Growth Performance of Weaned Angus Bulls Housed in a Compost-Bedded Pack Barn

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ABSTRACT

Compost-bedded pack barns (CBP) are a typical facility utilized in dairy cattle operations across the United States. Their popularity is the result of improved animal welfare and reduced costs. The crossover of CBP into the beef cattle industry is new and the benefits and downfalls are not yet explored. Through a grant from NRCS, a CBP was built at the Derrickson Agricultural Complex in 2019-2020. In fall of 2020, the pack was established by mixing manure and sawdust shavings to start the aerobic composting process and weaned bulls were given access to the barn in November 2020. The objective of our study was to determine the performance of growing bulls utilizing a CBP compared to a fully outdoor pasture housing system. Growth data from 2 consecutive years of growing bulls were utilized, with calves born in 2019 being used as a control (CON) group and calves born in 2020 being used as the CBP group. Adjusted weaning and yearling weights reported to the American Angus Association were utilized to measure growth performance. In order to limit the potential bias due to genetics, data for the heifers born in both years were also evaluated as an outside standardization mechanism. Weaning weights for CON and CBP bulls were similar (P = 0.45), though interestingly the corresponding heifer calves weaned with CBP bulls were heavier (P < 0.01) than those weaned with the CON bulls. Bulls housed in the CBP were significantly heavier (P < 0.01) as yearlings compared to the CON bulls (1092 lbs. vs. 935 lbs., respectively). Our results suggest that utilizing a compost bedded pack barn during the winter growing phase may be beneficial to the producer by increasing growth potential of weaned calves.

INTRODUCTION

Within the livestock industry, housing systems vary based for numerous reasons including animal needs, environment, and costs. As livestock producers are looking for housing to improve animal welfare and comfort, the compost bedded pack barn (CBP) has gained widespread interest. The first CBP was designed in Virginia during the 1980s with improved cow comfort, longevity and low barn costs in mind (Wagner, 2002). Currently, CBP are primarily found in dairy cattle operations worldwide. According to Janni et al. (2006), CBP in the United States, have focused the management and design of CBP on heat production within the bedded pack. The heat found within the pack is due to the aerobic fermentation that occurs when urine and feces mix with organic materials (sawdust, straw). To aid the fermentation, the pack is mixed 1-3 times a day to support drying (Black et al., 2013; Eckelkamp et al., 2006). The cattle waste is composted and can remain as the bedding base in the CBP for 6-24 months (Janni et al., 2006; Black et al., 2014). Many housing systems require frequent waste removal to promote the cleanliness of the animal, however, through use of CBP, waste can be incorporated into the bedding while maintaining the hygiene of the animal. The addition of heat, sanitation, and management of waste while economical have driven non-dairy cattle producers to investigate the functionally and use of CBP in other livestock production systems.

OBJECTIVE & HYPOTHESIS

The objective of our study was to determine the performance of growing bulls utilizing a CBP compared to a fully outdoor pasture housing system. We hypothesized that the bulls housed in a CBP would have better growth performance due to the compost bedded pack barn's warmer and drier housing which required less energy use.

MATERIALS AND METHODS

- The purebred Angus herd at the Derrickson Agricultural Complex was used and all animals were weighed in the same facility
- 17 weaned bull calves were housed in the CBP from November 2020 through February 2021
- For comparison basis, weights from 16 bulls from Year 1 were used as control (CON)
- For genetic comparison, weights from 18 heifers (Year 1) and 19 heifers (Year 2) were used
- All cattle (CON and CBP) were fed *ad libitum* access to mixed grass hay and pasture. Additionally, they were offered a mixed grain at a rate of 5 lbs per head per day
- Weaning weights (WW) were measured in October (prior to entry into barn) and yearling weights (YW) were measured in February.
- Internal and surface temperatures of the CBP were taken in 10 different sections of the barn every Monday, Wednesday, and Friday since December 2020. These measurements were taken using an infrared thermometer with a thermometer probe.
- Pack samples were collected from 10 different sections of the barn and placed into a freezer every Monday.
- Statistical analysis was completed using the MIXED procedures of SAS

RESULTS

Table 1. Comparison of weaning and yearling weights of CON and CBP bulls along with heifers for genetic comparison.

	Year 1 CON	Year 2 CBP	Standard Error	P-Value
Bulls				
Weaning weight, lbs	678	690	11.4	0.45
Yearling weight, lbs	935	1092	19.5	<0.0001
Heifers				
Weaning weight, lbs	588	634	9.9	0.0018
Yearling Weight, lbs	842	905	17.7	0.0147

DISCUSSION

The temperatures and samples taken throughout the week are currently in progress and therefore not discussed in this poster. Bulls housed in the CBP had a heavier YW compared to the CON, as they gained more weight from the point of weaning (P < 0.0001). However, the CBP and CON bulls had similar WW (P = 0.45). This suggests the bulls performed at a higher level when housing in the CBP. To help clarify any possible genetic differences in the CBP and CON bulls, heifer WW and YW were also measured and evaluated. Considering there had been improvement in the heifer's WW and YW in Year 2 it can be suggested that some of the weight gain in both heifers and bulls could be attributed to genetics. Based on the percent difference between the years, the possible genetic difference is not the only reason for the change in performance. The clearly significant yearling weight difference between CON and CBP ultimately supports the CBP success. The general appearance and health of the bulls would also support this conclusion.

CONCLUSION

A barn with the ability to help improve cattle performance is a highly valuable asset to any farm. This is important when raising beef animals, as a higher rate of gain indicates a better feed efficiency and use of resources. Management strategies are typically the best course of action to increase rate of gain. The management strategy we tested was a housing system to keep the bulls cleaner and more comfortable. Our hypothesis was proven as we found that yearling bulls living in the CBP had heavier weights compared to bulls without access to a CBP. This housing will not only benefit the physical comfort and health of the bulls themselves, but through better growth rates the producer will benefit too.

LITERATURE CITED

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