Feed additives can reduce campylobacter in free-range broilers

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Researchers from DTU National Food Institute have conducted trials on a commercial free-range chicken farm in Denmark and achieved an 80%

reduction in campylobacter in the chickens by supplementing their feed with biochar. The study is published in the journal *Poultry Science*.

"Campylobacter causes numerous cases of illness in humans every year. Reducing bacterial levels in chickens can make a significant difference in public health. Our findings highlight biochar's potential—particularly for free-range and organic chickens, where controlling bacteria is more challenging than in conventionally raised poultry," says senior researcher Brian Lassen from DTU National Food Institute, who leads the SafeChicken project.

Many studies of this kind are conducted in laboratories and show positive outcomes, but they often struggle to replicate these findings under real farm management conditions.

"We demonstrate that it's possible to achieve a significant reduction in campylobacter in free-range chickens slaughtered at two months of age without finding adverse effects on their health. This is significant for production systems where chickens have access to outdoor areas, which typically increases their exposure to campylobacter from the environment," says Ph.D. student Cristina Calvo-Fernandez, who has worked on the project as part of her doctoral studies.

Potential for organic farming

The researchers tested feed and water additives on the free-range chickens that had previously shown evidence of potentially reducing campylobacter under experimental conditions. The trials were conducted three times on the same farm.

"The best results came from using biochar, which is made from organic waste material, such as wood, transformed into biochar through pyrolysis. In addition to reducing campylobacter, biochar can help lower

CO_2 emissions and has the potential for becoming part of a circular economy," says Lassen.

Biochar could potentially be used in organic chicken production and implemented quickly, as it is a substance that can be used in this production type, which is otherwise more restricted in what can be added to feed than other production types.

Researchers also tested organic acids added to the chickens' drinking water. Previous studies have shown that these acids can reduce campylobacter levels.

"In our trials, we observed a 76% reduction in campylobacter when the chickens were 36 days old—half of this breed's slaughter age—but the effect diminished by the slaughter age of the free-range chickens three weeks later. This suggests that timing the administration of organic acids may need to be optimized from the experimental setup," says Calvo-Fernandez.

Food safety for the future

Chickens are natural hosts for campylobacter and thus can be found in chicken meat if the flock is infected. In humans, it can cause gastrointestinal illness if meat is undercooked or improperly handled. National initiatives in Denmark have already reduced levels of bacteria such as salmonella and campylobacter through Action Plans, but new methods are still needed to reduce their presence.

Campylobacter can be found in free-range and organic chicken flocks, especially during the summer period. Maintaining good kitchen hygiene and thoroughly cooking chicken meat can prevent illness, as high heat kills the bacteria.

"The result provides an important tool in making chicken meat as safe as possible. With 5,000 registered cases of campylobacter-related illness annually in Denmark—and many more unreported—campylobacter is a significant cause of gastrointestinal problems," says Lassen.

The SafeChicken project will continue until autumn 2025 and is investigating additional methods to combat campylobacter, including interventions at slaughterhouses.

The researchers are also analyzing why biochar reduces campylobacter levels in chickens.

"We are currently studying how biochar affects the families of bacteria in the chicken gut microbiome. Campylobacter is naturally present bacterium in the chicken's gut microbiome, and understanding just how biochar affects the chicken's microbiome and reduces Campylobacter is essential," says Calvo-Fernandez.

If the researchers can uncover this mechanism, it offers hope that the method could also be applied to conventional poultry farming and other livestock.

More information: Nao Takeuchi-Storm et al, Effect of feeding biochar, oat hulls, yeast fermentate, and organic acids on reduction of Campylobacter in free-range broilers from hatching to slaughter, *Poultry Science* (2024). DOI: 10.1016/j.psj.2024.104706

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