Made-in-Canada NIRS calibrations for swine and poultry feeding

by Kieran Brett

With funding from ACIDF and ALMA, this feed scientist corrected global standards for NIRS calibrations to help prairie producers formulate rations more precisely.

Pork and poultry producers incur a wide range of costs to get their product ready for market. Costs for housing, heating, lighting and breeding quickly add up. For the producer looking to manage costs, however, there's no question where the biggest target is.

By carefully managing the 60% to 70% of costs that are associated with feed, the producer can maintain profitability even in the face of volatile prices for grain and other ingredients.

Pieter van Wijck (Nutrition Partners), Emma Clowes (Nutrition Partners), and Shawn Fairbairn (Poultry Partners) Photos supplied by Emma Clowes.

As Emma Clowes explains, managing feed costs can be a tricky exercise. One reason is that nutritional values for feed components such as wheat, barley, peas and fababeans can vary widely.

"You can estimate nutrition based on book values but, for example, wheat purchased in the Canadian Prairies could have between 10% and 19% protein," says Clowes, Nutrition Scientist at Nutrition Partners and Poultry Partners Inc., a nutrition, health and management company based in Airdrie. "You can also buy canola meal as regular or expeller- or cold-pressed, and those also have different protein levels."

The cost and variability of feed ingredients is leading more pork and poultry producers to adopt Near Infrared Spectroscopy (NIRS) technology. NIRS allows for quick and accurate estimation of the nutritional value of a feed sample.

NIRS technology depends on valid calibrations that relate its readings to physical chemistry testing of the same, or closely related, samples. One of the leading NIRS tools being used in Western Canada is the German-made Bruker FT-NIR Multi-Purpose Analyzer Spectrometer.

Global calibrations not a complete answer

Feed formulations are based on estimates of the moisture, protein, fat, fibre, starch and other nutrients in feed grains. These nutrients can be used to estimate the amount of energy (Net Energy) in the ingredient. Bruker publishes global calibration models which predict the nutrients used to calculate net energy in feed grains and complete feeds. These calibrations are helpful, but Clowes believed Western Canadian swine and poultry producers needed something better than a one-size-fits-all standard.

Between 2015 and 2016, Clowes led a seven-month project to validate Bruker's NIRS Base Calibration Model Equations for feed ingredients grown in Western Canada. This work was supported by the Alberta Crop Industry Development Fund (ACIDF) through the $8 million Feeding Initiative funded by Alberta Livestock and Meat Agency (ALMA).

"The global equations span quite a broad range of nutritional values," Clowes says. "We looked at those values to see how they fit Western Canada because they can be significantly different. For example, in Canada we use the ANKOM system for measuring fiber, but in Europe the Fibertec Method is used."

Over the course of this project, Clowes and her team collected 257 feed grain samples, 64 co-product samples such as canola and soybean meal processed in different ways and 137 complete poultry and swine feed samples. All samples were analyzed with NIRS and nearly 300 of these samples were sent for wet chemistry analysis. Comparing NIRS readings with wet chemistry results allowed Clowes to add corrections to the Bruker calibrations so they more accurately reflected ingredients grown in Western Canada.

Adjusting formulations in real time

Emma Clowes will be sharing her findings with members of the Alberta NIRS Network, and working with Bruker's Canadian representative to refine the company's calibrations for prairie conditions. As she sees it, producers can now more readily capture the benefits that NIRS provides.

"NIRS has enabled feed ingredients to be measured in real time," Clowes says. "We can take a sample from a producer into our lab, grind it, and if needed, the analysis can be sent to the producer that day so they can tweak their formulation. NIRS has brought reliable testing of nutritional compositions down from several weeks to within a day. It's fantastic and it's quick as well."

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