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Evaluating Breakeven for Various Management Systems for Different Breed Types from Weaning to Slaughter

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Maximizing summer pasture gain after utilizing cornstalk grazing resulted in lower overall cost of production.

Summary

Two hundred twenty-four medium framed, weaned British-breed steer calves (509 lb) and 139 weaned continental-breed steer calves (542 lb) were used in two consecutive years (1994, 1995; 2 finishing pens/treatment/yr) to evaluate the effects of winter gain and length of summer grazing season on subsequent finishing performance and overall system breakeven within two different breed types.

Calves were wintered at two rates of gain: <.75 lb/day (Slow) and approximately 2 lb/day (Fast). Calves from each wintering treatment group grazed either native range or crested wheat grass. The grazing period was from May to July (61 days; Short) or September (120 days; Long). All steers were finished on a 90% concentrate finishing diet for 131 d (Short) and 118 d (Long). Winter gain and breed type

affected overall systems breakeven differently.

Introduction

As cattle frame size has increased through crossbreeding and through selection within breeds, an increasing percentage of large framed calves is now available at weaning. Producers have the option of buying medium or large framed calves, and are interested in differences in performance and cost of production when managed in various growing and finishing systems. Because of the many ways to feed and manage cattle from weaning to slaughter, economics of production systems will help producers develop management and marketing strategies for beef feeding systems.

Total efficiency (energy utilization) for a growing and a finishing period depends on the length of time of low energy feeding, level of energy restriction, level of nutrition during the compensatory period, and composition of the animal when compensatory growth is ended. Because cattle have compensatory gain potential, it allows the use of low quality economical feeds in at least part of the growing process.

The objectives of this research were to 1) evaluate the effect of winter management and length of summer grazing on subsequent finishing performance with medium framed and large framed steers, and 2) evaluate breakeven costs of production for various systems of production.

Experimental Procedures

Animals

During year one, 66 large-framed Continental cross steers (initial weight 522 lb) were compared with 128 medium-framed British cross steers (initial weight 503 lb). During year two, 73 large framed Continental cross steers (initial weight 562 lb) and 96 medium framed British cross steers (initial weight 516 lb) were subjected to the various systems. The steers were managed in a 2 × 2 × 2 factorial arrangement. Factors included: breed type (British cross or Continental cross), winter rate of gain (Slow at <.75 lb/day, or Fast at 2 lb/day), and summer grazing season (Short 58 days, year one and 63 days, year two; Long 121 days, year one and 119 days, year two). All steers were finished on a common high concentrate ration.

Initial weight and summer grazing weights (initial and final) were an average of two consecutive days' weights. Final finishing weight was a full weight that was shrunk 4 percent. All steers were implanted with Synovex S® at the beginning of the summer grazing season and were reimplanted at the beginning of the finishing phase. During the wintering and finishing phases in the feedlot, cattle were fed in two pens per treatment in both years. During the winter on cornstalks and during the summer grazing phase, all cattle were grazed together.

Winter Period

The wintering period averaged 145 days with the Slow treatment grazing cornstalks (supplemented with alfalfa hay) approximately 82 days followed by limit feeding the following diet. The winter diets for both years and for both the Slow and Fast treatments consisted of 34% dry rolled corn, 32% corn silage, 32% haylage, and 2% supplement (DM basis) and was formulated (DM basis) to contain 12.5% CP, .7% calcium, .3% phosphorus, 25 g/ton Rumensin, and 10 g/ton Tylan.

Summer Period

Wintering groups were randomly assigned by pen to either a Short or Long grazing season (2 pens per treatment). One pen (replicate) was randomly assigned to graze predominately crested wheat grass (*Agropyron cristatum* Gaertn.) pastures at the High Plains Agriculture Laboratory (HPAL) in Sidney, NE. The other pen was assigned to graze at the University of Nebraska, Panhandle Experiment Range (UNPER) in Sioux County, NE which was primarily native grass consisting of blue grama (*Bouteloua gracilis* (H.B.K). Lag. Ex Steud.), threadleaf sedge (*Carex filifolia* Nutt.), needleandthread (*Stipa comala* Trin. and Rupr.), and prairie sandreed (*Calamovilfa longifolia* (Hook.) Scribn.). Half of each wintering group was either grazed Short or Long season at each summer pasture location. The grazing period was from mid-May to mid-July for the early removal treatment or from mid-May to mid-September for the late removal treatment. The starting date for cattle being turned out to grass depended on the amount of forage left from the previous year of grazing, the precipitation for the current year and amount of forage growth in the current year.

Stocking rate averaged for the two locations was .31 and .28 AUM/acre for both years one and two, respectively. A mineral supplement was provided free choice for the steers grazing pasture.

Rumen fill differences after both the short and late grazing seasons were minimized by feeding a common diet of 50% corn silage and 50% haylage (DM basis) at 1.5% BW for 5 days before weighing. Weights were taken for two consecutive days before feeding in the morning.

Finishing Period

Steers were fed a common finishing diet for 137 days (Short) and 118 days (Long) for year one and 125 days (Short) and 118 days (Long) for year two until it was estimated that 70 percent of the steers had reached the Choice grade. The finishing diet for both years was a high concentrate corn diet which contained 10% DM from corn silage. The rations were formulated to contain (DM basis) 12.5% CP, .6% calcium, .3% phosphorus, 25 g/ton Rumensin, and 10 g/ton Tylan. Three step up diets were utilized which contained 50%, 28%, and 13% roughage (DM basis) with each step up ration fed for approximately 5-7 days. Carcass data were collected for both years after a 24 hour chill (Table 2).

Economics

Economic analysis for each system included standardized costs for both years for all inputs. Breakeven prices

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were used to evaluate the comparative economic costs of each system. The charges used for both years were: feedlot yardage, $.25/day; purchase price, $95/cwt; interest rate, 9%; feed cost for the Fast winter group, $.45/day; feed cost for the Slow group, cornstalks for 3 months at $.15/day and limit fed for 2 months, $.45/day; summer grass, $.33/day; and feed cost for finishing, $.05/lb.

Statistical Analysis

Data within in each trial were analyzed by analysis of variance using the General Linear Models procedure (SAS, 1985). The data for the economic analysis were evaluated for differences in mean values by use of Duncan's multiple range test for years one and two. Experimental design was a completely randomized design with a 2 × 2 × 2 factorial treatment arrangement, with finishing pen as the experimental unit. It was not possible to pool the two years because of a treatment x year interaction (P<.10).

Results

Cattle wintered at a Slow rate of gain compensated during the summer grazing period, as would be expected, and gained more than those wintered at a faster rate (P<.01;Table 1). The Continental cross cattle gained more on pasture regardless of previous winter gain the first year (P<.10), however summer gains were similar in both breed types the second year. The winter gain was slightly higher the second year for both the British cross and the Continental cross, and perhaps the Continental cross were near the same body condition as the British in year two when going to grass. Also the summer gain in year two tended to be higher than in year one for both breed groups. The differences in physiological maturity of the Continental and British cross cattle may not have been as great as in the previous year.

When nutrients are not restricted, perhaps the larger-framed cattle can continue to take advantage of their growth potential. Even though grass consumption was not measured, it is probable that the larger compensating cattle consumed considerably more forage.

During the finishing phase there was not a consistent carryover effect of winter gain in both years. Finishing dry matter intake for both years shows the Continental cattle consumed more than the British cattle regardless of winter or grazing treatments. In year two, cattle that were wintered at a Slow rate gained faster and were more efficient than those that were wintered at a faster rate. Because there was a lack of compensatory growth difference exhibited between the two breed types during the summer grazing period, perhaps these differences were exhibited during the finishing phase. Finishing ADG was higher for steers that finished after the Long grazing season compared with those grazed for the Short season for both breed types during year one. For both years, hot carcass weights and rib-eye areas were higher for Continental cattle, regardless of winter gain or grazing season.

Finishing feed to gain ratios (Table 2, year one) were higher (P<.10) for the Short grazing season than the Long for both breed types. For year one, the combination of both winter gains with Long season grazing resulted in the lowest finishing feed to gain ratio for both British and Continental cattle.

The most desirable breakeven for year one was for Continental cattle wintered Fast and summer grazed the Short season, and for year two it was for British cattle grazing cornstalks for the winter and summer grazed for the Short period (Figure 1). The letters used to identify boxes in Figure 1 are in the order of breed type, winter gain, and grazing season defined in Tables 1 and

Table 1. Steer performance for winter and summer management systems.

Breed type:	Brit	Brit	Brit	Brit	Cont	Cont	Cont	Cont	
Winter gain:	Slow	Slow	Fast	Fast	Slow	Slow	Fast	Fast	
Grazing season:	Short	Long	Short	Long	Short	Long	Short	Long	SEM
Year 1:									
No. of Steers	31	33	32	32	16	18	14	18	
Initial wt, lb[a]	501	505	507	498	531	546	516	497	4.56
Winter									
Total gain, lb[bc]	84	75	210	225	76	63	242	205	5.02
ADG, lb/[bc]	.55	.50	1.40	1.50	.50	.42	1.60	.62	.03
Summer									
Total gain, lb[cde]	130	210	78	134	143	229	97	161	6.46
ADG, lb/d[cde]	2.24	1.74	1.35	1.11	2.47	1.89	1.67	1.33	
Year 2:									
No. of Steers	26	23	24	23	19	17	18	19	
Initial wt, lb[b]	516	513	527	510	550	575	563	561	2.03
Winter									
Total gain, lb[af]	85	97	255	251	91	93	246	227	3.37
ADG, lb/[da]	.61	.70	1.85	1.82	.66	.67	1.78	1.64	.02
Summer									
Total gain, lb[ce]	167	239	99	150	177	258	114	181	9.69
ADG, lb/d[ce]	2.65	2.00	1.57	1.57	1.26	2.80	1.80	1.52	.13

[a]Breed type × Winter gain (P<.10). [b]Breed type × Grazing season (P<.10). [c]Winter gain (P<.01). [d]Breed type (P<.10). [e]Grazing season (P<.10). [f]Winter gain x Grazing season (P<.10).

Table 2. Steer performance during finishing phase of systems.

Breed type:	Brit	Brit	Brit	Brit	Cont	Cont	Cont	Cont	
Winter gain:	Slow	Slow	Fast	Fast	Slow	Slow	Fast	Fast	
Grazing season:	Short	Long	Short	Long	Short	Long	Short	Long	SEM
Year 1:									
Finishing data									
Gain, lb,[a]	481	424	444	442	483	464	509	509	16.80
F/G[ac]	6.58	6.44	7.37	6.48	7.30	6.18	6.84	6.47	.01
ADG, lb/d[a]	3.51	3.59	3.24	3.74	3.52	3.92	3.72	3.80	.13
DMI, lb[b]	23.10	23.10	23.85	24.25	25.75	24.30	24.45	24.45	.48
Final wt, lb[a]	1195	1213	1242	1298	1233	1302	1364	1310	11.66
Carcass data									
Hot carcass weight, lb[a]	748	730	788	792	782	813	884	821	12.88
Rib eye area, sq in[a]	14.4	12.6	13.3	13.9	11.9	13.9	13.6	14.3	.65
Year 2:									
Finishing data									
Gain, lb[bde]	565	455	387	404	446	439	370	429	24.39
F/G[bcde]	5.03	6.02	7.30	6.69	6.58	6.35	7.77	6.85	.01
ADG, lb/d[bde]	4.52	3.86	3.09	3.42	3.57	3.72	2.96	3.64	.20
DMI, lb[f]	22.75	23.25	22.60	22.90	23.50	23.70	23.00	24.80	.57
Final wt, lb[g]	1333	1303	1268	1314	1263	1365	1292	1398	20.01
Carcass data									
Hot carcass weight, lb[f]	781	812	842	834	830	864	853	896	28.59
Rib eye area, sq in[f]	14.4	12.8	15.1	12.9	15.9	13.5	16.0	13.7	.71

[a]Breed type × Winter gain × Grazing season (P<.10). [b]Breed type × Grazing season (P<.10). [c]Feed/gain was analyzed as gain/feed. Gain/feed is the reciprocal of feed/gain. [d]Breed type × Winter gain (P<.10). [e]Winter gain × Grazing season (P<.10). [f] Breed type (P<.10). [g]Grazing season (P<.10). [h]Winter gain (P<.10).

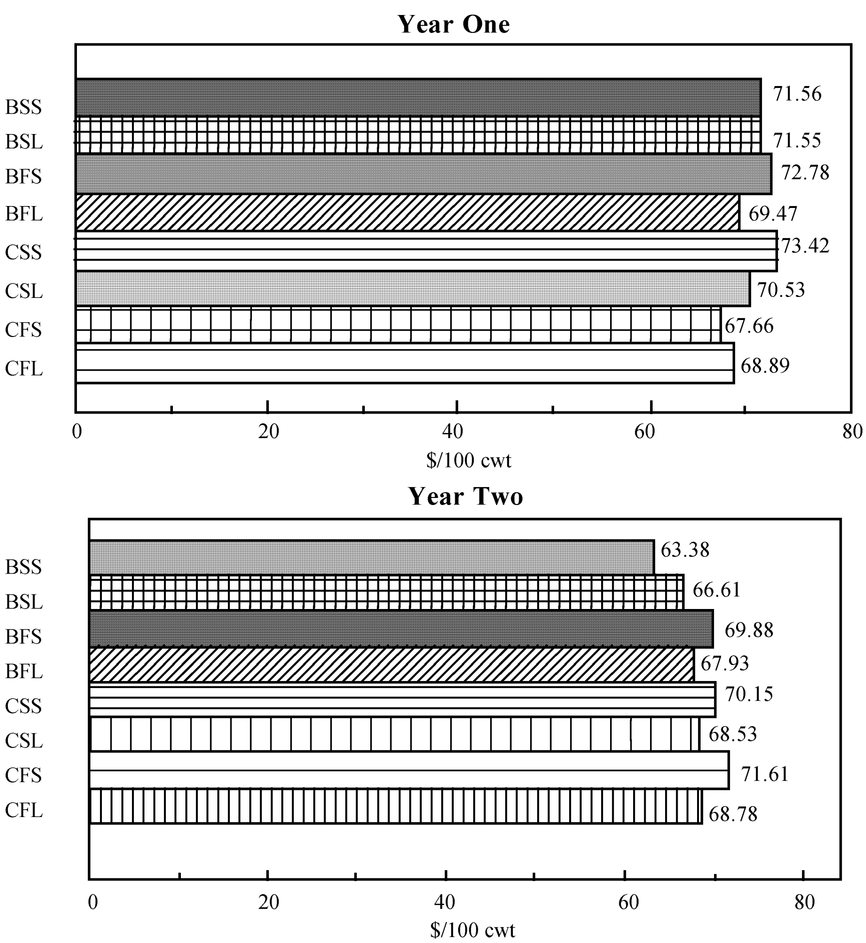

Figure 1. Breakeven analysis of management systems, coded from top three lines, Table 2.

2. In year two, Continental cross cattle that grazed cornstalks in the winter and grazed in the summer for the Long season had the highest breakeven. The difference in the two years may be explained by the biological differences in the cattle and the summer forage available.

Total costs for year two were lower for the Short summer grazing group than the Long season group. Total costs for year one were lower for the British cross cattle compared to the Continental cattle when both grazed cornstalks during wintering. Breakeven analysis was considerably different between years. Year one had a Continental group with the lowest breakeven which was the highest the following year. Since the two years of results were so different in the analysis, it shows that more research is needed to find out which management system may be the best in particular years.

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