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

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Summary

A three-year study was conducted to integrate pasturing systems with drylot feeding systems. Each year 84 fall-born and 28 spring-born calves of similar genotypes were used. Fall-born calves were started on test in May, and spring-born calves were started in October. Seven treatments were imposed: 1) fall-born calves directly into the feedlot (28 steers); 2 and 3) fall-born calves put on pasture with or without an ionophore and moved to the feedlot at the end of July (14 steers in each treatment); 4 and 5) fall-born calves put on pasture with or without an ionophore and moved to the feedlot at the end of October (14 steers in each treatment); and 6 and 7) spring-born calves put on pasture with or without an ionophore and moved to the feedlot at the end of October (14 steers in each treatment). Cattle on pasture receiving an ionophore gained faster (P=.009), but lost this advantage in drylot (P>.10). Overall, cattle started directly in the feedlot had higher gains (P<.001). Cattle receiving an ionophore on pasture had lower KPH than those that did not receive an ionophore (P<.01). Treatment influenced yield grade (P<0.001), although all treatments were YG 2. The percentage of cattle grading Prime and Choice was 75 % or higher for all treatment groups. The results show that using an ionophore improved pasture gains and that pasture treatments did not adversely influence yield and quality grades.

Introduction

Economics and environmental issues such as soil conservation are becoming driving forces behind cattle feeding. One way to reduce the cost of production and improve soil conservation is to use the pastures on highly erodable lands for grazing. Thus the purpose of this study is to integrate pasturing systems with conventional drylot feeding systems and compare the systems in terms of feeding performance, carcass characteristics and economics.

Materials and Methods

The three-year study was initiated with the establishment of a cool season grass pasture, smooth bromegrass, in May 1995, at the Western Iowa Research and Demonstration Farm at Castana, Iowa, and was concluded in June 1999. In order to reduce the genetic variation and backgrounding differences among calves, the Stuart Ranch near Caddo, OK, was chosen as the provider of the calves. The cow herd was large enough to provide homogenous spring- and fall-born calves. Each year eighty-four fall-born calves were used in the initial phase of the study. The calves were backgrounded and given their calfhood vaccinations at the ranch. After 12 hours of transportation they arrived at the research farm on April 17, 1996, April 15, 1997, and April 15, 1998, in the first, second and third years of the study, respectively. In order to alleviate the transportation stress and make calves accustomed to their environment, calves were given ground, mid-bloom alfalfa hay on arrival until May 7, 1996, May 8, 1997, and May 5, 1998, in the first, second and third years of the study, respectively. As a health precaution calves received one gram per head per day of chlortetracycline, which was fed at the rate of 0.25 lb per animal of four gram per lb AS-700® crumbles, top-dressed on the hay each morning. To aid in controlling coccidiosis, Amprolium® was added to the water source for two weeks after arrival of the calves. Before being placed on test on May 7, 1996, May 8, 1997, and May 5, 1998, calves were identified with an ear tag, implanted with Compudose®, and injected with Ivomec® plus Flukocide ®. They were randomly allotted into 12 groups of 7 animals each, and they weighed on the average 367, 350 and 432 lb in the first, second and third studies, respectively.

Five treatments, which involved four grazing and one control treatment, were assigned at random. On pasture supplement blocks either with monensin or without monensin were provided. The first treatment involved 14 steers receiving an ionophore on pasture that were put on pasture May 7, 1996, May 8, 1997, and May 5, 1998, respectively, and moved to the feedlot on July 30, 1996, July 29, 1997, and July 28, 1998, respectively, to be fed the finishing diet during the remainder of the trial. A second treatment involved 14 steers not receiving an ionophore on pasture that were put on pasture May 7, 1996, May 8, 1997, and May 5, 1998, respectively, and moved to the feedlot July 30, 1996, July 29, 1997, and July 28, 1998, respectively. A third pasture treatment involved 14 steers receiving an ionophore on pasture that were put on pasture May 7, 1996, May 8, 1997, and May 5, 1998, respectively, and moved to the feedlot October 22, 1996, October 21, 1997, and October 16, 1998 respectively. A fourth pasture treatment involved 14 steers not receiving an ionophore on pasture that were put on pasture May 7, 1996, May 8, 1997, and May 5 1998, respectively, and moved to the feedlot October 22, 1996, October 21, 1997, and October 16, 1998, respectively. A control group, 28 steers (seven head per pen), was placed directly into the feedlot after acclimation and was gradually adapted to an 82 % concentrate diet containing whole shell corn, ground alfalfa hay, and a natural protein, vitamin and mineral supplement containing an ionophore and molasses. Cattle moved from pasture to the feedlot at various times received the same feed the control group received. In the feedlot when animals reached 800 lb, the supplement was changed from natural protein to a urea-based 40 % crude protein, vitamin and mineral premix. About 100 days prior to slaughter, cattle were implanted with Revelor®.

The remaining two treatments involved obtaining 28 spring-born calves from the same ranch on September 17, 1996, September 15, 1997, and September 15, 1998, respectively, and processing them in the same manner as fall-born calves. They were placed on pasture on October 1, 1996, September 30, 1997, and September 29, 1998, respectively, (14 with ionophore and 14 without ionophore) and were moved to the feedlot on October 22, 1996, October 21, 1997, and October 19, 1997, respectively, to be finished.

The pasture consisted of 16 paddocks, each 1.7 acres in size, which were separated by two strands of electrical steel cable attached to metal “T” posts. Each grazing group had access to one paddock at a time. Cattle on the pasture were rotated on the basis of forage availability. In early summer, the cattle were not capable of consuming adequate forage to match the growth of the forage in all the paddocks, therefore they were rotated to a new paddock every three to four days. However later in the season when grass growth slowed, cattle were rotated about every two days to a new paddock. Nitrogen fertilizer was applied in two applications: one application of 100 lb per acre applied in late April and the other of 80 lb per acre applied in mid-August.

The feedlot facility consisted of pens with concrete floors and a shelter at the north end. Steers were fed in fence-line concrete bunks on the south side of the lot and had access to automatic waterers. Feeding levels 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.

Every 28 days steers were weighed individually. When the average weight of the pen of steers reached 1,150 lb, cattle were shipped to IBP in Denison, IA, for processing. After a 24-hour chill, 12^{th} rib fat thickness and ribeye area were measured on the left half of each carcass. Carcass quality and yield grades and % KPH fat were provided by USDA Meat Grading Service personnel.

Statistical Analyses

The experimental unit is a pen of cattle consisting 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

Performance data are presented in Table 1. As can be observed from the table, cattle receiving ionophore on pasture gained faster than those not receiving ionophore ($P<0.01$). When cattle were moved into the feedlot, cattle not receiving an ionophore on pasture tended to gain more rapidly than those receiving an ionophore on pasture ($P>0.14$). In general, cattle that spent more time in the feedlot had faster daily gains than those that spent less time. In terms of gain throughout the study, the cattle started directly in the feedlot had higher gains than cattle brought from pasture to the feedlot at various times ($P<0.01$). Also, for the duration of the study, cattle not receiving an ionophore on pasture had almost identical gains to those receiving an ionophore on pasture ($P>0.96$). Average daily dry-matter intake in the feedlot was less for cattle started directly in the feedlot and for spring-born calves moved to the feedlot in October than fall-born calves moved to the feedlot in July and October ($P<0.01$). In terms of feed efficiency, fall-born calves put on pasture in May and moved into the feedlot in October were less efficient than others ($P <0.02$), indicating that cattle that spent more time on pasture were less efficient. Cattle receiving an ionophore on pasture tended to be more efficient in the feedlot than those not receiving an ionophore ($P>0.63$).

Carcass data are provided in Table 2. The dressing percentage of cattle started directly in the feedlot was lower than others and differed significantly from fall-born cattle moved into the feedlot in July and spring-born cattle not receiving an ionophore on pasture ($P<0.05$). Treatments did not have an effect on loineye area ($P>0.72$). Cattle receiving an ionophore on pasture had higher backfat than those not receiving an ionophore ($P>0.1$). Cattle not receiving an ionophore on pasture had more KPH than those receiving an ionophore on pasture (P<0.01). Cattle that remained longer on pasture had less KPH than other treatments. All treatments were YG 2, however YG were higher for fall-born cattle spending more time in the feedlot (P<0.05). The percentage of cattle grading Choice and Prime was 75 % or higher for all treatment groups and tended to be higher for fall-born calves spending more time in the feedlot.

Implications

The results of this three-year study show that on pasture using an ionophore is an effective way to increase gain even though this does not carry over into the feedlot. Pasture treatments did not adversely influence yield and quality grades. Economic analysis of the treatments is being done to assess how these performance findings affect profitability.

Acknowledgments

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

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		2.89^{ab}	2.89^{d}	17.95^{d}	6.28^{h}
To feedlot July 30, 29					
Ionophore	1.43^{ac}	2.90^{ab}	2.51^{e}	18.62^{e}	6.47^{h}
No ionophore	1.23^{c}	2.96^{a}	2.49^{e}	18.56^{e}	6.38^{h}
To feedlot Oct 22, 21					
Ionophore	1.53^{a}	2.66^{c}	2.14^{f}	18.64^{e}	7.20^{i}
No ionophore	1.35^{ac}	2.76^{bc}	2.11^{f}	18.52^{e}	6.89^{i}
Spring-born calves					
To feedlot Oct 22, 21					
Ionophore	0.63^{b}	2.90^{ab}	2.70^{g}	18.09^{d}	6.36^{h}
No ionophore	0.41^{b}	2.93^{a}	2.70^{g}	18.04^{d}	6.22^{h}

[abc]Means with different superscripts in the same column are significantly different ($P<0.03$).
[defg]Means with different superscripts in the same column are significantly different ($P<0.01$).
[hi]Means with different superscripts in the same column are significantly different ($P<0.02$).

Table 2. Carcass characteristics of cattle.

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	1180^{a}	61.1^{a}	12.55	0.55	2.28^{d}	2.68^{a}	92.3
To feedlot July 30, 29							
Ionophore	1170^{ab}	61.8^{bc}	12.57	0.54	2.49^{ef}	2.62^{a}	92.8
No ionophore	1178^{ab}	62.2^{b}	12.60	0.49	2.55^{f}	2.63^{a}	95.1
To feedlot Oct 22, 21							
Ionophore	1161^{ab}	61.3^{ac}	12.30	0.44	2.14^{d}	2.35^{b}	75
No ionophore	1144^{b}	61.2^{ac}	12.48	0.42	2.19^{d}	2.29^{b}	75.6
Spring-born calves							
To feedlot Oct 22, 21							
Ionophore	1168^{ab}	61.3^{ac}	12.70	0.50	2.29^{de}	2.34^{b}	75.6
No ionophore	1160^{ab}	61.8^{b}	12.67	0.45	2.68^{f}	2.39^{b}	75.6

[abc]Means with different superscripts in the same column are significantly different ($P<0.05$).
[def]Means with different superscripts in the same column are significantly different ($P<0.04$).