Composting hoop structure bedding/manure* (Sessions 1B and 3A)

PRESENTERS: Tom Richard,** Department of Agricultural and Biosystems Engineering, ISU; Chauncey Jorgensen,** caretaker, ISU Rhodes Research Farm, Rhodes; Cory Weichman, producer, Hubbard; Dan Wilson, producer, Paullina
MODERATOR: Greg Brenneman, ISU Extension agricultural engineer, East Central Area
RECORER: Kris Kohl, ISU Extension agricultural engineer, Northwest Area

Tom Richard has conducted composting research on ISU's Rhodes Research Farm using cornstalk-bedded manure from a finishing hoop. The manure is partially composted in the building. Manure inside the hooped structure varies in moisture content and nitrogen. The wet areas where pigs dung are high in nitrogen; dry areas are low in nitrogen.

Research has focused on several methods of building a compost pile. One method was to load the manure into a manure spreader and immediately unload it onto the ground. When the pile reached the top of the spreader, the spreader was pulled forward to form a windrow. This method breaks up chunks and mixes the manure. The other method was to remove manure with an end loader to form 6-ft. tall windrows, which is the method used by most farmers.

Richard used two turning schemes. In one scheme the windrow was turned whenever the core temperature reached 160°F. This required frequent turning, every day for two weeks. In the other scheme, manure was not turned.

The biggest challenge using this system to handle and compost manure is a significant loss of nutrients. Half of the nitrogen is lost in the building and an additional 50 percent of the nitrogen can be lost during composting. Most of the potassium is lost in runoff water from the compost pile or leaching from the building. The good news is that all of the phosphorus in the manure is retained in the compost.

Nitrogen in manure is in its organic form, so much more manure must be applied during the first few years of use in a field (possibly two to 10 times as much, and at least four times as much), compared to nonorganic nitrogen. Organic nitrogen becomes available to plants within 10 years after it is applied.

Manure that is turned more frequently has a greater nitrogen loss than manure that is not turned. Richard found that spreader-built windrows had slightly more nitrogen loss than loader-built windrows. Much of the potassium was lost to the soil under the pile.

Richard listed two valuable aspects of composting manure:
1) Uniformity—manure is more uniform after composting, and
2) Reduction in moisture and volume—the final product has a 14 to 23 percent reduc-
tion in moisture and a 24 to 45 percent reduction in volume.

He added that concentration of nitrogen also takes place, despite a 35 percent loss in nitrogen when the compost is turned (mostly due to volatilization of ammonia into the atmosphere).

Chauncey Jorgensen, who manages the composting project on a daily basis at the Rhodes Research Farm, described the turning process. Compost piles are turned by scraping material from the outside and pushing it over the top. The middle part of the unturned pile is then scraped to the outside. The pile is pushed back to its original site to accommodate the nitrogen monitoring equipment, which is located underneath the pile.

Piles are turned when the internal temperature reaches 160°F, which occurred every day or two for three weeks. Piles were turned frequently.

For new bedding, six large round bales are spread out and left for the pigs to break apart and spread inside the hoop building. Bales are tipped every few days to make sure pigs are not crushed underneath them. Two bales are added each week, placed between wet and dry areas. Temperature readings inside the hoop show some composting is taking place in the dry areas where temperatures reach 110°F.

All compost going to the field is easy to spread and breaks up nicely with no large chunks.

Cory Weichman uses hoop buildings and discussed his method of composting manure. He piles manure outside the building, where it composts in much the way that it does at the Rhodes Research Farm. He also composites his mortalities in the windrows and has been unable to find the carcasses when he hauls the composted manure to the field. Large sows may leave a grease spot after two to three months, but not much else.

He reports no problem with weeds after manure is composted, but he advised producers to keep weeds down near the composting area. He plans to continue composting and believes it is a good practice.

Dan Wilson uses hoop buildings and discussed his method of composting manure. He uses cornstalk and straw bedding, then composites the material similar to the way it has been composted at the Rhodes Research Farm.

He said that most of the time composting works well, but if the pile is turned too often, or is too wet, odor levels rise. He turns the pile about once every two weeks to a month.

Spreading manure on the field works better after it has been composted because stalks shatter. Cornstalks are tougher in raw manure, plus more chunks get in the field or wrap in the spreader. He plans to continue composting the material from his operation.

*This is a combination of two concurrent sessions on the same topic.
**Presenter at both concurrent sessions on this topic.