

Driftless Region Beef Conference 2013

Beef Manure in Deep Bedded Confinement

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Deep bedded housing is becoming more popular as a confinement option. Besides taking less space than sheltered open lots, the rate of gain is comparable and runoff isn't an issue. The costs of building tend to be less than slotted floor confinement, although there tended to be slightly less nutrients maintained in the bedded manure versus the pit waste. The chart below uses data from Purdue ID 101 to show the difference in nutrients lost in the manure in different housing systems.

	Percent Nutrients Lost		
	N	P2O5	K2O
Open lot	40-60%	20-40%	30-50%
Bedded pack	20-40%	5-10%	5-10%
Pit	15-30%	5-15%	5-15%

In samples taken at multiple operations, there was not a large difference in manure content from the samples taken from the pack, bedded apron, or from a stockpile. There were, however, differences between operations related to pack and overall management.

The type of bedding will alter the final nutrient content in the manure. Absorbency affects the amount needed. Oat straw and corn stalks are among the most absorbent, taking in up to three times their weight in water. Bedding that absorbs less liquid will require additional material to maintain dryness. High Carbon to Nitrogen ratio bedding, such as wood products, can alter the amount of Nitrogen available by tying it up in organic compounds.

Higher pen densities, while maximizing the use of space, require greater management. In ISU research trials, cattle performance was the same at 40, 45, and 50 square feet per head. However, as the area per head gets smaller, the bedding packs became harder to maintain. As the bedding becomes wetter, more nitrogen is lost through denitrification when oxygen starved bacteria pull oxygen from nitrate molecules allowing the release of nitrogen to the air.

Nutrient content will vary with the season. Cold weather decreases the amount of denitrification and volatilization of nitrates. Feed efficiencies and manure production change as the weather reaches extremes in moisture and temperature.

Feed formulation and bunk management may have a large impact on manure nutrients. Cattle will absorb the amount of nutrients they can use and pass the rest in their manure. Feed that is spilled and not eaten instantly contributes to manure nutrient variability.

Nutrients will be lost during storage in different ways. Stockpiles that are allowed to sit in the sun and rain have greater losses to volatilization and denitrification. Manure that is washed away takes the nutrients with it. Protecting the stockpile by placing it on areas safe from runoff is recommended. Covered storage reduces volatilization and denitrification.

With so many variables, it becomes difficult to use book values when figuring out rates for manure application to fields. The solution to this is TEST YOUR MANURE! Manure can be tested for N, P, and K for around \$30.00. There are several labs in the Midwest that will do this. Tests over 3 or 4 years will show a trend of nutrient composition if the overall management has been consistent. These values will help in planning application rates

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and get the most benefit out of the manure.

Finishing animals produce approximately 9800 pounds of manure in 153 days. This equates to almost 10 tons of manure per animal space in a facility if it is kept full year round. In a year, on average, 122 pounds of Nitrogen, 76 pounds of P₂O₅, and 88 pounds of K₂O are produced annually per animal space. At \$0.42/lb for commercial N, \$0.60/lb for P, and \$0.49/lb for K, the manure is worth almost \$140.00 per ton coming from the animal. With losses to volatilization and denitrification, as well as the dilution from bedding, actual value per ton will be less. Again, testing your manure will determine the real value.

Making the manure nutrients available in the field becomes the next consideration. Getting an even spread is important to giving all plants access to the N, P, and K from the manure. Calibrating manure equipment will aid in figuring out ground speed and PTO RPM's to achieve even application and get a consistent level on the field. Incorporation will not only increase nutrient retention, but will aid in improved distribution of the manure.

In beef manure, not all nutrients are available the first year. Generally, only 30-40% of the Nitrogen is available the first year with around 10% the second, and 5% the third. Some is tied up in organic forms so that it is never available. There is a 90-100% availability of K and 60-100% availability of P the first year. As an example, if manure was tested and the results came back at containing 18 pounds of Nitrogen, 10 pounds of Phosphorous, and 12 pounds of Potassium per ton, there would be only about 6 of N, 8 of P, and 11 pounds of K available the first year. If it was decided that Nitrogen was the nutrient most needed from the manure, application rates would be based on the amount of N is required to satisfy the crop requirements. If 120 pounds of nitrogen per acre is desired, then 20 tons of manure containing 6 pounds of available nitrogen that year would be used. The next year, there would be 10% of the nitrogen available or 20 tons x 1.8 lbs/ton which comes out to 36 pounds per acre from the first year's application. During the third year there would be 18 pounds per acre still available. Using current pricing for Nitrogen, this would be a \$73.08 benefit per acre from a one-time application of manure on corn on corn ground. Adding in the value of P and K used by the crop, the application becomes worth \$233.35 over three years.

There can be considerable value to manure from Deep Bedded Confinement facilities. Taking care to preserve the nutrients through proper management will maximize the benefit and value from this resource.