Data drives more efficient poultry farming

Mechanistic modeling yields healthier birds, farms

Some dairy farmers use surveillance cameras and facial recognition software for cattle to make improvements in the barn. Similar technology is being developed for the poultry sector. FILE PHOTO

FORT LANGLEY – Technology and modelling have been used to determine nutrition needs for poultry for a number of years.

But David Dyble, senior nutritionist with Trouw Nutrition Canada, finds that ever-changing poultry growth rates and health issues require better tools to ensure efficient growth. He presented potential options for the future of poultry nutrition to the Fraser Valley branch of the BC Institute of Agrologists in early September.

According to Dyble, the amount of feed a broiler chicken eats to achieve current growth rates is "the equivalent to us eating a loaf of bread every hour that we're [awake]." This volume of food leads to the potential for digestion challenges. Environment, food and flock size are among the factors further complicating the situation.

While empirical models can tell growers how much to feed birds, Dyble says they can't tell if birds are getting the nutrients they need due to an inability to access the food source, digestion issues such as leaky gut syndrome and overall health concerns like bacterial illness.

"We know what the proportions [of nutrients] should be in the diet, but we know that doesn't happen in the real world. Food intake isn't always what is expected," he says. "Over time [poultry is] getting bigger, quicker. It means our models are wrong. If I did a model yesterday, it won't be right for the bird of tomorrow."

According to the Food and Agriculture Organization, farm animals globally perform 30% to 40% below their genetic potential due to suboptimal nutrition, health issues and growing conditions. Canada's farm animals likely fare better given that Dyble says male broiler weights have increased from 473 grams at 42 days in 1950 to 3,254 grams in 2010. Additionally, the number of days to achieve a two-kilogram weight has dropped from 163 days in 1950 to just 40 days in 2010.

Dyble says a nutritionist aims to ensure animals get the right nutrients to feel good and be productive while also optimizing a farm's economic return. Thus, feed is really about nutrient delivery that ensures a properly fed animal without waste.

One option for modeling nutrient delivery is a mechanistic model being developed at the University of Guelph. Data is constantly collected from the birds and used to calculate the model's evolution. Data includes environmental variables, feed, age, gender and genetics – a volume of information that's beyond most on-farm applications available today.

"Technology is moving out of the lab and into the field," Dyble explains. "There's the assumption we're going to go to some level of precision farming, but to do this we need high-scale data management. Trying to figure out how we're going to use these things in the future is kind of fun."

Regardless of the model, poultry nutrition will still require a "clever farmer" because the model may say to "crank it up" in terms of nutrients but if the bird is sick due to bacteria, increasing nutrients feeds the bacteria, not the bird.

To address this, researchers in Guelph are exploring the use of surveillance cameras and facial recognition software for poultry to identify suspect behaviour that may indicate birds with health issues. Data gathered from a camera may ultimately feed directly into the nutrition model, eliminating the need for human surveillance and intervention. Some elements of the technology already exist for the dairy industry, but broiler growers will have to wait a little longer.

"These models are only as good as the people that put them together," Dyble says. "But we're getting there and getting that data to cell phones is coming."

Modelling that can help identify myriad poultry health issues will get farmers ahead of the challenges they began facing as antibiotics started being eliminated from the production system in 2014, with phase-out completed by 2020.

Dyble says the poultry gut consists of a diverse mix of microbes. When combined with the organisms in a chick's environment, they can create issues for the birds right from hatching. Modelling can help manage the issues by providing farmers, veterinarians and nutritionists the information needed to create natural gut health.

Getting a mechanistic model up and running takes time. Dyble hopes he'll be able to preload environmental data for parts of BC and Alberta so growers don't have to start from scratch. The aim, he says, is to take "three hours to get it running rather than three days."

Ultimately, the best model will be one that solves the actual problems farmers face, not ones predicted by others. This, too, presents a chicken-and-egg challenge. Data may suggest a special feed for an individual farm that the farmer wants, but suppliers might not have the feed available.

Mechanistic modeling promises an improvement over simpler methods such as empirical modeling by assessing least-cost production methods. While empirical modelling needs few inputs and is more easily applied, its application is limited when compared to the larger number of inputs and learning involved in mechanistic modelling.

Dyble sees a future where data improves farming to be more efficient and sustainable.