

Effects of Stocking Density on Steer Performance and Carcass Characteristics in Bedded Hoop and Open Front Confinement Facilities: Progress Report

A.S. Leaflet R2509

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Summary and Implications

Interest in feeding cattle in bedded confinement facilities has grown in part due to increased regulations regarding open feedlot runoff. Work in Iowa has documented that cattle confined in a bedded hoop barn perform similarly to cattle fed in an open feedlot with shelter. The work was done with a stocking density of 50 sq ft per steer in the bedded hoop barn. A hoop barn is a more expensive facility system compared with open lot configurations. Fixed costs (facilities) are partially determined by stocking density. The objective of this study was to determine the effects of increased stocking density on performance and carcass characteristics of steers fed in bedded hoop and bedded open front facilities.

The trials were conducted in 2008 and 2009 at the ISU Armstrong Research Farm, Lewis, IA. The hoop barn was stocked with 40, 45, and 50 head per pen resulting in 50, 45, and 40 sq ft per steer, respectively. In the open front cattle feeding facility, pens were constructed to confine the cattle on concrete with bedding. Again the stocking density was 50, 45, and 40 sq ft per steer. In all trials, there was one stocking density per housing type per trial. The diet fed was 45.0% dry corn, 14.8% ground hay, 36.8% modified distillers grains, and 3.4% supplement on an as fed basis. The total diet was approximately 69% dry matter.

Because the project is on going, no statistical analysis was performed. However, the cattle performance and carcass characteristics seemed to be similar across all facilities and stocking densities. There may be a trend for slightly less average daily gain for the highest stocking densities (6% less in the hoop and 3% less in the open front). Bunk space may be a factor in cattle performance as well as density. However, without more replications and statistical analysis, no conclusions can be made at this time.

Introduction

Interest in feeding cattle in bedded confinement facilities has grown in part due to increased regulations regarding open feedlot runoff. Work in Iowa has documented that cattle confined in a bedded hoop barn perform similarly to cattle fed in an open feedlot with shelter. Cattle fed in the hoop barn carried less mud than

cattle in the feedlot. The work was done with a stocking density of 50 sq ft per steer in the bedded hoop barn. The hoop barn is a more expensive facility system compared with open lot configurations. Fixed costs (facilities) are partially determined by stocking density. The more steers in a given facility, the lower per steer cost of the facility. Therefore, the objective of this study was to determine the effects of increased stocking density on performance and carcass characteristics of steers fed in bedded hoop and bedded open front facilities.

Materials and Methods

The trials were conducted in 2008 and 2009 at the ISU Armstrong Research Farm, Lewis, IA. The hoop barn (50 x 120 ft) had three pens with fenceline bunk and automatic waterers. The hoop barn is described in Hoop Barns for Beef Cattle (MidWest Plan Service AED-50) or a prior Animal Industry Report (ASL-R2000). The hoop barn was stocked with 40, 45, and 50 head per pen resulting in 50, 45, and 40 sq ft per steer, respectively. Although our earlier work did not document any pen effects, we wanted to minimize and balance any effects of the pens. The three pens are—a north end pen, a middle pen, and a south end pen. Total bunk space was the same for each pen.

Also, in the open front cattle feeding facility, pens were constructed to confine the cattle on concrete with bedding. Again the stocking density was 50, 45, and 40 sq ft per steer. However, the 45 and 40 sq ft densities were only fed for two trials rather than three trials. Because the pens were smaller in the open front facility, there were 26, 28, and 32 steers per pen for the 50, 45, and 40 sq ft stocking densities, respectively. Because of the fewer cattle per pen, the total bunk space was reduced so that the bunk space per steer was equal for all pens. To minimize pen effects, the pens of cattle were rotated to a different pen within the hoop barn at each weigh day (approximately every 28d). In all trials, there was one stocking density per housing type per trial.

The pens were bedded with cornstalks and cleaned as needed. If any pen needed bedding, all pens in both facilities were bedded. Cattle were fed once daily. The diet fed was 45.0% dry corn, 14.8% ground hay, 36.8% modified distillers grains, and 3.4% supplement on a dry matter basis. The total diet was approximately 69% dry matter. Performance and carcass data were collected. Means by housing type by stocking density are presented. The experimental unit was a pen of steers. The project will continue in order to generate more replications and improve the ability to detect differences.

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Results and Discussion

Cattle performance and carcass characteristics by housing type and stocking density are shown in Table 1. Cattle were fed for 116-118 days from 864-871 to 1278-1304 lb liveweight. Because the project is on going, no statistical analysis was performed. However, the cattle performance and carcass characteristics seem to be similar across all facilities and stocking densities. There may be a

trend for slightly less average daily gain for the highest stocking densities (6% less in the hoop and 3% less in the open front). Bunk space may be a factor in cattle performance also. However, without more replications and statistical analysis, no conclusions can be made at this time.

Table 1. Performance and carcass characteristics of steers fed at various stocking densities in bedded confinement facilities.

Facility type	Hoop			Open-front		
Treatment, sq ft per steer	50	45	40	50	45	40
Cattle per pen, hd	40	45	50	26	28	32
No. of pens	3	3	3	3	2	2
Head (start)	120	135	150	78	56	64
Head (end)	120	135	149	78	54	64
Days on feed	116	116	116	116	118	118
Start weight, lb	868	864	868	870	867	871
End weight, lb	1304	1289	1278	1301	1292	1294
Gain, lb	436	425	410	431	425	423
Avg. daily gain, lb/hd/d	3.76	3.67	3.54	3.70	3.60	3.59
Dry matter intake, lb/hd/d	27.9	28.8	27.0	28.3	26.6	26.7
Feed/gain, lb dm/lb gain	7.51	7.95	7.67	7.68	7.47	7.49
Mud score ^a	2.23	2.04	2.36	2.26	2.13	2.36
Carcass weight, lb	806	801	796	805	802	804
Yield, %	61.8	62.2	62.3	61.8	62.1	62.2
Fat cover, in.	0.44	0.45	0.45	0.48	0.46	0.48
Kidney/pelvic/heart fat, %	2.10	2.10	2.02	2.10	1.88	1.88
Rib eye area, in. ²	12.99	12.87	13.10	12.92	12.55	12.70
Marbling score ^b	1019	1020	1015	1015	1018	1013
Choice or better, %	62.5	65.9	58.4	52.6	68.3	59.4
Yield grade 1 and 2, %	46.7	45.9	57.7	46.2	59.3	50.0

^aClean = 1, 5 = dirty.

^bMarbling score scale: slight = 900, small = 1000, and modest = 1100.