



Strategies to reduce feedlot odors presented at K-State Research Roundup.

Story & photos by
MICKY WILSON

"It's a challenge to say the least, but it's a challenge I think is worthy of taking on," said John Jaeger, beef cattle scientist at the Kansas State University (K-State) Research and Extension Agricultural Research Center-Hays, referring to feedlot odor. Jaeger spoke during the K-State Research Roundup in early April. "As urban areas continue to expand into agricultural areas, these types of complaints are going to become more and more frequent."

Odor is a product of microbial breakdown. "Of course, the major source in this situation is manure or other organic material," Jaeger explained. An average feedlot animal is thought to produce up to 350 pounds (lb.) of wet manure per week.

"Most bad odors are created during anaerobic (oxygen-free) breakdown," Jaeger added. To avoid anaerobic breakdown, manure and other organic materials should be kept as dry as possible.

Strategy 1: pen design

The first strategy presented to reduce feedlot odor was pen reshaping. Suggestions made by Jaeger were to gutter feedbunk roofs in order to prevent pen moisture and to increase slope away from feed and water aprons. Manure accumulation

at the back of feed and water aprons leads to water collection, which causes anaerobic breakdown.

"Anytime you get water collection, you're going to get anaerobic breakdown," Jaeger explained. Anaerobic breakdown promotes certain soilborne bacteria and the odor commonly associated with feedlots.

Pen reshaping strategies include making a trough in the center of the pen for drainage. "We're trying to encourage water to run to the center of the pen to get more water accumulation there," Jaeger said. "It's more likely to exit the pen rapidly into the sediment basin."

The overall goal, Jaeger said, is to increase the drainage and simplify cleaning of feedlot pens. Additionally, the goal is to clean feedlots frequently — at least every 60 days, more often if possible.

Strategy 2: soil stabilizer

The second strategy suggested to control feedlot odor was to stabilize the soil in the lots. Hard-surface pens, compacted with soil — not manure — are most desirable. Jaeger

recommends removing traces of manure and other loose surface material and replacing it with soil. At the K-State Agricultural Research

Center-Hays, the excess manure is given to farmers for fertilizer. An additional option is to compost manure and market it commercially as garden fertilizer.

After cleaning the pens, Jaeger said, "I wanted to look for ways that we could economically hard-surface [pens] and make them more cleanable."

Fly ash, a byproduct from coal-fired electric plants, "has properties very similar to concrete, and it can be used to improve soil stability and increase runoff," Jaeger explained. Fly ash is also inexpensive, costing less than \$2.50 per ton. Hidden costs with fly ash, however, may be in trucking fees, since many feedlots are not conveniently located near electric plants.

As a rule of thumb, Jaeger explained, one ton of fly ash covers approximately 300 square feet of pen space.

"After it's dumped, it needs to be spread to a thickness of about 6 inches," Jaeger added. It then needs to be mixed in with the soil by

discing, and watered to keep the dust down. Optional follow-up includes going over the lot with a mulch shredder or roto-tiller.

Finally, "Additional water is then added to ensure that you get adequate compaction," Jaeger concluded. To ensure fly ash attaches to the soil in feedlot pens correctly, moisture needs to be added to the pens for five days following the fly ash application. Additionally, livestock and equipment need to be kept off pen surfaces for a minimum of 28 days.

Strategy 3: nutritional options

Though still in the early research stages, nutritional options are also being examined as a way to reduce feedlot odors. Zeolite, a volcanic mineral, can absorb ammonium and plant nutrients that contribute to cattle odor. Its chemical structure allows ammonium and plant nutrients to be released later when manure is applied to cropland.

Additionally, the identification of more digestible feedstuffs to reduce the amount of organic material that is deposited in the soil is being studied. Jaeger is working with Fort Hays State University chemist Eddie Olmstead to measure volatile organic acids to help determine which feedstuffs are best for reducing feedlot odor.



John Jaeger

The Right Seasoning

Studies at the Roman L. Hurska U.S. Meat Animal Research Center (MARC) near Clay Center, Neb., suggest reduction of manure odor could be a matter of adding the right seasoning. The key is thymol, a component of the aromatic oils found in herbal seasonings like thyme and oregano.

Thymol can be extracted from a variety of plants and produced synthetically as well. Its pleasant aroma and antiseptic properties make thymol a common ingredient in mouthwash and throat lozenges. When applied to manure, thymol reduces the production of volatile fatty acids responsible for odor. Thymol also kills pathogenic bacteria found in manure, including *E. coli* O157:H7.

According to MARC microbiologist Vince Varel, thymol curbs the volatilization of ammonia nitrogen and related compounds in manure. The microbial fermentation of waste is inhibited, thus reducing the production of gases suspected of contributing to global warming.

"Now, we're working with thymol in its solid form — a crystallized form. It can be applied to the pen surface, like the granules, where cattle step it into the manure," Varel explains. "Once it's mixed in, thymol attaches to waste solids. It won't wash away with liquid waste."

With regard to cost, Varel says it's too soon to come up with a hard figure. It appears that an effec-

tive treatment rate requires 2 grams (g) of thymol per kilogram (kg; 1 kg = 2.2 lb.) of manure. Thymol currently costs about 1¢ per g, which translates to about \$18.18 worth of thymol per ton of manure.

The concentration of applied thymol will diminish over time, so one application won't last forever. The frequency of application will vary with conditions such as frequency of rainfall. Managers may also find that spot treatment of only specific pens or feedlot problem areas is necessary.

For the article in full text, see "The Right Seasoning" in the May 2006 issue of the *Angus Journal*.

— by **Troy Smith**