Effects of pen cleaning on feedlot performance and carcass characteristics of beef steers fed during the winter in the northern Great Plains

Neville, B.W., R.L. Moore, and W.J. Rodehorst
NDSU Carrington Research Extension Center, Carrington, North Dakota USA

ABSTRACT:

The objective of this study was to evaluate the impacts of winter pen cleaning on livestock performance of beef cattle fed to finish in the Northern Great Plains. One-hundred fifty-six mixed-breed beef steers (284 ± 14 kg) were assigned to one of 12 pens. Treatments were assigned randomly to pen and consisted of: 1) Control - no cleaning, 2) Apron - bunk aprons (approximately 3 m behind the bunk) cleaned twice throughout the study, and 3) Full - entirety of the pen cleaned twice throughout the study. Full pens or bunk aprons were cleaned on two occasions at 56-day intervals. Pens were stocked at a similar density, approximately 26.9 m^2 of pen space per steer. Steers were adapted to and finished a common finishing diet. Cattle were provided fresh bedding weekly, with an estimated 2.5 kg cereal straw·steer^{-1}·d^{-1} used as bedding during the study. Pen cleaning did not influence ($P \geq 0.48$) final body weight (628 ± 12 kg), or average daily gain (1.8 ± 0.03 kg/d). Dry matter intake (10.6 ± 0.24 kg) and feed efficiency (0.167 kg gain:kg dry matter intake) were similar ($P \geq 0.55$) across treatment. Hot carcass weight, ribeye area, back fat and yield grade of carcasses were not affected ($P \geq 0.44$) by pen cleaning treatment. Increasing extent of pen cleaning increased marbling score ($P = 0.03$; 444, 463, and 484 ± 11.1 for control, apron, and full, respectively). Quality grade was greater ($P < 0.05$) in carcasses resulting from steers managed with either pen cleaning strategy compared to control. Further, increasing extent of pen cleaning increased ($P = 0.03$) quality grade of carcasses. Pen cleaning did not improve animal performance in this study, which was unexpected. Further research on the accumulation of marbling over time with different pen cleaning systems is warranted.

INTRODUCTION:

Adverse winter weather conditions negatively affect cattle performance. Management strategies including bedding and providing wind protection have improved feedlot performance during winter feeding in the northern Great Plains. Muddy feedlot conditions decrease feedlot performance (Mader, 2011). Pen Cleaning may improve livestock performance by reducing energy expenditures for maintaining body temperature. The objectives of this research were to evaluate extent of pen cleaning on feedlot performance and carcass characteristics of steers fed in the northern Great Plains during the winter.

PROCEDURES:

- 156 mixed-breed beef steers were utilized
  - 12 pens (n = 4)
  - Pen served as Experimental Unit
- Treatments
  - Control = No Cleaning
  - Apron = Bunk aprons cleaned on two occasions
  - Full = Entire pen cleaned on two occasions
- Cleaning events occurred on 56d intervals
- 26.9m^2 of pen space per steer was provided
- Two-day body weight (BW) were collected at the initiation and conclusion of the study
- Cattle were provided a common finishing ration
- Bedding provided as needed
  - Average of 2.5 kg cereal straw·steer^{-1}·d^{-1}
- Carcass data was collected
- Statistical Contrast Statements:
  - Con vs Clean = Control vs. Apron and Full
  - Extent = Control vs. Apron vs. Full

RESULTS:

Table 1. Impacts of pen cleaning on feedlot performance and carcass characteristics of steers.

	Treatment					Contrasts	
	Control	Apron	Full	SEM	*P*-value	Con vs. Clean	Extent of Cleaning
Feedlot Performance							
Initial BW, kg	284.7	283.5	283.7	13.73	0.99	0.95	0.99
Final BW, kg	631.6	621.6	631.2	12.06	0.81	0.73	0.59
ADG, kg	1.78	1.74	1.78	0.03	0.48	0.56	0.98
DMI, kg	10.5	10.6	10.6	0.24	0.94	0.77	0.89
G:F	0.170	0.163	0.169	0.004	0.55	0.48	0.84
Carcass Characteristics							
HCW, kg	380.2	376.5	383.1	7.02	0.81	0.96	0.78
Ribeye area, cm^2	85.2	84.5	84.5	1.81	0.97	0.87	0.83
Back Fat, cm	1.27	1.17	1.27	0.064	0.44	0.43	0.85
Marbling Score[1]	444	463	484	11.1	0.09	0.06	0.03
Quality Grade[2]	9.9	10.2	10.4	0.13	0.09	0.05	0.03
Yield Grade	3.1	3.0	3.1	0.10	0.46	0.67	0.82

[1] Marbling score based on 400 = Small[00]
[2] Quality grade based on low choice = 10, high prime = 15.

CONCLUSION:

It was unexpected that feedlot performance was not improved by pen cleaning. It is possible that the relatively light stocking rates may have negated the potential differences in live-animal performance. The abundance of bedding provided may have also lessened the impacts of deteriorating pen conditions. The improvements in marbling score appear to indicate that pen cleaning did improve carcass quality. Future research evaluating accumulation of marbling across the feeding period and it relationship to cleaning events and pen conditions would be beneficial. Research on the combined impacts of stocking density and cleaning frequency would also prove useful for feedlot operations.

LITERATURE CITED:

Mader, T.L. 2011. Mud effects of feedlot cattle. 2011-Nebraska Beef Cattle Report. 82-83.