Kansas Agricultural Experiment Station Research Reports

Volume 6
Issue 2 *Cattlemen's Day*

Article 3

2020

Effects of Limit Feeding Cold Stressed Growing Calves in the Morning Versus the Evening, as well as Bunk Line Sharing on Performance

C. A. Sasscer
Kansas State University, sasscer@k-state.edu

S. P. Montgomery
Kansas State University, Manhattan, smontgom@k-state.edu

C. I. Vahl
Kansas State University, vahl@k-state.edu

See next page for additional authors

Effects of Limit Feeding Cold Stressed Growing Calves in the Morning Versus the Evening, as well as Bunk Line Sharing on Performance

Abstract

Objective: To determine the response of cold stressed growing calves to being fed in the evening instead of morning hours, as well as the effect of bunk line sharing.

Study Description: Crossbred steers (n = 360) of Texas, Oklahoma, and Idaho origin were blocked by weight into four size groups and randomly assigned to pens, which were randomly allocated to one of five treatments. All steers received a diet formulated to provide 60 Mcal net energy for gain/100 lb of dry matter and were limit fed with a target of 2.0% of their body weight in dry matter intake. Treatments consisted of being fed in the morning (AM), in the evening (PM), fed half of their feed in the morning and half in the evening (50/50), and two treatments that allowed cattle to be fed in the same pen yet were rotated twice daily utilizing a holding pen, allowing for half of the calves to be fed in the morning (Shuttle AM) and half to be fed in the evening (Shuttle PM), doubling the use of the pen and bunk line. The steers were fed for 77 days and individual animal weights were taken on day -1 (allocation), day 0 (initial processing), day 64/65 (blood sampling), and day 77 (final weights). Plasma glucose was obtained individually on day 64 and 65, and pen weights were collected on days 0, 21, 28, 35, 56, 63, 70, and 77.

The Bottom Line: When limit feeding cold stressed growing calves, neither shifting from morning feed delivery to evening feed delivery, nor bunk line sharing significantly improves the efficiency of feed conversion.

Keywords

Limit feeding, bunk line sharing, cold stressed calves

Authors

C. A. Sasscer, S. P. Montgomery, C. I. Vahl, W. R. Hollenbeck, R. N. Wahl, A. J. Tarpoff, and D. A. Blasi

K-STATE Research and Extension

CATTLEMEN'S DAY 2020

Effects of Limit Feeding Cold Stressed Growing Calves in the Morning Versus the Evening, as well as Bunk Line Sharing on Performance

C.A. Sasscer, S.P. Montgomery, C.I. Vahl, W.R. Hollenbeck, R.N. Wahl, A.J. Tarpoff, and D.A. Blasi

Abstract

Previous work has shown that shifting the time of feed delivery from morning to evening hours for cold stressed growing calves can result in greater feed efficiency. It is not known what the extent of the feed efficiency response is when limit feeding cold stressed growing calves later in the day. In order to determine the growing calf response to later feeding times, 360 crossbred steers (mean weight = 638 lb) of Texas, Oklahoma, and Idaho origin were blocked by weight and allocated to pens based on weight. Steers in four separate treatment groups were fed a total mixed ration once daily for 77 days, and a fifth treatment received half in the morning and half in the evening. The four treatment diets were formulated to provide 60 Mcal net energy for gain/100 lb. Cattle off-test weights were not different ($P > 0.05$) for calves fed in the evening. Overall, feed efficiency was not improved, nor was average daily gain greater for calves fed later in the day.

Introduction

Previous work at Kansas State University and North Dakota State University has shown that shifting the time of feed delivery from morning to evening hours for cold stressed growing calves can result in greater feed efficiency. The suspected mode of action behind this is shifting the heat of fermentation from daytime hours to nighttime hours, when ambient temperatures tend to be lower. It is hypothesized that this heat helps to maintain body temperature so the animal uses less of the energy from digestion to meet maintenance requirements. It is not known to what extent feed efficiency can be improved when limit feeding cold stressed growing calves later in the day. Further, producer interest has been expressed in bunk line sharing. This management practice provides that two groups of calves eat out of the same bunk, and are rotated daily to a holding pen to allow the other group to eat. This maximizes infrastructure, as limit fed cattle tend to consume their allocated feed within several hours of delivery.

Experimental Procedures

A total of 377 crossbred steers of Texas, Oklahoma, and Idaho origin, averaging 638 lb were allocated to pens based on weight. Animals were previously vaccinated for viral and clostridial diseases. Thirty-two pens with feed bunks were used (8 for each treatment) and 8 holding pens were utilized. Each group of steers consisted of nine head. Fourteen steers on the higher end of the weight spectrum and three on the lower end were removed from the research population. The remaining 360 steers were blocked by weight into four size groups and randomly assigned to groups, which were randomly allocated to one of five treatments. The five treatments all received a diet formulated to provide 60 Mcal net energy for gain/100 lb of dry matter and all were limit fed with a target of 2.0% of their body weight in dry matter intake. The experiment consisted of one treatment fed in the morning (AM), one in the evening (PM), one fed half of their feed in the morning and half in the evening (50/50), and two additional treatments (Shuttle AM, Shuttle PM) that were fed in the same pen yet were rotated twice daily utilizing a holding pen. This scheme allowed for half of the calves to be fed in the morning and half to be fed in the evening, doubling the use of the pen and bunk line. Pen was the experimental unit. The steers were fed their respective diets once daily at approximately 0800 for morning fed calves and 1600 for evening fed calves for 77 days. Individual animal weights were taken on day -1 (allocation), day 0 (initial processing), day 64/65 (blood sampling), and day 77 (final weights). Plasma glucose was obtained individually on day 64 and 65 and frozen for later analysis. Pen weights were collected on days 0, 21, 28, 35, 56, 63, 70, and 77. Feed delivery was adjusted based on daily refusals while calves were adjusting to ration, and later bunks were checked daily to ensure total feed consumption. Bunk and individual ingredient samples were taken weekly.

Results and Discussion

Over the entire 77-day trial, average daily gain for calves fed in the evening and/or assigned to share a bunk line was not different ($P > 0.95$) compared to calves fed in the morning and not rotated daily (Table 2), although there was a difference at day 35 ($P > 0.01$). Dry matter intake did not tend to be different ($P > 0.77$) between treatments over the entire 77-day trial. Feed efficiency was not greater in calves fed in the evening nor shuffled between pens ($P > 0.98$), but a difference was seen at day 35 ($P > 0.03$). No numerical difference was observed in blood glucose levels.

Implications

When limit feeding cold stressed growing calves, no statistically significant differences were observed with the performance data of the calves over the entire 77-day trial. Significant effects on day 35 average daily gain and feed efficiency may potentially be explained by colder weather in January and February (Figure 1). There were no negative observations regarding cattle health or behavior with feeding calves at different times of the day, nor with utilizing one pen by two groups of calves at different times of the day. Further aspects of evening feeding and bunk line sharing should be considered by a producer, such as labor needs, equipment wear, and infrastructure requirements.

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. Persons using such products assume responsibility for their use in accordance with current label directions of the manufacturer.

Table 1. Experimental diet

Ingredient	Dry matter %
Corn	25.50
Supplement	7.50
Corn silage	27.00
Wet corn gluten feed (Sweet Bran[1])	40.00
Total	100.00

Item	100% Dry matter basis
Dry matter, %	54.60
Protein, %	14.22
Calcium, %	0.70
Phosphorus, %	0.55
Salt, %	0.38
Potassium, %	0.94
Magnesium, %	0.26
Fat, %	3.10
Acid detergent fiber, %	11.37
Net energy for maintenance, Mcal/100 lb	92.11
Net energy for gain, Mcal/100 lb	60.71

[1]Cargill Sweet Bran.

Table 2. Effects of feeding time on performance

Weight, lb						
Day:	0		35		77	
		Standard error of the mean		Standard error of the mean		Standard error of the mean
AM	590	22.54	675	6.38	821	9.85
AM Shuttle	619	22.54	677	6.22	827	9.60
PM	616	22.54	701	6.22	827	9.60
PM Shuttle	650	22.54	696	6.37	831	9.84
50/50	628	24.09	699	6.66	822	10.28
Treatment *P*-value		0.47		0.01		0.95

Average daily gain, lb/day				
Day:	0–35		0–77	
		Standard error of the mean		Standard error of the mean
AM	1.57	0.18	2.60	0.13
AM Shuttle	1.61	0.18	2.69	0.12
PM	2.29	0.18	2.68	0.12
PM Shuttle	2.15	0.18	2.74	0.13
50/50	2.26	0.19	2.62	0.13
Treatment *P*-value		0.01		0.95

Dry matter intake, lb/day				
Day:	0–35		0–77	
		Standard error of the mean		Standard error of the mean
AM	11.80	0.31	13.62	0.40
AM Shuttle	12.22	0.30	14.21	0.39
PM	12.25	0.30	14.14	0.39
PM Shuttle	12.10	0.31	14.16	0.40
50/50	12.37	0.33	14.34	0.42
Treatment *P*-value		0.78		0.77

continued

Table 2. Effects of feeding time on performance

Feed-to-gain ratio, lb				
Day:	0–35		0–77	
		Standard error of the mean		Standard error of the mean
AM	8.75	0.97	5.36	0.34
AM Shuttle	8.81	0.94	5.31	0.33
PM	5.52	0.94	5.51	0.33
PM Shuttle	5.90	0.97	5.22	0.33
50/50	5.67	1.01	5.50	0.35
Treatment *P*-value		0.03		0.96

Gain-to-feed ratio, lb				
Day:	0–35		0–77	
		Standard error of the mean		Standard error of the mean
AM	0.13	0.02	0.19	0.01
AM Shuttle	0.13	0.02	0.19	0.01
PM	0.19	0.02	0.19	0.01
PM Shuttle	0.18	0.02	0.19	0.01
50/50	0.18	0.02	0.18	0.01
Treatment *P*-value		0.02		0.98

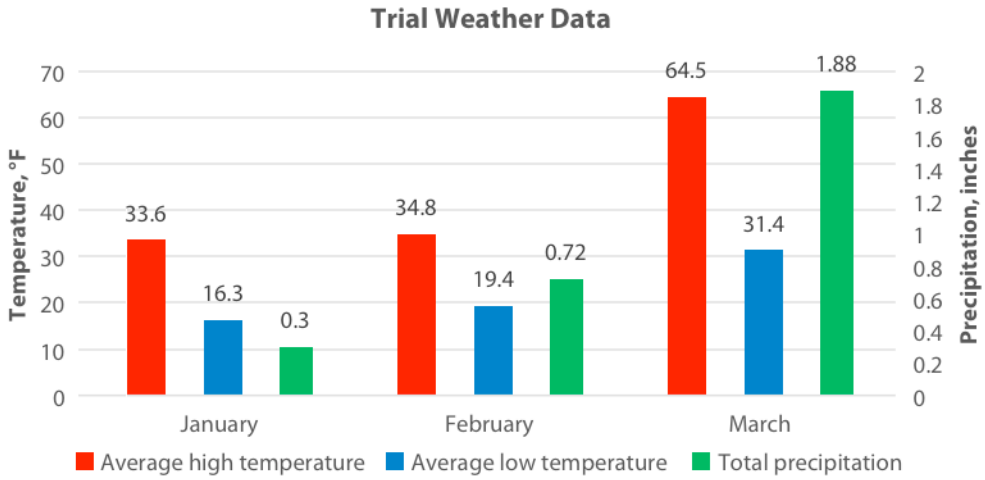

Figure 1. Trial weather data.