

Beef Cattle Feeding in a Bedded Hoop Barn: Three Year Summary

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Introduction

Iowa's beef cattle industry is comprehensively evaluating the environmental management of feedlots. As the Iowa cattle feeding industry focuses on environmental management, there has been increasing interest in systems where runoff is minimized, such as a bedded hoop barn. A three-year study evaluating the performance of yearling steers in a bedded hoop barn was conducted.

Materials and Methods

A 50 × 120 foot hoop barn was constructed at the ISU Armstrong Research Farm in the late fall of 2004. The building houses 120 head in three pens. A description of the building is reported in the Animal Industry Report (ASL-2000) and Hoop Barns for Beef Cattle (MidWest Plan Service AED-50). A feed bunk is along the east side of the hoop barn. Both ends of the hoop barn are open. During the winter, large round bales are stacked three high across the north and south end of the hoop barn for a partial windbreak. Slightly more than half of each end at ground level is blocked. The comparison feedlot is a semi-confinement outside lot with shelter that includes a drive-through feed alley. This facility includes three pens, each with a capacity of approximately 40 head per pen. In summer 2005, a 3-year experiment began comparing the two facilities with two groups of yearling steers each year.

Each year of the three-year study, two groups of yearling steers were fed. The summer/fall groups were put on test in August and marketed in November. The winter/spring groups were put on test in December and marketed in April/May. The steers were randomly allotted to pens within each housing treatments. There were approximately 40 head of steers per pen.

The hoop barn apron was scraped weekly and bedding was added. Bedding was added as whole large round bales of cornstalks with the net wrap removed. The semi-confinement feedlot was not cleaned or bedded during the summer/fall group. During the winter, the area in front of the bunks was scraped every 2 to 3 weeks as needed. When the cattle were started in the semi-confinement for the winter/spring groups, bedding was used.

The diet fed was 78% dry corn, 17% ground hay, and 5% supplement on a dry matter basis. Water was added to the diet to improve mixing. Performance, carcass, labor, and bedding use data were collected. Means by housing type and housing type by season are presented.

Results and Discussion

Cattle performance by housing type is shown in Table 1. Cattle were fed for 103 days on average. There were no differences for gain, average daily gain, average daily feed intake, or feed/gain ratio ($P > 0.05$). Final mud scores were greater for the feedlot cattle compared with the hoop cattle ($P \leq 0.02$). The added mud for the feedlot cattle may have increased the final weight. If the final weight of the feedlot cattle is adjusted to a standard yield of 62% (equal to the hoop cattle), the numerical performance differences by housing type

disappear (calculated data not shown). The carcass characteristics by housing type are shown in Table 2. There were no differences in fat cover, ribeye area, marbling, quality grades, or yield grades by housing type ($P > 0.05$).

Results of cattle performance by housing type and season are shown in Table 3. Cattle were fed an average of 95 days in the summer/fall trials and 110–111 days in the winter/spring trials. Average daily gain and average daily feed intake was similar for the two housing systems ($P > 0.01$). Feed efficiency was also similar ($P > 0.01$). Table 4 presents the carcass data by season and housing type. Yield, fat cover, KPH fat, ribeye area, and marbling score did not differ between the housing systems ($P > 0.01$). Table 5 is a summary of labor and bedding use by system and season. As expected the deep-bedded hoop system used more bedding than the semi-confinement

lots. The bedded hoop barn required about 5 to 6 lb of cornstalk bedding per day that the steers were on feed. The winter/spring feeding group used the amount of bedding at the higher end of this range. Labor for cleaning and bedding averaged 21 to 23 hours per group regardless of housing system.

Overall the cattle performed similarly with similar carcass data for both housing systems. The hoop cattle had less mud at market than the feedlot cattle. Therefore, in Iowa, yearling cattle fed in a bedded confinement hoop barn performed similarly to cattle fed in a semi-confinement feedlot.

Acknowledgements

The project was supported by the Iowa Cattlemen's Foundation, the Leopold Center for Sustainable Agriculture, and personal donations of many western Iowa cattle feeders.

Table 1. Performance of yearling steers in a hoop confinement barn and semi-confinement lots.

Item	Unit	Hoop	Feedlot	SEM	P-value
Pens	--	18	18	--	--
Head (start)	hd	712	716	--	--
Head (end)	hd	709	715	--	--
Days on test	d	103	103	.9	0.62
Initial weight	lb	904	905	11	0.94
Final weight	lb	1,311	1,350	11	0.32
Gain	lb	407	421	7	0.16
Avg. daily gain	lb/d	4.0	4.1	0.6	0.19
Avg. daily feed intake (100% dm)	lb/d	27.5	27.5	0.3	0.98
Feed/gain (100% dm)	lb/lb	6.9	6.7	0.1	0.17
Final mud score (1=clean, 5=dirty)	1–5	1.9	2.2	0.1	0.02

Table 2. Carcass characteristics of yearling steers in a hoop confinement barn and semi-confinement lots.

Item	Unit	Hoop	Feedlot	SEM	P-value
Hot carcass	lb	813	818	6	0.59
Yield	%	62.0	60.6	--	--
Fat thickness	in.	0.43	0.43	0.01	0.92
Kidney/pelvic/heart fat	%	2.4	2.4	0.01	0.99
Ribeye area	in. ²	13.2	13.1	0.1	0.38
Marbling score ¹		1031	1027	.5	0.61
Choice or better	%	75.4	74.3	2.7	0.78
Yield grade, 1 and 2	%	63.4	62.9	2.7	0.94

¹Marbling score scale: slight = 900, small = 1000, and modest = 1100.

Table 3. Seasonal performance of yearling steers in a hoop confinement barn and semi-confinement lots.

Item	Unit	Summer/fall ¹		Winter/spring ²		SEM	P-value
		Hoop	Feedlot	Hoop	Feedlot		
Pens		9	9	9	9	--	--
Head (start)	hd	352	356	360	360	--	--
Head (end)	hd	349	355	360	360	--	--
Days on test	d	95	95	110	111	1	0.62
Initial weight	lb	924	925	885	886	15	0.98
Final weight	lb	1,328	1,341	1,295	1,311	15	0.94
Gain	lb	404	417	410	426	9	0.90
Avg. daily gain	lb/d	4.3	4.4	3.7	3.9	0.1	0.85
Avg. daily feed intake (100% dm)	lb/d	28.1	28.3	26.8	26.7	0.4	0.68
Feed/gain (100% dm)	lb/lb	6.6	6.4	7.2	7.0	0.2	0.80
Final mud score (1=clean, 5=dirty)	1-5	1.5	1.7	2.3	2.7	0.1	0.38

¹Summer/fall groups started on test in August and were marketed in November.

²Winter/spring groups started on test in December were marketed in April/May.

Table 4. Seasonal carcass characteristics of yearling steers in a hoop confinement barn and semi-confinement lots.

Item	Unit	Summer/fall ¹		Winter/spring ²		SEM	P-value
		Hoop	Feedlot	Hoop	Feedlot		
Hot carcass weight	lb	822	826	804	810	9	0.94
Yield	%	61.9	61.6	62.1	61.8	--	--
Fat thickness	in.	.42	.42	.43	.43	0.01	0.76
Kidney/pelvic/heart fat	%	2.7	2.7	2.2	2.2	0.1	0.85
Ribeye area	in. ²	13.3	13.2	13.0	13.0	0.1	0.31
Marbling score ³		1028	1024	1033	1031	7	0.86
Choice or better	%	77	72	74	76	4	0.38
Yield grade, 1 and 2	%	63	66	63	59	4	0.36

¹Summer/fall groups started on test in August and were marketed in November.

²Winter/spring groups started on test in December were marketed in April/May.

³Marbling score scale: slight = 900, small = 1000, and modest = 1100.

Table 5. Seasonal labor and bedding use in a hoop confinement barn and semi-confinement lots.

Item	Unit	Summer/fall ¹		Winter/spring ²	
		Hoop	Feedlot	Hoop	Feedlot
Bedding	lb/hd/d	5.0	0.0	5.7	2.2
Bedding	lb/lb gain	1.3	0.0	1.6	0.6
Labor ³ (cleaning/bedding)	hr/group	21.2	9.1	22.5	28.7

¹Summer/fall groups started on test in August and were marketed in November.

²Winter/spring groups started on test in December were marketed in April/May.

³In 2005, due to sudden cold weather, the feedlot was not cleaned after the summer/fall group. The manure for the summer/fall group was removed after the winter/spring group, thus the winter/spring feedlot labor is the labor to remove the manure for three groups.