

Characteristics and value of manure from bedded confinement buildings for beef production

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Introduction

Bedded confinement buildings are being used more frequently for beef production in the Midwest. Due to higher commercial fertilizer prices, feedlot producers want to be able to manage manure nutrients for crop production. Knowing the amount of nutrients in the manure is the first step in this process. There has not been an effort to analyze manure samples from the bedded confinement buildings as a benchmark. This project aimed to characterize nutrient concentration and moisture of bedded manure from several operations using different management and various facilities over a six month time period from January to June of 2008.

Types of buildings and management represented in the survey

Twelve producers with bedded confinement buildings participated in this survey. All of the producers were including some distillers in the diets but actual % in the diet would vary. The range of CP in the diets was 11.2 % to 15.2 % and the range in phosphorus in the diets was .39% to .52% on a dry matter basis. The buildings included hoop structures and mono-slope type of facilities all with concrete floors. Some producers cleaned the entire pen weekly to biweekly and others maintained a manure pack during the sampling period. In those buildings with a pack there was an apron along the feed bunk that was cleaned weekly. In some facilities stockpiles of manure were established outside the cattle pen. In most cases one group of cattle were on feed during the sampling period.

Sampling and analysis

Pack or aprons in the pen and stockpiled areas were sampled separately. The pack and apron samples were taken from one pen at each operation over the time period. Several locations within each pen area were sampled, mixed, and then a small subsample taken of the mix for analysis. The pack samples were taken either using a core type device or a tined fork to get a sample representing a profile of the entire depth of the pack. Apron and manure without a bedded pack were sampled using a shovel to scrape several areas in a pen. Stockpile samples were taken by going from the surface of pack into a depth of 2 feet in several locations of the stockpile. Fifty six samples were obtained from January thru July of 2008 and analyzed for dry matter, total N, P₂O₅, K₂O, and S by a commercial laboratory. Twenty nine of the samples were analyzed for ammonia concentration. .

Summary of data

Dry matter was especially consistent among the samples. Although there was some variation in the nutrient concentrations, in this survey there were no statistical differences in nutrient concentrations due to the operation, location in the pen sampled, or date. However there was enough variation to suggest that you need to sample your own buildings to manage the manure nutrients effectively. These results would indicate that manure from bedded confinement facilities is a more consistent source of fertilizer nutrients for crop production as compared to open feedlot manure. The ammonia concentrations would suggest that approximately 18 % of the nitrogen in the manure was in an inorganic form.

Table 1 Means and Standard Deviation and ranges of manure characteristics analyzed

| Variable | Mean | Standard Deviation | Highest | Lowest |
|---------------------------------------|-------|--------------------|---------|--------|
| Dry matter | 30% | .9 % | 36% | 25% |
| N lbs/ton | 18 .3 | 4.13 | 15 | 29 |
| NH ₃ lbs/ton | 3.4 | 1.6 | 5.2 | 2.2 |
| P ₂ O ₅ lbs/ton | 9.7 | 2.7 | 12.9 | 6.9 |
| K ₂ O lbs/ton | 11.8 | 3.03 | 19 | 9.6 |

Nutrients captured in manure

The expected amount of nutrients in manure and amount of manure produced annually per space were calculated using ASAE Standard D384 for manure characteristics and an estimated pounds and nutrient concentration for the added bedding. The average concentration of nutrients in the samples compared to calculated values would indicate 82% of total N, 73% of P₂O₅, 56% of K₂O, excreted or added in the bedding were captured in the manure. There is likely some of the N that volatilizes from the manure but if there is no runoff then what happens to the lost phosphorus and potassium is a question.

Quantity of manure

The amount of manure was not determined in the survey but it we can calculate it using the estimated pounds of manure excretion and moisture content of manure plus the added bedding. Since the moisture content of the manure in the pen was fairly consistent the excreted manure and bedding were adjusted to 70% moisture. At 70 % moisture there should be about 30 lbs of manure per head per day or 2.3 tons/head for a 153 day feeding period. Annual this would amount to about 6 tons per head. However in one feeding period of 116 days in two different bedded buildings at the ISU Armstrong farm manure removed from each building was about 50 lbs per head per day.

Value of manure

If the prices of nutrients in commercial fertilizer are \$.28/lb N, \$.55/lb P₂O₅, \$.65/lb K₂O then on average the potential value of manure from the bedded buildings per ton is \$15. The breakdown of value per nutrient is \$2.00 for the N assuming 40% is available, \$5.30 for the P₂O₅ and \$7.67 for the K₂O. The capture this potential value the manure has to be applied where the nutrients are needed by the crops and credit for the nutrients in the manure decreases application of nutrients from commercial fertilizer.

Summary

It could be hypothesized that a greater amount of nutrients are captured in the confinement building manure as compared to an open lot since there is less exposure to rainfall, sunlight, drying and other environmental effects, plus more of the manure is actually captured for land application.