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Jeffrey D. Folmer
University of Nebraska-Lincoln

Casey N. Macken
University of Nebraska-Lincoln

Galen E. Erickson
University of Nebraska-Lincoln, gerickson4@unl.edu

Terry J. Klopfenstein
University of Nebraska-Lincoln, tklopfenstein1@unl.edu

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Summary

Two experiments were conducted over two years to evaluate effects of two developmental systems on performance and economics of long yearling steer production. Steers were wintered in the normal system with corn residue grazing and dry lot hay feeding, with 5 lb per day wet corn gluten feed as a supplement. Intensively managed steers were given 6 lb per day wet corn gluten feed and implanted with Ralgro® at the beginning of the wintering period and Synovex S® at the beginning of the dry lot phase. In addition, intensively managed steers were removed from summer pasture early. Intensive system steers were marketed in October and normal system steers were marketed in November following a finishing period. Economic analysis indicated a performance and economic advantage to the intensive system, when marketing the steers after the wintering period or after the summer grazing period; however, if steers were marketed after feedlot finishing, profitability estimates were not different.

Introduction

Nebraska research has developed a wintering system that develops long yearlings. Jordan et al. (*2002 Nebraska Beef Report*, pp. 25-29) found steers wintered at 1.5 lb daily gain had lower slaughter breakevens than steers wintered at 0.5 lb daily gain. The lower breakeven was produced by providing steers daily supplements of 5 lb (DM) of wet corn gluten feed during the corn residue grazing and drylot period in the winter/spring. In addition, Jordan et al. (*2001 Nebraska Beef Report*, pp. 41-49) fed seven levels of wet corn gluten feed to steers grazing corn residue. Using breakpoint analysis, steers began replacing grazed corn residue with wet corn gluten feed when fed more than 6 lb (DM) daily.

Increasing both weight gain and weight at sale should increase the profitability of the beef production system. In order to accomplish this, intensive management of steers may be needed. Increased levels of supplementation, growth promoting implants, short season grazing, and ionophores increase weight gain and ultimately final sale weight.

The objectives of this research were 1) to compare animal performance with our normal yearling steer production system to a more intensive shorter season production system, and 2) to compare the economic effects of our normal yearling steer production system to the more intensive, shorter season production system.

Procedure

Yearling Steer Development

Two experiments were conducted over a two-year period. In the fall of each year, 200 steers were purchased at weaning and received according to normal protocols. They were then stratified by weight and assigned to one of two yearling steer production systems, each containing one hundred steers. System one was the normal University of Nebraska yearling production system. System two was the experimental system of intensive winter management and partial season summer grazing.

Wintering Period

Steers were weaned and managed in two groups. Both groups were allowed to graze corn residue for about 89 days, from approximately December 1 until March 1. Groups were then placed in drylot for hay feeding for 49 days until approximately April 20. Steers in the normal system were supplemented daily with 5 lb (DM) of wet corn gluten feed during the entire winter production cycle, whether grazing corn residue or being fed hay.

In order to achieve increased rates of gain, steers in the intensive system were supplemented daily with 6 lb (DM) of wet corn gluten

feed. Included in this supplemental wet corn gluten feed was an ionophore, (Bovatec) fed at 170 mg/head/day. In addition, intensive steers were implanted at the beginning of the winter phase with Ralgro® and at the beginning of the hay-feeding phase with Synovex S®, while normal steers were not implanted.

Summer Period

After the wintering period, steers in both groups were weighed, implanted with Revalor®-G, and allowed to graze brome grass pasture from approximately April 20 to May 15, and then moved to native Nebraska Sandhills range to graze until their appropriate time of removal from pasture.

Normal system steers were allowed to graze the entire summer season until approximately September 1 when they were placed on feed for finishing. To increase summer grazing rates of gain and take advantage of higher summer feeder cattle markets, intensively managed steers were removed from summer pasture approximately July 1 when they were placed on feed for finishing.

Feedlot

In both years, steers were adapted to the final finishing diet in 17 days using four step-up diets containing 45%, 35%, 25%, and 15% roughage. Diets were fed for three, four, five, and five days. The final diet (7% roughage; Table 2) was formulated to contain a minimum of 13% CP, 0.7% Ca, 0.35% P, 0.6% K, 30 ay,g/ton Monensin, and 10g/ton, Tylan (DM basis). The final finishing diet contained, on a dry matter basis, 40% wet corn gluten feed, 48% high moisture corn, 7% alfalfa hay, and 5% supplement. Our goal in these experiments was to feed steers in either management system to the same degree of finish.

Initial and final weight for all periods of the system were based on two-day consecutive weights following five days of limit feeding 50% alfalfa and 50% wet corn gluten feed fed at 2% of body weight (DM basis). Slaughter weight was calculated assuming a constant dressing percent (63%). Steers were harvested at the same commercial abattoir where hot carcass weight, 12th rib fat thickness, rib eye area, USDA yield and quality grade, and marbling score, were collected following a 48-hour carcass chill.

Economic Analysis

Due to interest charges increasing over time, a separate analysis for each period was necessary. Differences between systems in input costs will be noted; otherwise it should be assumed that inputs were similar. For all sale prices including initial steer cost, winter ending price, grass ending price, and feedlot live marketing price, average weight of a pen was multiplied by the USDA western Nebraska-eastern Wyoming 10-year average price (Feuz and Burgener, *2004 University of Nebraska Cooperative Extension Bulletin,* PHREC 04-21). Initial steer cost for 500-600 lb steers was $87.04/cwt for the month of October (Feuz and Burgener, *2004 University of Nebraska Cooperative Extension Bulletin,* PHREC 04-21). Health and processing for the winter period were charged at $25 for each system plus $2 for implants, and $1 for the ionophore feed additive in the intensive system. Simple interest was charged on initial animal cost and health for the entire ownership period. All interest charges discussed herein were based on a simple 8.9% rate.

The two systems were charged a corn residue-grazing fee of $0.24/head/day during the corn residue-grazing period. Interest was charged for half of the residue grazing period plus the remainder of ownership. Wet corn gluten feed was charged to each system at a cost of $103.00/ton (DM basis; equal to a corn price of $2.44/bu [as-is]) and a mineral supplement ($406.00/ton; DM basis) at the rate of 0.11 lb/head/day (DM basis). Interest was charged on wet corn gluten feed and mineral supplement for half of the corn residue grazing period and the remainder of the ownership.

Grass hay was priced at $40.00/ton (as-is) and interest was charged on hay for half of the feeding period plus the remainder of ownership. Steer sale price for the end of the wintering period was based on winter end weight for the respective systems in the month of April. Intensive system steers were priced at $72.38/cwt for 800 to 900 lb steers, and normal steers were priced at $77.38/cwt for 700 to 800 lb steers (Feuz and Burgener, *2004 University of Nebraska Cooperative Extension Bulletin,* PHREC 04-21). Winter profit or loss was calculated by multiplying price by the respective winter final weight minus total winter costs for the appropriate treatment.

Grazing period economics were calculated on a grazing day basis. Each group of steers was charged $0.50 per head per day grazing fee which would include all supplemental grazing and water costs. Steer sale price for the end of the summer grazing period was based on grazing end weight for the respective system and the month the steers would have been marketed. Intensive steers would have been marketed in July and were assigned a sale price of $75.32/cwt for 900-1000 lb steers, and normal treatment steers were assigned a sale price of $76.98/cwt for 900-1000 lb steers for September. Since there are only seven years of pricing data for 900-1000 lb steers, these figures were used (Feuz and Burgener, *2004 University of Nebraska Cooperative Extension Bulletin,* PHREC 04-21). Grazing profit or loss was calculated by multiplying price by the respective grazing final weight minus total costs

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including the wintering costs and summer grazing costs.

Feedlot finishing economics were based on a finishing diet cost of $115.38/ton (DM; using 10-year average prices for ingredients) and individual system days on feed. Final selling price was adjusted for the appropriate time of marketing. Feedlot breakeven was calculated by dividing total cost by the live final weight. Live profit or loss was calculated by subtracting the live breakeven from the appropriate sale price for the month of marketing for the particular system. Intensive system steers were marketed in October with a 10-year average price of $70.09/cwt, and normal steers were marketed in December with a 10-year average price of $70.07/cwt (Feuz and Burgener, *2004 University of Nebraska Cooperative Extension Bulletin*, PHREC 04-21).

In addition to live sale economics, a marketing grid profitability analysis was performed. Based on three carcass grid-pricing scenarios (Table 1), profitability for each system on each grid was calculated. The three grids used in this analysis, as proposed by Feuz (*2002 Nebraska Beef Report*, pp. 39-41), were a quality-rewarding grid, a yield-rewarding grid, and a commodity grid. Premiums and discounts for each grid are summarized in Table 1 and profitability was calculated with a base price of $110.40/cwt of hot carcass weight for steers marketed in September and $112.29/cwt of hot carcass weight for steers marketed in December. Premiums and discounts were applied to these base prices. Grid profit or loss was calculated from a carcass breakeven calculated similar to live breakeven with hot carcass weight instead of final weight as the multiplier.

Table 1. Premiums and discounts for three alternative grids.

Item	Commodity	Yield Rewarding	Quality Rewarding
Prime, $[a]	6.00	3.00	10.00
Choice, $	0.00	0.00	0.00
Select, $	-7.00	-5.95	-8.05
Standard, $	-17.00	-8.95	-$23.05
Yield Grade 1, $	2.00	3.00	1.00
Yield Grade 2, $	1.00	2.00	1.00
Yield Grade 3, $	0.00	-1.00	0.00
Yield Grade 4, $	-15.00	-20.00	-12.00
Yield Grade 5, $	-20.00	-25.00	-17.00
Light & Heavy, $	-15.00	-15.00	-15.00

[a]All prices on 100 lb of carcass basis.

Table 2. Steer development performance[a].

Item	Intensive[b]	Normal	Difference	SE	*P*-value
Purchase BW, lb	543	540	3	5.7	—
Corn grazing, days	89	89	—	—	—
Dry-lot, days	49	49	—	—	—
Winter daily gain, lb	1.96	1.66	0.30	0.15	0.05
Grass BW, lb	813	769	44.0	10.2	0.06
Grass daily gain, lb	1.98	1.72	0.27	0.17	0.26
Summer grazing, days	78	128	50.0	—	—
Grass end date	July 2	August 25	—	—	—
Grass end BW, kg	968	986	18.0	14.2	0.15

[a]Steers were developed during winter, spring and summer and managed in intensive and normal yearling production systems.
[b]Intensive system = 6 lb (DM) wet corn gluten feed daily, plus Ralgro® (during corn residue grazing), and Synovex S® (during drylot feeding); Normal system = 5 lb (DM) wet corn gluten feed daily.

Table 3. Feedlot performance for intensive and normally developed steers.

Item	Intensive[b]	Normal	Difference	SE	*P*-value
Initial BW, lb	968	986	18	14.2	0.151
Dry matter intake, lb	27.8	28.8	1.0	0.60	0.04
Daily gain, lb	3.96	4.27	0.31	0.06	0.10
Days on feed	102	90	12.0	3.2	0.20
Feed/gain	7.04	6.75	0.29	0.25	0.20
Final BW, lb	1372	1371	1.0	12.6	0.97

Table 4. Carcass characteristics for intensive and normally developed steers.

Item	Intensive[b]	Normal	Difference	SE	*P*-value
Carcass wt., lb	864	864	—	7.91	0.97
Yield Grade	2.43	2.41	0.03	0.04	0.50
Fat thickness, in.	0.45	0.45	—	0.02	1.00
Longissmus, sq. in.	14.7	13.8	0.9	0.50	0.32
Marbling[a],	482	510	28	10.2	0.20
% Choice	34.5	54.0	19.5	5.53	0.13
% Select	65.5	46.0	19.5	5.53	0.13
% Yield Grade 4+	1.5	0.5	1.0	1.11	0.59
% Heavy	4.5	2.5	2.0	1.11	0.30

[a]Marbling score = 400 = Slight^0, 500 = Small^0 etc.

Table 5. Steer winter economics for intensive and normally developed steers.

Item	Intensive[b]	Normal	Difference	SE	*P*-value
Steer cost + int., $[ab]	495.30	495.40	0.10	0.85	0.88
Winter yardage + int., $	22.79	22.79	—	—	—
Winter feed + int., $	69.30	62.80	6.50	2.14	0.01
Health + int., $	10.89	8.81	2.08	<0.01	<0.01
Total cost + int., $	603.66	595.14	8.52	3.45	0.03
Winter breakeven, $[c]	74.49	77.69	3.20	0.80	0.08
Winter p/l, $	+8.20	-17.29	25.49	1.34	0.04

[a]Interest rate = 8.9%.
[b]Initial steer cost 10-year average price of $87.04/cwt for 500-600 lb steers.
[c]Intensive system sale price, 10-year average of $72.38/cwt for 800-900 lb steers; normal system sale price 10-year average of $77.38/cwt for 700-800 lb steers.

Table 6. Steer summer economics for intensive and normally developed steers.

Item	Intensive[b]	Normal	Difference	SE	*P*-value
Steer cost + int., $[ab]	498.91	505.42	6.51	7.23	0.05
Winter yardage + int., $	22.62	22.78	0.16	0.64	0.02
Winter feed + int.,$	69.84	64.12	5.72	3.04	0.02
Health + int., $	17.64	17.42	0.22	0.23	<0.01
Grazing cost + int., $	38.86	64.16	25.30	3.43	0.08
Total cost + int., $	656.08	682.75	26.68	8.27	0.07
Grazing breakeven, $[c]	67.81	69.25	1.44	0.34	0.10
Grazing p/l, $	53.88	26.32	27.56	8.48	0.05

[a]Interest rate = 8.9%.
[b]Initial steer cost 10-year average price of $87.04/cwt for 500-600 lb steers + interest cost for winter and summer periods.
[c]Intensive system sale price, 7-year (July) average of $75.32/cwt for 900-1000 lb steers; normal system sale price 7-year (September) average of $76.98/cwt for 900-1000 lb steers.

Results

Wintering and Summer Performance

Winter and summer performance are summarized in Table 2. Steers managed in the intensive system had significantly greater daily gains ($P = 0.05$) and grass weights ($P = 0.058$). Intensively managed steers gained 1.96 lb per day, producing a grass weight of 813 lb. Normally managed steers gained 1.66 lb per day which produced a grass weight of 769 lb.

Over the two-year period intensively managed steers grazed for an average of 78 days and gained 1.98 lb per day during the summer. Daily gain was not significantly different for the normally managed steers, but was numerically lower (1.72 lb per day) while the steers grazed for an average of 128 days. In addition, normally managed steers had a numerically greater, but not significantly ($P = 0.15$) greater feedlot in weight of 986 lb versus 968 lb for the intensively managed steers.

Feedlot Performance

Feedlot performance for the two systems is summarized in Table 3. Summer-fed, intensively managed steers had significantly ($P = 0.04$) reduced daily dry matter intakes, consuming 27.8 lb/day (DM), compared to normally managed steers who consumed 28.8 lb per day. This may be a result of decreased feedlot in weight, but more likely is a result of increased summer temperatures reducing feed intake. Summer-fed, intensively managed steers were fed for an average of 103 days, while fall fed normally managed steers were fed for an average of 91 days.

Intensively managed steers gained 3.94 lb per day versus 4.25 lb per day for the normally managed steers ($P = 0.08$). Fall fed, normally managed steers had a numerically ($P = 0.17$) lower feed conversion ratio of 6.78 versus a 7.08 ratio for the summer fed intensively managed steers. No differences were present in feedlot final weight, which averaged 1372 lb for the intensively managed steers versus 1371 lb for the normally managed steers.

Carcass Characteristics

Carcass characteristics for the two groups of steers are summarized in Table 4. Equal feedlot final weight between treatments resulted in equal average hot carcass weights for the two treatment groups of 864 lb. Steers in the two systems had an average of 0.45 inches of 12th rib fat thickness. In addition USDA yield grade did not differ between treatments with intensively managed steers having an average yield grade of 2.43, with normally managed steers averaging 2.41. Summer fed intensively managed steers had an average marbling score of 482 and fall fed normally managed steers had an average of 510 (400 = Select^0; 500 = Choice^0; $P = 0.19$).

Steer Development Economics

Economics of winter and summer periods are summarized in Tables 5 and 6. Winter feed and health costs were significantly greater for the intensive system steers ($P = 0.01$). This resulted in a significant ($P = 0.03$) increase in the total costs. Differences in costs and weights at winter's end resulted in a tendency for a difference ($P = 0.08$) in the winter breakeven for the two systems. Normal system steers had a winter breakeven of $77.69 versus $74.49 for the intensive system. This led to significantly ($P = 0.04$) greater profitability

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for the intensive system. Intensive system steers showed a profit of $8.20 per head while normal system steers showed a loss of $17.29 per head.

Due to the effect of time on interest costs, significant increases were present for normal system steer cost ($P = 0.05$) and winter yardage cost ($P = 0.02$). In addition, normal system grazing costs were greater ($P = 0.08$) at $64.14 per head versus $38.86 for the intensive system. This resulted in a decreased ($P = 0.10$) breakeven at the end of the grazing period for the intensive system despite the increased weight at the end of the grazing period for the normal system. Normal system grazing breakeven was $69.25 versus $67.81 per head for the intensive system. This decreased breakeven for the intensive system resulted in a significant ($P = .05$) increase in intensive system profitability ($53.88 versus $26.32) for the normal system.

Feedlot Economics

Feedlot finishing economics are summarized in Table 7. Feedlot feed ($P = 0.09$), yardage ($P = 0.20$), and total health costs ($P < 0.01$), increased in the intensive system due to the increased days on feed and winter implants. However, due to decreased summer grazing days, days of ownership were less in the intensive system. Increased ownership days caused increased steers costs ($P = 0.06$) and increased winter yardage cost ($P = 0.01$) for the normal system. However, total costs were not different between the two systems. Intensive steers had a total cost of $897.02 versus $902.79 for the normal system ($P = 0.40$).

Similar total steer costs coupled with similar live final weights resulted in a similar ($P = 0.55$) feedlot breakeven of $65.85 for the normal system and $65.40 for the intensive system. As can be expected, similar breakevens and similar live final weight produced similar ($P = 0.56$) live feedlot profitability.

As could be expected with similar hot carcass weight and costs, carcass breakeven price was similar ($P = 0.55$) between treatments. Analyzing the carcass data and marketing the steers on a grid basis, normal system steers showed numerically greater profitability. If steers were marketed on a quality-rewarding grid, normal steers returned a profit of $78.76 versus $49.55 per head for the intensively managed steers ($P = 0.27$). In addition, if steers were sold on a yield-rewarding grid, normal system steers showed a profit of $87.32 versus $62.54 per head for the intensive system ($P = 0.27$). If steers were sold on a commodity grid, the result was the same. Normal system steers resulted in a profit of $77.89 versus $51.16 for the intensive system ($P = 0.27$). These numerical differences in grid profitability are most likely a direct result of the tendency ($P = 0.12$) for an increase in the percentage choice in the normal system.

Results of this study indicate intensive management of long yearling steers can produce greater profitability if a producer is going to market the steers after the wintering or grazing periods. However, if the producer is going to finish the steers in the feedlot, differences in profitability disappear when selling on a live or carcass basis. Increases in profitability may be achieved with the normal system if marketed on a grid due to slight differences in carcass quality.

Table 7. Feedlot economics for intensive and normally developed steers.

Item	Intensive[b]	Normal	Difference	SE	*P*-value
Steer cost + int., $[a]	518.39	524.52	6.13	0.89	0.06
Winter yardage + int., $	23.87	24.16	0.29	0.50	0.01
Winter feed + int.,$	73.35	67.33	6.02	1.49	0.01
Grazing cost + int., $	40.48	66.80	26.32	4.29	0.09
Feedlot yardage + int., $[b]	31.02	27.37	3.65	0.99	0.20
Feedlot feed + int., $[c]	165.92	151.51	14.41	3.27	0.09
Total health + int., $	30.39	27.45	2.94	0.03	< 0.01
Total cost + int., $	897.02	902.79	5.77	3.52	0.40
Live breakeven, $[d]	65.40	65.86	0.46	0.45	0.55
Live p/l, $	64.37	57.84	6.53	6.72	0.56
Carcass breakeven, $[e]	103.81	104.54	0.73	0.72	0.55
Quality p/l, $	49.56	78.76	29.21	3.6	0.27
Yield p/l, $	62.53	87.32	24.81	1.6	0.27
Commodity p/l, $	51.16	77.89	26.71	2.5	0.27

[a]Interest rate = 8.9%.
[b]Yardage $0.30/day.
[c]Ration cost $115.38/ton (DM).
[d]Calculated from total system cost and a live sale price $70.09/cwt.
[e]Carcass Base Price of $112.27/cwt.

[1]Jeffrey D. Folmer, Casey N. Macken, research technicians; Galen E. Erickson, assistant professor; Terry J. Klopfenstein, professor, Animal Science, Lincoln.