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Effect of Feeding Interval on Finishing Performance of Beef Steers

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Introduction

It has long been accepted that optimal performance in beef cattle occurs when cattle are fed at a similar time each day. In fact, in Frederick Mumford's *Syllabus of Illustrated Lecture on Profitable Cattle Feeding* published by the U.S. Department of Agriculture in 1905, Mr. Mumford stated, "Cattle should be fed at certain hours and in the same way. This cannot be varied 15 minutes without some detriment to the cattle." Little research has been conducted examining interval of feed delivery. Most feedlot research examining feed delivery has focused on the comparison of once or twice daily feed delivery on animal performance. The current research examined beef steer finishing performance with stable or variable once daily feed delivery.

Experimental Procedures

Two hundred and forty crossbred steers (average initial weight = 692 ± 70.5 lb) were purchased through an order buyer from multiple sale barns in Mississippi and Alabama and were transported approximately 17 hours to the Kansas State University Agricultural Research Center Feedlot in Hays, KS (KSU-ARCH). Upon arrival, cattle were individually tagged and weighed. Cattle were penned by truck lot and allowed free choice access to water and good quality grass hay for 24 hours. Cattle were then individually weighed, vaccinated for clostridial (Ultrapac 7, Zoetis, Parsippany, NJ) and respiratory pathogens (Bovi-Shield Gold, Zoetis, Parsippany, NJ), and administered an anti-microbial (Zuprevo, Merck, Madison, NJ). Steers also received a growth-promoting implant (Component E-S with Tylan, Elanco Animal Health, Greenfield, IN). Cattle were then stratified by truck and arrival weight and assigned randomly to one of 8 pens (27 or 28 head per pen). Steers were fed the facility's standard receiving ration and were observed twice daily for symptoms of bovine respiratory disease for a 60-d receiving period.

Following the receiving period, cattle were individually weighed and assigned randomly by pen to one of two treatments: pens assigned to the control were fed at 0900 each day, whereas pens assigned to variable feed-delivery timing were fed daily at a randomly generated time ± 0 to 60 min relative to the control group. Average difference in daily feed-delivery time for the control was 0900 ± 15 min and for the variable feed delivery was 0900 ± 60 min with the greatest variation being two hours.

Animals were maintained in 11,120 ft² dry lot pens with 9.5 inches of linear bunk space per head for the duration of the study. Cattle were fed once daily, using a slick-bunk management method, and feed calls were made each morning at 0700 before feed delivery. Cattle received 2 growth-promoting implants (Component; Elanco Animal Health, Greenfield, IN) during the study, and these were administered on day 115 (Component TE-IS with Tylan), and day 172 (Component TE-S with Tylan). Body weight measurements (BW) were collected monthly on days 28, 56, 85, and 113 of the experiment. Carcass characteristics of steers were measured with ultrasound on day 90 of the experiment, and pay weight, carcass weight, backfat thickness, loin muscle depth, rib eye area (REA; inch²), and marbling score were calculated by Cattle Performance Enhancement Company software using live body weight and the ultrasound measurements.

Results and Discussion

Steer body weight was similar between treatments each month during the experiment (Table 1). Additionally, steer average daily gain was not affected by the intervals between feedings for the stable or variable feed delivery groups (Table 1).

Interval between daily feed delivery to beef steers did not affect pay weight, carcass weight, loin muscle depth, REA or backfat thickness (Table 2). However, steers fed using a variable (± 2 hours from the previous day's feed delivery time) feed delivery time displayed marbling scores 0.5 greater than steers fed using a stable (± 15 minutes from the previous day's feed delivery time) feed delivery time (Table 2).

A variable daily feed delivery of up to ± 2 hours was not sufficient to elicit a change in animal performance or most carcass characteristics compared to performance of steers fed at a similar (± 15 minutes of the previous day's feed delivery) time each day. Although variable feed time steers did have a statistically greater marbling score, this difference was likely not biologically or economically significant. Additional research should be conducted to determine the variable time interval when beef cattle performance is affected by an inconsistent interval of feed delivery.

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Table 1. Body weight and average daily gain of beef steers exposed to a stable (Control) or variable (Variable) interval of feed delivery for once daily feeding during the feedlot finishing phase

	Treatment	
	Control	Variable
Date, 2021	BW, lb	
1/08	916	919
2/06	996	997
3/05	1100	1107
4/02	1208	1197
4/07	1214	1218
Day	ADG, lb	
Day 1–28	2.77	2.69
Day 28–56	3.72	3.93
Day 56–84	3.84	3.21
Day 0–90	3.31	3.33

Table 2. Steer carcass characteristics after exposure to a stable (Control) or variable (Variable) interval of feed delivery for once daily feeding during the feedlot finishing phase. Carcass characteristics were measured with ultrasound on day 90 of the experiment, and pay weight, carcass weight, backfat thickness, loin muscle depth, rib eye area (REA; inch²), and marbling score were calculated by Cattle Performance Enhancement Company software using live body weight and the ultrasound measurements.

	Treatment	
	Control	Variable
Pay weight, lb	1206	1210
Carcass weight, lb	758	761
Backfat thickness, inch	0.39	0.43
Loin muscle depth, inch	2.44	2.52
REA, inch ²	14.0	14.5
Marbling score*	5.05 [†]	5.55 [†]

*Marbling score: 30 = Slight⁰⁰, 40 = Small⁰⁰, 50 = Modest⁰⁰.

[†]Indicates values in a row are significantly different between feed delivery intervals at $P \leq 0.05$.