

Can canola meal do more?

Fermentation looks to unlock probiotic properties

Like many researchers in Canada and around the world, Doug Korver is exploring effective, practical alternatives to antibiotics in poultry production. His team at the University of Alberta are getting ready to feed fermented canola meal to broilers to validate the probiotic properties of this altered feed ingredient.



Doug Korver

can work with something already in poultry diets that has a probiotic effect and brings other health benefits, that's very promising," says Korver.

Canola meal naturally contains a lot of phenolic acid – compounds with known antimicrobial, anti-inflammatory and antioxidant properties. For the lab portion of the research project, Pham fermented canola meal by adding the probiotic lactobacilli. "I used lactic acid bacteria to ferment canola meal and then extracted the phenolic acids," says Pham.

The phenolic acid she extracted from fermentation was then added to poultry pathogens in the lab – *Salmonella*, *Campylobacter* and *Clostridium perfringens*. "The good news is we learned that fermentation increases the antimicrobial activity of phenolic acid, compared to unfermented canola meal," says Pham. "And this is important news for bird health and human health."

Many prebiotics and probiotics are being explored to arm birds with better gut health for a stronger stance against infection. "What our research has shown is that by fermenting canola meal with lactobacillus bacteria, you are essentially

converting the phenolic acid that is already there into more potent antimicrobial compounds that are naturally present," says Korver.

From lab to live birds

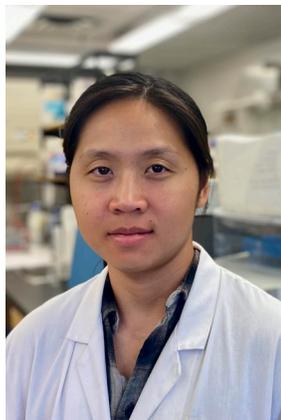
For an antibiotic alternative to be successful it has to work in commercial production. While the team's research looks promising in the lab, new alternatives must also be easy to incorporate into commercial operations. To get one step closer to that possibility, Korver and Pham are moving into the live animal testing portion of their work. They'll be fermenting canola meal on a larger scale to incorporate into the daily diet of broiler birds.

"We'll be looking to demonstrate that fermented canola meal is effective at reducing potential pathogens in the chicken gut."

Broilers will be fed diets that contain fermented canola meal for the trial work set to take place this spring/summer at University of Alberta research facilities. The team will collect digestive samples to look at the levels of microbes. "We'll be looking to demonstrate that fermented canola meal is effective at reducing potential pathogens in the chicken gut," says Korver. "We're focusing on two human pathogens – *Salmonella* and *Campylobacter*, and a poultry pathogen – *Clostridium perfringens*."

To test efficacy of the altered meal against *Clostridium* – the causal agent for necrotic enteritis – they'll use a challenge model to induce necrotic enteritis and determine if the fermented canola meal reduces the incidence and severity of the disease.

As a feed ingredient, they'll also be calibrating how much of the fermented canola meal to add to the broiler diet. "We'll test a few different levels of inclusion in the diet, and then based on the results will be able to choose the optimal level for further testing," says Korver.



Vi Pham

They will look at the impact of fermentation on the nutritional characteristics of canola meal, and also track performance measures on the birds including growth, feed conversion, nutrient digestibility and carcass yield.

Pham is also interested in evaluating the probiotic effect of the fermented canola meal. "The lactic acid bacteria I use to ferment the canola meal is a

common probiotic with proven effects on humans and animals. So, I expect to find less *Salmonella*, *Campylobacter* and *Clostridium* by feeding fermented canola meal," says Pham.

The big goal in the gut

The main goal with any antibiotic alternative is not to eliminate bacteria from the gut, or even eliminate all of certain troublesome pathogens, but to make it difficult for pathogens to establish, proliferate and cause problems.

"In our challenge model, we're looking to create chaos in the gut to see how well fermented canola meal can reduce the chances for *Clostridium perfringens* to take hold," says Korver. "When there is chaos in the intestinal tract, there is competition among the microbes and an opportunity for *Clostridium* to outcompete other bacteria."

And that's where probiotics like fermented canola meal come in. "It's important to ensure the gut is stable and probiotics occupy ecological niches in the bird gut that prevent pathogens from establishing," says Korver.

Farm-friendly alternatives

The big questions for Korver – and others searching for antibiotic alternatives – is how to come up with alternatives that are as economically efficient as possible so the industry

can incorporate them. He knows there isn't going to be one product that will work as well as antibiotics have, and that combinations and different strategies are probably the path forward. But it's also why he is so encouraged by their results. "This work is so interesting because in a single step, we have used two different mechanisms – the antimicrobial phenolic compounds inherent in canola meal and the lactic acid used for fermentation – to create a possible new alternative."

While the fermentation process shows promise for unlocking the antimicrobial properties of canola meal, the research team know the process still needs some work as it produces a wet feed ingredient. If they can make it work on a small scale, and the live bird results show as much promise as the lab work, they'll look at how to make it a practical process for the industry. That may include options for on-farm fermentation, as well as looking at the possibilities of a dry, stabilized fermented canola meal.

"The initial approach we are taking is that feeding fermented canola meal would be an on-farm process," says Korver. "Down the road, we'll probably see if the product can be dried and be stable enough to add in at the feed mill, making it an easier ingredient to incorporate."

Korver expects results from the next phase of their research, feeding canola meal to broilers, to be completed late summer or early fall, this year.

This research is funded by the Canadian Poultry Research Council as part of the Poultry Science Cluster which is supported by Agriculture and Agri-Food Canada as part of the Canadian Agricultural Partnership, a federal-provincial-territorial initiative. Additional funding was received from the Ontario Ministry of Agriculture, Food and Rural Affairs, George Weston Seeding Food Innovation, Alberta Agriculture Funding Consortium, Lallemand Inc. and Compute Canada.