Reducing feedlot odor could be a matter of ...

# The Right Seasoning


*by* ***Troy Smith***

One of the biggest challenges facing feedlot managers is waste management. We won't delve into the increasingly restrictive state and federal regulations with which concentrated animal feeding operations (CAFOs) must comply — that's another story. For now, just consider the challenge of managing the volume of manure produced by feedlot cattle.

Manure-measuring experts claim an average feedlot critter produces up to 350 pounds (lb.) of wet manure each week. That means 1,000 head of cattle will produce about 175 tons of the stuff weekly. If a feedlot's capacity is 20,000 or 50,000 head — well, you do the math.

Despite its value as a natural fertilizer, the handling and disposal of so much manure can be a big problem. Some large feedlots successfully manage their manure burdens by supplying area farmers with fertilizer. Some feedlots even develop companion enterprises by composting manure to market commercially as garden fertilizer. However, even if a feedlot operation develops a means for disposing its manure, the stuff still piles up long enough to raise a stink.

Neighbors sometimes object to that. Complaints about the smell might come from town folks who fled the city limits to build homes on rural acreages located downwind from a feedlot. In some cases, however, expansion of feedlot capacity can increase the intensity and duration of odor such that even longtime farm and ranch neighbors grumble about it.

But, there may be a way for feedlots to improve relations with their neighbors. U.S. Department of Agriculture Agricultural Research Service (USDA ARS) personnel are studying ways to quell the smell. Studies at the Roman L. Hruska 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.

## Environment experiment

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. Researchers have observed prolonged odor reduction effects when thymol is applied to manure storage pits on swine operations. But, storage pits provide a nearly oxygen-free, or anaerobic, environment. It's not so easy in a feedlot's aerobic environment.

Varel says feedlot experiments began with application of thymol to feedlot pen surfaces as a liquid spray. However, the liquid dissipated into the atmosphere too quickly to be effective. Better results came from application of thymol in a granule made of ground corncobs. The problem with that is the bulkiness of the carrier and, of course, using a carrier adds to the cost.

"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 effective 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.

Of course, 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. During periods of dry weather, the need for odor control is diminished. Managers may also find that spot treatment of only specific pens or feedlot problem areas is necessary.

"The value [of treatment with thymol] is likely to vary considerably, but some operations might easily justify spending a little money on odor control," Varel says. "But, we're looking at compounds that could be cheaper to use."

## Odor alternatives

One possible alternative is carvacrol, which is a substance made from the peels of citrus fruit. It represents essentially the same chemistry as thymol and works as well to reduce odor.

"Another possibility is a substance derived from pine trees — a byproduct of the pulp industry. It has been just as effective as thymol in the lab, so we are testing it in the feedlot," Varel adds. "It's much cheaper than thymol (a little more than one-tenth the cost) and, in the end, any treatment has to be cost-effective."

Thymol and possible alternatives are being evaluated for their potential as preharvest food safety interventions for control of pathogens contained in manure. Microbiologists Jim Wells and Elaine Berry have determined that thymol is effective against *E. coli* O157:H7 when applied at the same rate used for odor reduction. Wells says the research suggests *E. coli* concentrations of 1 million cells per g of manure can be reduced to undetectable levels within a few days after treatment with thymol. The other compounds possess pathogen-killing potential and are being studied to determine effective application rates.

"It is possible that Environmental Protection Agency (EPA) regulations could someday require producers to monitor levels of pathogens in manure and implement control interventions," Wells says. "We are looking for reasonable and affordable methods for meeting possible government mandates."