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# Comparison of a Long Yearling System and Calf-fed Performance and Economics

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## Summary

*A study was conducted to determine differences in performance, carcass characteristics, and profitability of a calf-feeding and a yearling production system. Yearlings had higher daily gains compared to calf-feds; however, calf-feds were more efficient than yearlings. Yearlings produced more weight than calf-feds leading to an improvement in profitability for yearlings compared to calf-feds. There were no differences in yield grade or percentage grading Choice for yearlings compared to calf-feds, even though calf-feds had higher fat thickness compared to yearlings.*

## Introduction

There are two major types of cattle production systems. One is an extensive system where cattle are placed in a backgrounding program after weaning and before finishing. The other is an intensive system where cattle are weaned and fed a high concentrate diet until slaughter.

Heavier calves are suited for intensive finishing systems which results in acceptable carcass weights at a quality grade of Choice. If larger framed animals are placed in an extensive production system, animals may become too heavy and produce overweight discounts. In contrast, lighter, smaller framed animals can be grown for a period of time in an extensive system and still be slaughtered at acceptable weights. Smaller framed animals can enter intensive production systems; however, this leads to lighter carcasses and decreased profitability because of the amount of weight sold.

Therefore, the objectives of this study were to compare a calf- and a

yearling-finishing system by analyzing performance, carcass characteristics, and profitability.

## Procedure

### Experiments

The calf vs. yearling system comparison used data from the University of Nebraska from 1996-2004. Data used in this project are from a calf-feeding or a yearling grow/finish experiments conducted each year except for 1997, where a different yearling production system was used. Calf-finishing trials beginning in the fall each year were selected for comparisons. Calves were sorted from a large pool of animals received during the fall of each year and sorted by weight. Heavier, larger framed steers from this sort were placed into a calf-feeding system. Lighter, smaller framed steers were purchased each year and placed into a yearling finishing system. The calf system represents 804 head of steers fed in 80 pens and the yearling system represents 302 head of steers fed in 18 pens.

### Calf Trials

Calf trials used in this study were selected based on the composition of the finishing diet. Finishing diets had to contain 25 - 40% wet corn gluten feed (WCGF) and either dry rolled or high moisture corn. Inclusion of WCGF at levels of 25 - 40% have not shown any differences in finishing performance of steers. Calves were weaned in the fall, acclimated to the feedlot for 20 to 40 days and placed directly on feed until slaughter in late April to early May, depending on the year.

### Yearling Trials

Steers were purchased in the fall and placed on to cornstalks from December 1<sup>st</sup> until April 20<sup>th</sup> of each year. During the wintering period

steers were supplemented 5 lb/head daily of WCGF to achieve a gain of 1.5 lb/day. After the wintering period steers were placed on brome grass pasture until the middle of May and then moved to Sandhills range until September. After completion of the summer grazing period steers were placed into the feedlot and fed until slaughter. The finishing diet contained 40% WCGF and 45% of either dry rolled or high moisture corn, depending on the year. As with the calf-feds the control cattle from the yearling studies were used to make comparisons between yearlings and calf-feds

### Economic Analysis

Initial animal price in both systems was determined using a slide of \$3.20/cwt and the USDA 1998-2004 average December feeder cattle price of \$ 98.98/cwt for a 600 lb steer. The average December price was determined by averaging the price of a 550 lb steer (\$ 102.97/cwt) and a 650 lb steer (\$ 94.98/cwt). The price slide was determined from the actual purchase prices for cattle purchased by the University of Nebraska from 2000-2005. After determining the average December price for a 600 lb steer, the slide was used to adjust the price paid for the steers, using the weight of the steers at initiation of experiments.

The interest rate used was determined using the seven-year average prime interest rate. The interest rate used is equal to prime plus 1% for the months that cattle were owned (6.6%). The interest rate was the same for both calf-feeding and yearling cost. Therefore, all costs are assessed as interest rate of 6.6%.

### Calf Finishing Economics

Calf-finishing slaughter breakevens were calculated on pens of animals from each of the respective trials. Initial animal cost was determined using the average price (\$97.37/cwt)

times the BW. Interest was applied to initial cost of the animal over the entire ownership. Health, processing, and implanting were assessed a flat rate of \$ 16.66/head. Feed costs for calf-feds were based on the seven-year average price of ingredients for the months that ingredients were used. Depending on type of corn processing used in the calf feeding trials a processing charge was applied to the cost of corn. Wet corn gluten feed was priced as 95% the price of corn using the seven-year average price for corn. The average ration cost for calf-fed diets was \$ 104.28/ton (DM-basis). Yardage was charged at a rate of \$0.33/head daily. Interest was charged on finishing diet and yardage for half of the feeding period. A 2% death loss was applied to the calf-feds. To calculate slaughter breakeven, total cost was divided by slaughter weight.

#### Yearling Grow/Finishing Economics

Initial steer cost was determined using the average price (\$101.44/cwt) times the BW. Health and processing were charged at \$8.33/head for the winter period and a 1.5% death loss was assumed. Simple interest was charged on initial animal cost and health for the entire period of ownership.

The cost of corn residue was charged at a rate of \$0.32/head daily. This cost includes \$0.12/head for the rent of cornstalk residue and \$0.20/head daily charged as yardage while steers grazed cornstalk residue. This yardage cost includes the cost of fencing stalk fields and cost of labor to deliver WCGF and water to the cattle. Steers were supplemented with 5 lb/head daily of WCGF for the winter period at a cost of \$84.20/ton (DM basis). Interest was charged on the WCGF for half of the winter period and the remainder of ownership.

Summer grazing cost was charged using the seven-year average animal unit month (AUM) value of \$23.29 for native range. To determine the animal unit equivalent of the steers used in this study the initial weight and weight of cattle when they were removed from grass was averaged and divided by 1,000 lbs.

Cattle were charged \$8.33 for summer health cost and a death loss of 0.5% was assessed during the summer grazing period. Interest was charged for the cost of the AUM and health cost.

Finishing costs for yearlings were similar to calf-feds using the same yardage rate of \$0.33/head daily. Feed ingredients were priced using the seven-year average for ingredients the month they were used. The average cost of the yearling diet was \$96.08/ton. There was no death loss or medical charges assessed during the finishing period for the yearling cattle. Average DMI for each pen was used to determine total feed consumption during the finishing period. Interest was charged on finishing diet and yardage for half of the feeding period. To calculate slaughter breakeven, total cost was divided by slaughter weight.

Profit was calculated two ways. Profit was calculated using seven-year average live price for the month of May (calf-fed; \$72.68/cwt) and December (yearling; \$74.23/cwt) and subtracting the total cost of production from the value of the animal. Second, profit was calculated by selling cattle on the rail in a value based market that rewards for quality. The grid used was calculated using two-years of grid prices from the plant where these cattle were sold and averaging the premiums and discounts received for the carcasses. The grid used is presented in Table 1. The base carcass for this grid was a carcass with a minimum quality grade of Choice<sup>0</sup> and an Yield Grade 3 carcass. The base price used for the animal was the average Nebraska dressed fed cattle price of a Yield Grade 3, Choice<sup>0</sup> for calf-feds in May (\$120.69/cwt) and yearlings in December (\$121.52/cwt) from 1998 to 2004. This price was calculated using the Nebraska Dressed Price (1998 to 2004) adjusted by adding the sum of 1 minus the average Choice grading percentage for the month of May for calf-feds and December for yearlings multiplied by the Choice/Select spread for the month of May and December.

**Table 1. Premiums and discounts for grid marketing analysis.**

Item, \$/cwt	Calf-fed	Yearling
Prime	8.00	8.00
Upper Choice	3.00	6.00
Choice	0.00	0.00
Select	-9.01	-8.10
Standard	-10.50	-15.00
Yield Grade 1	8.00	3.00
Yield Grade 2	4.00	3.00
Yield Grade 3	0.00	0.00
Yield Grade 4	-10.00	-10.00
Yield Grade 5	-15.00	-17.49
Carcass weight > 950 lbs	-10.00	-10.00
Carcass weight > 1000 lbs	-20.00	-20.00

## Results

### Animal Performance and Carcass Characteristics

Animal performance data are presented in Table 2. At receiving calf-feds were 116 lb heavier ( $P<0.01$ ) than steers entering the yearling/grow finish system. However, when comparing calf-feds to yearlings at feedlot entry the yearling cattle were 315 lb heavier ( $P<0.01$ ) than calf-feds. The increase in initial feedlot BW led to a 83 lb heavier ( $P<0.01$ ) final BW for yearling cattle compared to calf-feds. Yearlings consumed more DM/d ( $P<0.01$ ) compared to calf-feds. Calf-feds consumed 838 lb more total DM ( $P<0.01$ ) during the finishing period compared to yearlings. The increase in total DM is because calf-feds were fed 78 days longer ( $P<0.01$ ) than yearlings. Yearlings had 0.72 lb greater ( $P<0.01$ ) daily gain compared to calf-feds; however, calf-feds were 16.7% more efficient ( $P<0.01$ ) than yearlings. Carcass characteristics of yearlings and calf-feds are presented in Table 3. When comparing hot carcass weight, yearlings were 52 lb heavier than calf-feds ( $P<0.01$ ).

Calf-feds had greater fat thickness ( $P<0.01$ ) compared to yearlings, however, marbling was not different ( $P=0.21$ ) when comparing production systems. There was no difference in the percentage of animals grading Choice or higher ( $P=0.13$ ) or USDA yield grade ( $P=0.46$ ) when comparing production systems.

(Continued on next page)

## Economic Results

Results from the economic analyses are presented in Table 4. Initial animal cost was \$93.96 ( $P<0.01$ ) higher for calf-feds compared to yearlings, because the calf-feds were 116 lb heavier at receiving than yearlings. During the yearling growing phase, winter cost of grazing corn stalks and supplementing WCGF totaled \$78.72 and Sandhills Range rental was \$90.10 for the summer grazing period. When comparing the cost of the finishing periods the calf-feds had \$25.80 ( $P<0.01$ ) higher yardage cost due to increased days on feed, and \$54.63 ( $P<0.01$ ) more feed cost due to increased total feed consumption. However, yearlings accrued \$25.60 ( $P<0.01$ ) more interest during ownership due to the increase in the length of ownership compared to calf-feds. Death loss was not different, when considering the percentage of animals that died before harvest; however, the cost of yearling death loss was \$0.31 more per head ( $P=0.02$ ) than calf-feds, because some yearlings died in the summer grazing period after wintering cost of production had occurred and the animal was heavier when it died compared to calf-feds.

When comparing total cost of production, breakevens, and cost of gain across production systems, yearlings had a slight advantage due to increased total weight gain in the production system and low input cost in the winter and summer growing periods of production. Total cost of production was \$20.80/head higher for yearling cattle ( $P=0.02$ ) compared to calf-feds; however breakevens (\$/cwt) were \$2.88 lower for yearling cattle ( $P=0.04$ ) compared to calf-feds. The advantage in breakevens for yearling cattle is due to the increase in weight gain during the production system and yearling cost of gain during production was not different compared to calf-feds. When comparing live and grid values of yearlings and calf-feds; yearlings were \$80.63 ( $P<0.01$ ) and \$62.53 ( $P<0.01$ ) more valuable than calf-feds, respectively. The increase in yearling value led to a \$60.04 ( $P<0.01$ ) and \$41.91 ( $P<0.01$ ) higher profitability for yearlings compared to calf-feds, respectively.

**Table 2. Animal performance as a main effect of treatment**

Item	Calf-fed	Yearling	SEM
Initial BW, lb	642 <sup>a</sup>	526 <sup>b</sup>	5
FINT <sup>c</sup> , lb	642 <sup>a</sup>	957 <sup>b</sup>	7
Final BW, lb	1282 <sup>a</sup>	1365 <sup>b</sup>	8
Feedlot ADG	3.81 <sup>a</sup>	4.53 <sup>b</sup>	0.04
DOF <sup>d</sup>	168 <sup>a</sup>	90 <sup>b</sup>	1
DMI, lb/d	21.36 <sup>a</sup>	30.56 <sup>b</sup>	0.15
F/G	5.63 <sup>a</sup>	6.76 <sup>b</sup>	0.02
Total Feed <sup>e</sup> , lbs	3591.9 <sup>a</sup>	2754.0 <sup>b</sup>	32.1

<sup>ab</sup>Means within a row with different superscripts differ ( $P<0.01$ ).

<sup>c</sup>FINT = initial BW at the beginning of the finishing period.

<sup>d</sup>DOF = days on feed.

<sup>e</sup>Total Feed = amount of feed consumed during the finishing period.

**Table 3. Carcass characteristics as a main effect of treatment.**

Item	Calf-fed	Yearling	SEM
Carcass weight, lb	808 <sup>a</sup>	860 <sup>b</sup>	5
Fat thickness, in	0.53 <sup>a</sup>	0.47 <sup>b</sup>	0.01
Yield grade	2.71	2.60	0.14
Marbling Score <sup>c</sup>	510	525	9.9
% Choice	58.4	65.0	3.8

<sup>ab</sup>Means within a row with different superscripts differ ( $P<0.01$ )

<sup>c</sup>Marbling score = 400=slight<sup>0</sup>, 500=small<sup>0</sup>, etc.

**Table 4. Economic analysis as a main effect of treatment**

Item	Calf-fed	Yearling	SEM
Steer cost, \$	627.50 <sup>a</sup>	533.54 <sup>b</sup>	5.11
Wintering cost, \$		78.72	
Summer cost, \$		90.10	
Interest <sup>c</sup> , \$	24.95 <sup>a</sup>	50.55 <sup>b</sup>	1.19
Feed cost, \$	188.34 <sup>a</sup>	133.71 <sup>b</sup>	6.54
Yardage, \$	55.58 <sup>a</sup>	29.78 <sup>b</sup>	1.90
Death loss, \$	13.43 <sup>a</sup>	13.74 <sup>b</sup>	0.10
Total Cost, \$	925.09 <sup>a</sup>	945.89 <sup>b</sup>	7.07
COG <sup>cd</sup> , \$	42.97	43.32	1.24
Breakeven <sup>d</sup> , \$	72.26 <sup>a</sup>	69.38 <sup>b</sup>	1.12
Live Value <sup>e</sup> , \$	932.28 <sup>a</sup>	1012.91 <sup>b</sup>	19.26
Grid Value <sup>f</sup> , \$	955.19 <sup>a</sup>	1017.72 <sup>b</sup>	15.95
Live p/l <sup>g</sup> , \$	6.83 <sup>a</sup>	66.87 <sup>b</sup>	15.40
Grid p/l <sup>g</sup> , \$	29.68 <sup>a</sup>	71.59 <sup>b</sup>	10.53

<sup>ab</sup>Means within a row with different superscripts differ ( $P<0.05$ )

<sup>b</sup>Interest is the total amount of interest accrued from the animal and all cost of production.

<sup>c</sup>All prices on a cwt carcass basis.

<sup>d</sup>COG is the cost of gain for the entire production system.

<sup>e</sup>Live sale price of \$74.23/cwt for yearlings and \$72.68/cwt for calf-feds.

<sup>f</sup>Carcass base price of \$121.52/cwt for yearlings and \$120.69/cwt for calf-feds.

<sup>g</sup>p/l is profit or loss.

Yearlings have an advantage in performance in the feedlot due to the increased gain and less feed consumed during the finishing period. However, yearlings require more days of ownership in order to reach harvest. Even though calf-feds may be more efficient in gain, yearlings are more profitable than calf-feds, having lower breakevens than calf-feds, because yearlings

produce more weight and exhibit no difference in marbling scores and yield grades.

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