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Effect of Feeding Procedure and Intake Level on Steer Feedlot Performance and Carcass Composition: A Progress Report

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Abstract
Two feedlot trials were conducted to evaluate the effects of feeding frequency (once daily in the morning, once daily in the afternoon or twice daily) and feeding level (ad libitum, 95% of ad libitum, or 90% of ad libitum) on the feedlot performance and carcass composition of beef steers. Data were collected using 196 yearling beef steers. In both trials cattle fed once daily in the morning tended to have higher gains and better feed efficiencies than cattle fed once daily in the afternoon or cattle fed twice daily. Overall, cattle restricted to 95% and 90% of ad libitum intake levels had better feed efficiencies than cattle with ad libitum access to feed. Cattle fed once daily in the morning tended to have less backfat than cattle fed once daily in the afternoon or cattle fed twice daily.

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Summary

Two feedlot trials were conducted to evaluate the effects of feeding frequency (once daily in the morning, once daily in the afternoon or twice daily) and feeding level *(ad libitum, 95%* of *ad libitum,* or 90% of *ad libitum)* on the feedlot performance and carcass composition of beef steers. Data were collected using 196 yearling beef steers. In both trials cattle fed once daily in the morning tended to have higher gains and better feed efficiencies than cattle fed once daily in the afternoon or cattle fed twice daily. Overall, cattle restricted to *95%* and 90% of *ad libitum* intake levels had better feed efficiencies than cattle with *ad libitum* access to feed. Cattle fed once daily in the morning tended to have less backfat than cattle fed once daily in the afternoon or cattle fed twice daily.

Introduction

In this progress report comparisons will be made between feeding cattle only once per day either in the morning or the afternoon and feeding cattle twice daily. The purpose of this study was to determine what effect the time of day cattle are fed had on their overall performance and carcass characteristics at three different feed intake levels.

Materials and Methods

Trial one was begun November 9, 1993 at the Western Iowa Research Center at Castana, Iowa. Eighty-four British crossbred yearling steers with an average weight of 863 pounds were implanted with CompudoseTU, injected with Ivomec™ and placed into 12 pens of seven animals each. Trial two was begun November 1, 1994. One hundred twelve British crossbred yearling steers with an average weight of 753 pounds were implanted with Compudose™, injected with Ivomecm and placed into 16 pens of seven animals each.

In each trial a pen of steers was assigned at random to a feeding frequency and intake level. There were three feeding frequencies: 1) feeding once per day at 8 am, 2) feeding once per day at 4 pm or 3) feeding twice per day at 8 am and 4 pm. The feed intake levels were *ad libitum*, 95% of *ad libitum* and 90% of *ad libitum*

All steers were fed a corn grain and chopped alfalfa hay diet. The 89% concentrate ration was supplemented with an urea-based 40% crude protein, vitamin and mineral premix. Molasses was added to control dust and increase palatability. Feed allotments were determined daily prior to the morning feeding.

Steers were housed in pens with concrete floors and access to shelter at the north end. Steers were fed in fence-line concrete bunks and one automatic waterer was shared between every two pens.

Steers were weighed individually every 28 days during each trial. Average daily gain and feed conversion were determined by adjusting each steer's flnal live weight to a constant dressing percentage of 61.5%. When pens of cattle reached about 1,235 pounds average live weight they were processed at IBP in Denison, IA. Backfat and loineye area were measured on the left half of each carcass between the 12th and 13th ribs after a 24-hour chill. Carcass grades were provided by the USDA Meat Grading Service.

Results and Discussion

Feedlot Performance

In trial one cattle fed once daily in the morning (Table 1), tended to have higher gains when averaged across feeding levels than cattle fed once daily in the afternoon or cattle fed twice daily (3.19 vs 2.85 and 3.04 lb, respectively). Likewise, cattle fed once daily in the morning had better feed efficiencies than cattle fed once daily in the afternoon or cattle fed twice daily (7.83 versus 8.75 and 8.25 lb DM/lb gain, respectively). Cattle restricted to 90% of *ad libitum* intake levels had the highest gains for cattle fed once daily in the morning. Cattle with *ad libitum* access to feed had the highest gains of cattle fed once daily in the afternoon. Restricting cattle to 95% of *ad libitum* provided the best gains in cattle fed twice daily. Overall, cattle restricted to 95% and 90% of *ad libitum* intake levels had better feed efficiencies than cattle with *ad libitum* access to feed. In trial two cattle fed once daily in the morning had the highest average rate of gain for the feeding period (Table 2; 3.59 lb/day). Daily dry matter intake values were similar between feeding frequencies; consequently, cattle fed once daily in the morning had better feed efficiencies (7.07 lb DM/lb gain) than cattle fed once daily in the afternoon (7.22) or cattle fed twice daily (7.47). Cattle with *ad libitum* access to feed had the highest daily gains for the once-daily morning-fed cattle, similar to trial one. Restricting cattle to 95% of *ad libitum* provided the best gains in cattle fed twice daily, again similar to trial one. Overall, cattle restricted to 95% and 90% of *ad libitum* intake levels had better feed efficiencies than cattle with *ad libitum* access to feed.

Carcass Composition

In the first trial, when averaged across all feeding levels, cattle fed once daily in the morning had higher dressing percentages (60.17%) than cattle fed once daily

in the afternoon (59.88%) or cattle fed twice daily (58.92%, Table 3). Cattle fed once daily in the morning had larger loineye areas and less backfat versus cattle fed once daily in the afternoon or cattle fed twice daily. As a result, cattle fed once daily in the morning had lower yield grades. Ouality grades for once-daily morning-fed cattle were intermediate to quality grades of cattle fed at the other two frequencies. Feeding levels tended to have less impact upon yield and quality grades.

In the second study, across all feeding levels, cattle fed twice daily had a higher dressing percentage (61.78%) than cattle fed once daily in the morning (60.58%) and once daily in the afternoon (59.18; Table 4). However, as in trial one, cattle fed once daily in the morning were leaner (0.35 vs 0.37 vs 0.48 in, respectively). There was little difference between feeding frequencies in the loineye area or liver weight means across feeding levels. Cattle fed once daily in the morning and twice daily tended to have higher quality grades on average. The aveMge quality grade for cattle fed once daily in the morning and twice daily was low Choice, while the average quality grade for cattle fed once daily in the afternoon was high Select.

Feeding level had little impact on dressing percentage, loineye area, liver weight, or yield grade. Cattle restricted to 90% of *ad libitum* had less backfat (0.37 in) than cattle fed *ad libitum* (0.41 in) or 95% of *ad libitum* (0.42 in). Cattle restricted to 95% and 90% of *ad libitum* had better quality grades (low Choice) on average versus cattle fed *ad libitum* (high Select).

Implications

Based upon the preliminary findings of this study, feeding steers once daily in the morning versus feeding once daily in the afternoon or feeding twice daily could result in increased average daily gain and improved feed effciency, while at the same time improving carcass composition through reduced fatness and still maintaining quality grade.

Acknowledgments

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Table 1. Feedlot performance data for trial one.

Feeding frequency	Item	Feeding levels *Adlibitum*	95%	90%	Avg
	Initial wt, lb	863.57	863.57	860.71	862.62
	Final wt[a], lb	1,263.64	1,203.25	1,227.92	1,231.60
Once daily	Daily DMI, lb	26.36	25.25	23.14	24.92
in am	ADG, lb	3.20	3.06	3.31	3.19
	FE, DM/lb	8.24	8.25	7.00	7.83
	Initial wt, lb	862.86	867.86	860.00	863.57
	Final wt[a], lb	1,229.50	1,191.40	1,236.47	1,219.12
Once daily	Daily DMI, lb	26.36	25.25	23.26	24.96
in pm	ADG, lb	2.93	2.91	2.71	2.85
	FE, DM/lb	8.99	8.66	8.59	8.75
	Initial wt, lb	862.72	862.50	863.22	862.81
	Final wt[a], lb	1,218.78	1,234.94	1,188.32	1,214.01
Twice daily	Daily DMI, lb	26.44	25.25	23.22	24.97
	ADG, lb	3.01	3.36	2.76	3.04
	FE, DM/lb	8.80	7.53	8.42	8.25
	Initial wt, lb	863.05	864.64	861.31	
	Final wt[a], lb	1,237.31	1,209.86	1,217.57	
Avg.	Daily DMI, lb	26.39	25.25	23.21	
	ADG, lb	3.05	3.11	2.93	
	FE, DM/lb	8.68	8.15	8.00	

[a] Final weights are adjusted to a constant dressing percentage (61.5%).

Table 2. Feedlot performance data for trial two.

Feeding frequency	Item	Feeding levels *Ad libitum*	95%	90%	Avg
	Initial wt, lb	752.29	753.15	748.29	751.24
	Final wt[a], lb	1,231.93	1,230.78	1,250.88	1,237.86
Once daily	Daily DMI, lb	26.68	25.35	23.94	25.32
in am	ADG, lb	3.84	3.63	3.29	3.59
	FE, DM/lb	6.95	6.98	7.28	7.07
	Initial wt, lb	753.14	750.71	756.27	753.37
	Final wt[a], lb	1,228.75	1,209.76	1,224.16	1,220.89
Once daily	Daily DMI, lb	26.42	25.05	23.85	25.11
in pm	ADG, lb	3.61	3.14	3.74	3.50
	FE, DM/lb	7.32	7.98	6.38	7.22
	Initial wt, lb	755.07	756.72	753.29	755.03
	Final wt[a], lb	1,250.31	1,216.60	1,273.06	1,246.66
Twice daily	Daily DMI, lb	26.43	25.26	23.87	25.19
	ADG, lb	3.24	3.49	3.40	3.38
	FE, DMllb	8.16	7.24	7.02	7.47
	Initial wt, lb	753.5	753.53	752.62	
	Final wt[a], lb	1,237.00	1,219.05	1,249.37	
Avg	Daily DMI, lb	26.51	25.22	23.89	
	ADG, lb	3.56	3.42	3.48	
	FE, DM/lb	7.47	7.40	6.89	

[a] Final weights are adjusted to a constant dressing percentage (61.5%).

Table 3. Carcass data for trial one.

Feeding frequency	Item	Feeding levels *Ad libitum*	95%	90%	Avg
	Final wt[a], lb	1,263.64	1,203.25	1,227.92	1,231.60
	Hot carcass wt, lb	777.14	740.00	755.17	757.44
Once daily	Dressing %	60.55	59.49	60.47	60.17
in am	Backfat, in	0.33	0.34	0.40	0.36
	LEA, sq in	13.43	13.09	12.27	12.93
	Liver wt, lb	15.03	14.93	15.17	15.04
	Yield grade	2.00	2.00	2.17	2.06
	Quality grade[b]	6.57	6.29	6.33	6.40
	Final wt[a], lb	1,229.50	1,191.40	1,236.47	1,219.12
	Hot carcass wt, lb	756.14	732.71	760.43	749.76
Once daily	Dressing %	59.68	58.96	61.01	59.88
in pm	Backfat, in	0.37	0.56	0.54	0.49
	LEA, sq in	12.74	12.06	12.24	12.35
	Liver wt, lb	14.93	14.76	15.01	14.90
	Yield grade	2.14	2.43	2.29	2.29
	Quality grade[b]	6.43	6.71	6.43	6.52
	Final wt[a], lb	1,218.78	1,234.94	1,188.32	1,214.01
	Hot carcass wt, lb	727.71	759.49	727.14	738.11
Twice daily	Dressing %	58.56	59.59	58.61	58.92
	Backfat, in	0.45	0.42	0.42	0.43
	LEA, sq in	12.06	12.27	12.47	12.27
	Liverwt, lb	14.51	15.26	14.41	14.73
	Yield grade	2.32	2.32	2.07	2.24
	Quality grade[b]	6.24	6.10	6.26	6.20
	Final wt[a], lb	1,237.31	1,209.86	1,217.57	
	Hotcarcasswt, lb	753.66	744.07	747.58	
Avg	Dressing %	59.60	59.35	60.03	
	Backfat, in	0.38	0.44	0.45	
	LEA, sq in	12.74	12.47	12.33	
	Liver wt, lb	14.82	14.98	14.86	
	Yield grade	2.15	2.25	2.18	
	Quality grade[b]	6.41	6.37	6.34	

[a] Final weights are adjusted to a constant dressing percentage (61.5%).
[b] Select+ = 6, Choice- = 7.

Table 4. Carcass data for trial two.

Feeding frequency	Item	Feeding levels Ad *libitum*	95%	90%	Avg
	Final wt[a], lb	1,231.93	1,230.78	1,250.88	1,237.86
	Hot carcass wt, lb	757.64	756.93	769.29	761.29
Once daily	Dressing %	60.02	61.11	60.62	60.58
in am	Backfat, in	0.37	0.34	0.34	0 35
	LEA, sq in	13.00	13.26	12.86	13.04
	Liver wt, lb	15.56	14.63	15.09	15.09
	Yield grade	2.26	2.00	2.29	2.18
	Quality grade[b]	6.24	7.00	7.00	6.75
	Final wt[a], lb	1,228.75	1,209.76	1,224.16	1,220.89
	Hot carcass wt, lb	755.68	744.00	752.86	750.85
Once daily	Dressing %	56.28	60.09	61.16	59.18
in pm	Backfat, in	0.41	0.39	0.30	0.37
	LEA, sq in	12.79	13.49	12.60	12.96
	Liver wt, lb	15.78	14.95	15.01	15.25
	Yield grade	1.97	2.00	2.00	1.99
	Quality grade[b]	5.57	6.93	6.50	6.33
	Final wt[a], lb	1,250.31	1,216.60	1,273.06	1,246.66
	Hot carcass wt, lb	768.94	748.21	782.93	766.69
Twice daily	Dressing %	62.73	60.53	62.07	61.78
	Backfat, in	0.45	0.54	0.46	0.48
	LEA, sq in	13.09	12.96	13.14	13.06
	Liver wt, lb	14.98	15.04	15.05	15.02
	Yield grade	2.08	2.43	2.21	2.24
	Quality grade[b]	7.00	6.93	7.43	7.12
	Final wt[a], lb	1,237.00	1,219.05	1,249.37	
	Hot carcass wt, lb	760.75	749.71	768.36	
Avg	Dressing %	59.68	60.58	61.28	
	Backfat, in	0.41	0.42	0.37	
	LEA, sq in	12.96	13.24	12.87	
	Liver wt, lb	15.44	14.87	15.05	
	Yield grade	2.10	2.14	2.17	
	Quality grade[b]	6.27	6.95	6.98	

[a] Final weights are adjusted to a constant dressing percentage (61.5%).
[b] Select$^+$ = 6, Choice- = 7.