On one side, feeding starchy, highly palatable ingredients in large amounts may upset rumen fermentation or alter feeding behavior after milking, whereas feeding high fiber concentrates may compromise total energy intake and limit milking performance. Nonetheless, AMS (and

some milking parlors, especially rotary ones) offer the possibility of feeding cows to their estimated individual nutrient needs by combining different feeds on real time with the aim of maximizing profits rather than milk yield. This approach requires that not only the amount of feed offered to each cow but also the composition of the feed vary according to the different nutrient needs of the individual cows.

CONCLUSIONS: The authors concluded that there are opportunities and pitfalls of milking and feeding cows in an AMS and there are different feeding strategies to maximize profits by managing the nutrition of the cows individually.

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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](#).)

- **“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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