

# Feeding chickens charcoal improves litter as fertilizer

by **Stephanie Schupska**, University of Georgia  
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When charcoal is used in chicken feed, bacteria in manure convert uric acid into ammonium, not ammonia. This makes litter less odorous or harmful, and can make litter a better nitrogen fertilizer for crops, too.

According to a University of Georgia Extension poultry specialist, if chickens eat a bit of charcoal, it helps lower the ammonia in their manure, which can lead to happier, healthier and more environmentally friendly chickens. High levels of ammonia in litter can affect a chicken's growth and performance.

Casey Ritz, a poultry scientist, has researched charcoal as an additive to poultry bedding to control ammonia levels in chicken houses for the past four years. It was working, but he thought charcoal might be able to do more from inside the chicken.

"Our question was 'if it is fed to chickens, can we stop ammonia production before it hits the ground?'" he said.

One group of chickens was given feed with charcoal added. Another group received normal feed without charcoal. Ritz and his colleagues then took the chicken manure and incubated it. They found a significant drop in the amount of ammonia in manure of chickens fed charcoal compared to the chickens who ate regular feed, he said.

The researchers were initially worried that the chickens might not eat feed with charcoal in it. Chicken feed is usually light brown. The charcoal turns it black. Fortunately, the color didn't bother the chickens. And, thanks to the charcoal's affect on manure color, the researchers knew without a doubt which chickens had charcoal in their diets.

Charcoal is very porous, making it an excellent natural filter. It has no nutritional value for chickens, so it is only a filler in their feed. Scientists now want to see how much charcoal must be added to a chicken's diet to be effective.

"We want the biggest bang for the buck with added char," Ritz said. Right now, he thinks that is between 1 and 2 percent of poultry feed. He'll conduct experiments the next few months to figure final formulation.

## Better fertilizer

Chickens produce ammonia through their manure, also called litter. Nitrogen in the feed they eat is converted into uric acid in their intestines. When charcoal is used in the feed, bacteria in manure convert the uric acid into ammonium, not ammonia. This makes the litter less odorous or harmful, and can make it a better nitrogen fertilizer for crops, too.

"Chicken litter is a great fertilizer," Ritz said. "But if we can enhance it a little bit, we'd make it even better. Chicken



litter, from a volume standpoint, is only about 3 percent nitrogen. If we could enhance it a couple of percentage points, it would be a big deal."

## Air quality

Ammonia dissipates quickly into air. The human nose detects ammonia between 5 and 50 parts per million. "We can't even get 5 parts per million very far outside of a chicken house," he said. In other words, unless someone is standing inside a poultry house, it isn't the ammonia that stinks; it's other odors.

Ammonia isn't on the E.P.A. list of top six air pollutants, but lowering it helps overall air quality. "What it comes down to is we must stop ammonia before it's made, instead of trying to mitigate it after it's emitted," Ritz said. "Charcoal is a strategy with a good chance of success."

## Next steps

Next, Ritz and colleagues want to make charcoal feed additive affordable for poultry producers, and find companies to produce and sell it as a poultry additive. The U.S. Food & Drug Administration and U.S.D.A. must approve use of charcoal as commercial feed additive.

Charcoal is already approved for human consumption, he said.

## Dr. Casey Ritz

### Poultry House Air Quality & Emissions

Poultry house air emissions have become a focus for regulation in recent years. Importance of air quality for optimal poultry production is likewise undeniable. Investigating in-house air quality and emission-controls is important research to enhance production, performance standards and pollution prevention.

Dr. Ritz investigated ammonia emissions outside chicken houses and evaluated litter-applied chemicals and management strategies to reduce ammonia generated in the production environment. Unique research is investigation of using charcoal as topical litter amendment and feed supplement to reduce ammonia volatilization.

