

Beneficial anti-inflammatory effects observed when plant extracts fed to sick pigs

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Porcine reproductive and respiratory syndrome (PRRS) is the most expensive and invasive disease for pig producers on a global scale. Though it is not occurring on every farm, it is the biggest disease problem in the pig industry, said a University of Illinois animal sciences researcher.

E. coli has also been a problem historically and continues to be on an industry-wide basis, said James Pettigrew. "Either disease can sweep through a farm so their alleviation would substantially reduce production costs. Even though many management practices have been used in the swine industry, these practices cannot guarantee freedom from disease for [pigs](#)," he said.

Consumer concerns about bacterial resistance to antibiotics have prompted the swine industry to seek additional methods to protect the health of pigs, including special feed additives. This interest led Pettigrew and his team to explore the potential benefits of selected plant extracts.

The researchers conducted two experiments to test the beneficial effects of adding plant extracts to pig diets to combat PRRS and *E. coli*. In both experiments, researchers used four diets in weanling pigs, including a control diet and three additional diets that included garlic botanical extracted from garlic, turmeric oleoresin extracted from ginger, or capsicum oleoresin from pepper. In both experiments, half of the pigs in each dietary treatment were challenged with either *E. coli* or PRRS virus

while the other half of the pigs were non-challenged.

"We've known for a long time that plant extracts, also called essential oils or botanicals, have certain biological actions," said Yanhong Liu, a doctoral student who led the studies. "For instance, they can act as antioxidants or as antimicrobials. We wanted to test whether we could get a benefit from feeding those products in very low doses to pigs that were challenged with these specific diseases."

E. coli, a bacterial illness of the gut, is marked by diarrhea, decrease in appetite, decrease in body weight, and in some cases, a higher mortality rate. *E. coli* is especially dangerous post-weaning as pigs adapt to new feed and new environments, Pettigrew said.

The pigs in the study challenged with *E. coli* that had been fed any of the three plant extracts had a lower frequency of diarrhea (20 percent) than the pigs fed the control diet (40 percent). The pigs fed plant extracts were more efficient (40 percent) in feed use than the pigs fed the control diet in the *E. coli*-challenged group, and challenged pigs fed plant extracts had sounder gut morphology compared with the challenged pigs fed the control diet.

Liu noted that even the pigs in the non-challenged group, with a low frequency of mild diarrhea, benefited from the plant extracts. "Because there is a relatively high diarrhea rate in post-weaning pigs as they are moved from the mom and started on all solid feed, the extracts could also be used to reduce its occurrence," she said.

Common symptoms of PRRS, a viral infection of the lung, include fever, lethargy, trouble breathing, loss of appetite, and decreased growth performance. The disease can also lead to spontaneous abortions and higher pre-weaning mortality rates in pigs.

After feeding the pigs challenged with the PRRS virus the three plant extracts, the researchers observed that the pigs were more efficient in week 1 (55 percent) and week 2 (40 percent) than the pigs fed the control diet. The pigs continued eating and gaining weight. They found this to be especially true with turmeric, Liu said.

When they checked blood samples from the pigs with the PRRS virus, they found that the pigs fed plant extracts also had a lower blood viral load (13 percent) and lower concentrations of inflammatory mediators than pigs fed the [control diet](#). These observations also suggest that feeding plant extracts could suppress ongoing inflammation and prevent secondary infections.

The researchers believe the benefits resulted from the effects on the pigs' immune systems because feeding plant extracts reduced the inflammation caused by *E. coli* and the PRRS virus.

"In production animals, inflammation is costly. Inflammation reduces feed intake, and it diverts nutrients away from growth to the immune system," Pettigrew said, "If we can bring that quickly back down to normal after a challenge, then that helps in production."

Although previous studies have looked at using plant extracts in pig diets, Pettigrew said Liu's study, which looked at the effects of three different extracts on two different diseases, had not been done previously. He also added that the low concentration of the extracts used while still producing beneficial results set this study apart.

The researchers will continue to study the mechanisms behind the beneficial effects they observed, including conducting gene expression studies. "We want to know the big picture of how these [plant extracts](#) affected the challenged and non-challenged pigs," Liu said.

More information: *Journal of Animal Science* a
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