

A Survey of Manure Characteristics from Bedded Confinement Buildings for Feedlot Beef Production - Progress Report

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Summary and Implications

Manure nutrient concentrations and dry matter were consistent in three sources of manure samples evaluated from bedded beef feedlot confinement facilities. Manure from bedded confinement buildings for beef production can be a valuable, consistent source of nutrients for crop production.

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. This project aimed to characterize nutrient and dry matter concentration of bedded manure from several operations using different management and various facilities over a six month time period in winter and summer.

Materials and methods

Twelve producers with bedded confinement buildings participated in this survey. The buildings included hoop structures and mono-slope type of facilities. 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. The different locations in the pen or stockpile area were sampled separately. The pack and apron samples were taken from one pen over the time period. Several locations within each pen were sampled, mixed in a container 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. The

data were analyzed using the General Linear Models procedure of SAS 9.1. Variables accounted for in the analysis of variance were producer and manure type with sample date and percent dry matter serving as quantitative variables. Least square means are reported.

Results and Discussion

Means and standard deviation for dry matter and nutrient concentrations are shown in Table 1. Dry matter was especially consistent among the samples. Table 2 shows least square means for nutrient concentrations by location of the manure sample or manure type in the facilities. In this survey there were no significant differences in nutrient concentrations due to the source of the manure. These results would indicate that manure from bedded confinement facilities is a consistent source of fertilizer nutrients for crop production.

The expected amount of nutrients in manure and amount of manure produced annually per space was 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, and 75% of S of the nutrients excreted or added in the bedding were captured in the manure. The ammonia concentrations would suggest that approximately 18 % of the nitrogen in the manure was in an inorganic form.

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. Further work is being planned to measure actual amount of manure produced and the best management practices for utilizing the manure nutrients for crop production.

Table 1. Means and Standard Deviation of manure characteristics.

Variable	Mean	Standard Deviation
Dry matter	29.99	3.15
N lbs/ton	60.97	13.77
NH ₃ lbs/ton	11.31	5.24
P ₂ O ₅ lbs/ton	32.39	9.16
K ₂ O lbs/ton	39.45	10.11
S lbs/ton	7.88	1.48

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Table 2. Least square means of nutrient concentration by manure source.

Manure source	Pound per ton				
	N	NH ₃	P ₂ O ₅	K ₂ O	S
Apron	65.64	14.08	33.94	34.83	8.02
Pack	59.47	10.64	30.64	39.01	7.67
Stockpile	64.87	12.10	34.52	42.74	7.65

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