Integration of Pasturing Systems for Cattle Finishing Programs: A Progress Report

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Summary

In this study, 84 fall-born and 28 spring-born calves of similar genetic background were used to evaluate the incorporation of rotational pasturing systems into cattle finishing programs. Because the second-year trial is not complete, this report will include only the first year of the five-year study. Seven treatments were imposed: 1) fall-born calves put directly into the feedlot on May 7, 1996; 2) fall-born calves put on pasture and receiving an ionophore and moved to the feedlot on July 30, 3) fall born calves put on pasture on May 7 and not receiving an ionophore and moved to the feedlot on July 30; 4) fall-born calves put on pasture on May 7 and receiving an ionophore and moved to the feedlot on October 22; 5) fall-born calves put on pasture on May 7 and not receiving an ionophore and moved to the feedlot on October 22; 6) spring-born calves put on pasture on October 1 and receiving an ionophore and moved to the feedlot on October 22; and 7) spring-born calves put on pasture on October 1 and not receiving an ionophore and moved to feedlot on October 22. Performance data showed that cattle on pasture receiving an ionophore had higher gains than those not receiving an ionophore on pasture. This trend was reversed in the feedlot period. Yield grades were not greatly influenced by treatment, although quality grades tended to be higher for older cattle and those cattle that were in drylot for a longer period of time.

Introduction

In this report, a system of finishing beef cattle utilizing a rotational grazing system in conjunction with a conventional feedlot is presented. The pasture exists on land classified as highly erodible, making soil conservation, as well as input cost reduction, an important consideration. The purpose of this study is to integrate pasturing systems for cattle finishing programs and compare them in terms of performance, carcass characteristics, and economics.

Materials and Methods

This study was begun in May, 1995 at the Western Iowa Research and Demonstration Farm at Castana, Iowa, with the establishment of a smooth bromegrass pasture. The purpose of the study was to examine the feasibility of using a pasturing system prior to placing cattle in drylot as a means of improving land usage and the overall economics of beef production. Eighty-four fall-born calves, purchased from the Stuart Ranch near Caddo, OK, were used in the initial phase of this study. The calves were given their booster shots at the ranch and injected with Ivomec® plus Flukocide®. They arrived at the research farm on April 17, 1996, after 12 hours of transport. The calves were given ground,mid-bloom alfalfa hay on arrival until May 8, 1996, when they were started on test. Initially the cattle received one gram per head per day of chlortetracycline as a health precaution. This was fed at the rate of .25 lb per animal of four gram per lb AS-700® crumbles, top-dressed on the hay each morning. Amprolium® was added to the water source for two weeks after arrival of the calves to aid in the control coccidiosis. The steers, weighing 367 lb on average, were identified with an ear tag, implanted with Compudose®, and randomly allotted into 12 groups of seven animals each on May 7, 1996, prior to being placed on test.

Each group of steers was assigned at random to one of five treatment combinations. There were four grazing treatments; steers on each treatment were provided supplement blocks either with monensin sodium ionophore or without ionophore. The first pasture treatment involved placing 28 steers on the cool season grass pasture May 7, 1996, 14 with or 14 without ionophore, and then moving them to the feedlot July 30, 1996, to be fed the finishing diet during the remainder of the trial. The second 28 head of steers were placed on the cool season grass pasture on May 7, 1996, 14 with and 14 without ionophore, and then moved to the feedlot on October 22, 1996.

The 28 control steers (seven head per pen) were placed directly into the feedlot after processing and gradually adapted to an 82 % concentrate diet containing whole shell corn, ground alfalfa hay, a natural protein, vitamin and mineral supplement containing ionophore, and molasses to control dust. After steers being fed the finishing diet attained an average weight of 800 lb, the supplement was switched from natural protein to an urea-based 40 % crude protein, vitamin, and mineral premix. Control feedlot groups were implanted with Revelor® on October 22, 1996, approximately 100 days prior to slaughter. The remaining groups were reimplanted in the same manner in the feedlot phase when, based on live weight and live weight gains, they were estimated to be 100 days from finishing.

The final two treatments involved placing 28 spring-born calves, from the same source and processed in the same

manner as the fall-born calves, on the cool season grass pasture October 1, 1996, and moving them to the feedlot October 22, 1996, to be fed the finishing diet for the remainder of the trial. This group arrived September 17, 1996, from Oklahoma and were identified with ear tag, implanted with Compudose® injected with Ivomec®, randomly allotted into four groups of seven animals each on October 1, 1996, and put on pasture.

On pasture, those cattle receiving ionophore grazed together as a group (14 steers), and those not receiving ionophore grazed together as a separate group. Each grazing group had access to one paddock at a time, approximately 1.7 acres each. There were 16 paddocks each separated by two strands of electrified steel cable attached to metal "T" posts. Including cattle lanes, which were grazed as needed, the total pasture available was 29.85 acres. Cattle were moved on the basis of forage availability. Initially, the cattle were not capable of consuming adequate forage to match the growth of the forage in all the paddocks and they were moved every three or four days to a new paddock. Three paddocks were harvested as grass hay during the second week of June. Because the grass grew at a slower rate later in the season and the cattle were able to consume more forage per day, they were moved every two days to a different paddock. Nitrogen fertilizer was added to the pasture in two applications; the first 100 lb per acre of nitrogen was applied in late April and an additional 80 lb per acre was applied in mid-August.

Control feedlot steers were housed in pens with concrete floors and a shelter at the north end. Steers were fed in fence-line concrete bunks and had access to automatic waterers. Feed allotments were determined daily prior to the morning feeding. Feed samples were collected twice per week for dry matter determination. Alfalfa hay samples were collected weekly for determination of neutral detergent fiber (NDF) and acid detergent fiber (ADF) content (Goering and Van Soest, 1970; Van Soest et al., 1991).

Steers were weighed individually every 28 days during the trial. When pens of cattle reached about 1,150 lb average live weight, they were processed at IBP in Denison, IA. After a 24-hour chill, 12th rib fat thickness and ribeye area were measured on the left half of each carcass. Carcass grades were recorded as determined by the USDA Meat Grading Service personnel.

Statistical Analyses

The experimental unit is a group of seven steers. There are seven treatment combinations. Six with two replications and one with four replications. The analysis will take the form of a one-way analysis of variance with six degrees of freedom for treatments and 9 degrees-of-freedom within treatments or experimental error.

Results and Discussion

Descriptive data for performance are presented in Table 1. Cattle receiving ionophore on pasture tended to perform better than those not receiving ionophore. This difference became especially evident later in the season when forage quality and quantity decreased. When cattle were moved to the feedlot from pasture, cattle not receiving ionophore on pasture performed better than those receiving ionophore on pasture. In the feedlot, cattle brought from pasture to the feedlot had lower gains than those cattle started directly in the feedlot, with the exception of spring-born calves moved to the feedlot on October 22 and not receiving ionophore on pasture. In terms of gain throughout the study, the cattle started directly in the feedlot had higher gains than cattle brought from pasture to feedlot at various times. Also, for the duration of the study, cattle not receiving ionophore on pasture had slightly higher gains than those receiving ionophore on pasture, with the exception of fall-born calves not receiving ionophore and moved to the feedlot on October 22. The reason for this exception is not clear at this time. Dry-matter intake was lowest for cattle started directly in drylot and highest for cattle moved to the feedlot on July 30; it was intermediate for fall-and spring-born cattle moved to the feedlot on October 22. Feed efficiency was best for cattle started directly on feed, and cattle not receiving an ionophore on pasture had better feedlot feed efficiency than those receiving an ionophore on pasture.

Carcass characteristics are given in Table 2. No big differences appeared among treatments. Loineye areas of fall-born calves not receiving ionophore on pasture tended to be larger than those receiving ionophore. Cattle receiving an ionophore on pasture tended to have more backfat than those not receiving ionophore on pasture. Yield grades of fall-born cattle receiving ionophore on pasture and moved to the feedlot on July 30 and October 22 were higher than those not receiving ionophore. On the other hand, spring-born cattle moved to the feedlot on October 22 had higher yield grades when they did not receive ionophore on pasture. Ninety-two percent of the calves started directly in drylot scored choice or higher, where as all fall-born cattle moved to the feedlot on July 30 fell in to this category. Fall-born cattle moved to the feedlot on October 22 averaged 70 % choice or higher. Quality grade of spring-born cattle was lower than fall born cattle.

Implications

The results of this first-year study show that using an ionophore on pasture is an effective way to increase rate of gain, although this advantage did not persist during the drylot finishing period. Yield grades were not greatly influenced by treatment; quality grades for fall-born calves were very acceptable regardless of treatment. Spring-born calves had lower quality grades than anticipated, even though processed into beef at the same end weight as fall-born calves. Additional trials are in progress to corroborate these findings and to

provide data for complete economic analyses of these feeding systems.

References

Goering, H.K. and P.J. Van Soest. 1970. Forage fiber analyses (apparatus, reagents, procedures, and some applications). USDA Agr. Handbk.

Van Soest, P.J., J.B. Robertson, and B.A. Lewis. 1991. Methods for dietary fiber, neutral detergent fiber, and nonstarch polysaccharides in relation to animal nutrition. J. Dairy Sci. 74:3583.

Table 1. Performance of cattle both in feedlot and on pasture, trial one.

Treatment	Pasture gain (lb per day)	Feedlot gain (lb per day)	Gain throughout experiment (lb)	DMI (in feedlot)	FE (in feedlot)
Fall-born calves					
Direct to feedlot		2.83	2.83	17.61	6.23
To feedlot July 30					
Ionophore	1.81	2.67	2.45	19.18	7.20
No ionophore	1.77	2.74	2.50	19.18	7.00
To feedlot Oct 22					
Ionophore	1.88	2.31	2.12	18.65	8.12
No ionophore	1.73	2.36	2.08	18.65	7.92
Spring-born calves					
To feedlot Oct 22					
Ionophore	1.96	2.70	2.63	18.65	6.91
No ionophore	1.31	2.93	2.78	18.65	6.40

Table 2. Carcass characteristics of cattle, trial one.

Treatment	Final weight (lb)	Dressing %	Loineye area ($inch^2$)	Back fat (inch)	KPH fat %	Yield grade	Quality grade (% Pr and Ch)
Fall-born calves							
Direct to feedlot	1157	60.8	12.21	0.41	2.00	2.50	92
To feedlot July 30							
Ionophore	1168	61.7	11.97	0.53	2.32	2.79	100
No ionophore	1185	62.7	12.49	0.48	2.39	2.64	100
To feedlot Oct 22							
Ionophore	1165	60.5	11.47	0.43	2.13	2.50	75
No ionophore	1149	60.6	12.56	0.39	1.96	2.21	64
Spring-born calves							
To feedlot Oct 22							
Ionophore	1146	61.8	12.88	0.49	2.00	2.07	31
No ionophore	1179	61.7	12.88	0.43	2.42	2.46	54