

The Heifer Bull Project: Update and Economic Analysis

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Introduction

Using sires of low birth weight potential (heifer bulls) on virgin heifers has been shown to decrease calving difficulty and increase live calving percentages. However, the resulting offspring may not do well in finishing programs where the animals are placed on a high-energy finishing ration soon after weaning. The present research program seeks to assess calving ease of sires of different birth weight potentials when used on virgin heifers and to explore finishing options for the resulting offspring.

Calving Ease Study

Year One (2008-2009): One hundred eight head of virgin heifers were stratified by frame score and weight within frame score. Twelve head of exceptionally large and small heifers were removed from the main study and diverted to a demonstration project using Galloway sires. The remaining heifers were randomly assigned to Moderate birth weight potential sires (Angus Sires with birth weight EPD between -3.5 and + 0.8 lb.) and Very Low birth weight potential sires (Lowline Sires). There was a significant sire birth weight potential by calf sex interaction for birth weight and calving ease with no difference in birth weight and calving ease between heifer calves of the two sire groups but bull calves from the Moderate sires had heavier birth weights and greater calving difficulty than bull calves from Very Low sires (Table 1.). Both steer and heifer calves from the Moderate sires were heavier at weaning (Table 1).

Year Two (2009-2010): An intermediate sire birth weight group was added termed the “Low” birth weight potential group. It consisted of Red Angus sires with birth weight EPD’s between -6.1 lb. and - 8.1lb. which translate into -3.3 to -5.3 lb. birth weight EPD’s on Angus scale. The birth weight EPD range of the Moderate sire group was narrowed to -1.0 to +1.0 lb. and a Red Angus AI sire whose converted birth weight EPD fit the range was included in the Moderate group. One hundred seventeen virgin heifers were stratified by frame score weight within frame score. Twelve very large and very small were removed from the main study and placed in diverted to a demonstration project using Galloway sires. The remaining 105 heifers were randomly allocated to the Moderate, Low and Very Low sire groups. Unlike year one, there was no sire birth weight potential by calf sex interaction. Averaged across steer and heifer calves the calves from the Moderate sires were heavier at birth and experienced greater calving difficulty than calves from the Low and Very Low birth weight potential sires (Table 2.). The calves from the Low and Very Low sires did not differ from each other in birth weight or calving difficulty. Analysis of calf weights when pairs were turned out to pasture a few weeks ago shows that calves from the Very Low sires were lighter at turnout than calves from the Low and Moderate sires (Table 2.).

Stocker-Finishing Study

In May of 2009 steer calves from born to first-calf heifers in 2008 were frame scored and sent to 6 pastures. Steers with frame scores of 2 and 3 were considered small frame and those with frame scores of 4, 5, and 6 were considered medium frame. July 1 half of the medium frame steers and half of the small frame steers in each pasture were removed for feedlot finishing on a diet of corn, hay and a commercial intake regulator. The remaining steers were left in the pastures to be forage-finished. At the end of the grazing season forage-finish steers which had not yet reached USDA Choice quality grade as determined by ultrasound were pen-fed on a high-forage diet until reaching USDA Choice with 25 months of age being the default slaughter endpoint. Complete study details are found in the [2009 CGREC Grass & Beef Review](#).

Economic analyses were performed to calculate the residual value of small and medium frame steers at weaning by subtracting backgrounding, grazing, and finishing costs from value of steer at slaughter. Tables 3-6 show the returns for medium and small frame steers under both finishing systems. For comparison Table 7 shows the returns from 6 large-frame 2008 CGREC steers entered in the 2008-2009 Eastern Dakota Feedout and placed in a custom finishing yard in December of 2008. For the small and medium frame steers a short period of grazing followed by finishing on a high-corn diet proved to be more profitable than forage finishing when all animals were marketed at commodity beef prices. For medium frame steers the forage-finished animal would have to receive a 5-cent per lb. premium to be as profitable as the grain-finished animal. For small-frame steers a forage-finished animal would need a 7-cent per lb. premium to be as profitable as a grain-finished animal. It should be noted that the lowest residual value per lb. of weaned calf was from the large-frame steer calves sent away to the steer futurity.

The major areas of opportunity to decrease the production costs in the CGREC forage-finishing system are to: First increase the stocking rate in the research pastures to decrease the land cost per lb. of pasture gain, long-term grazing-intensity research at CGREC suggests stocking rate could be substantially increased without affecting individual animal performance; Second, utilize cover crop grazing as a way to extend the grazing season and limit the amount of time animals spend being finished on hay in the pens as this segment of production cycle has the highest cost per lb. of gain.

As with the forage-finishing system, a major opportunity to decrease costs in the system of half-season grazing followed by feedlot finishing is to place more animals in each pasture and get them on the pasture earlier in the season to increase gain per acre. Another major opportunity for decreasing costs is to develop an intake limiter that is less costly than the commercial intake regulator currently being used. The cost of the commercial intake regulator accounts for a third of the feed costs during the finishing phase.

Range Management Considerations

The practice of stocking heavily the first half of the grazing season and resting during the second half of the grazing season is called intensive early stocking. It generally improves gain per acre without sacrificing gain per animal. It has the potential decrease abundance of exotic cool-season invasive species, but if mismanaged can also decrease abundance of native cool-season grass species. Modified intensive early stocking was developed at Kansas State University's Hays Research Center in the midgrass area of west-central Kansas. It involves stocking somewhat lighter than intensive early stocking and only removing half of the animals at mid-season. The grazing management used in this study most closely resembles modified intensive early stocking.

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Table 1. Birth weights, calving difficulty scores, weaning weights, and dam weight loss pre-calving to weaning, by sire birth weight potential and calf sex for calves born to first calf heifers at CGREC in 2009.

Sire Birth Weight Potential & Calf Sex	Birth Weight	Calving Difficulty	Weaning Weight		Dam Weight Loss Pre-calving to Weaning
			Actual	Projected 205 Day	
	(lb.)	(Scale 1 to 4)	(lb.)	(lb.)	(lb.)
Moderate Bull-Steer	88	1.7	482	551	97
Moderate Heifer	73	1.0	477	521	92
Very Low Bull-Steer	74	1.1	444	485	69
Very Low Heifer	72	1.0	413	452	52
Least Significant Difference ($P < 0.05$)	6	0.3	28	24	31

Table 2. Birth weight, calving difficulty scores, and pasture turnout weights of calves born to first-calf heifers spring 2010 at CGREC by sire birth weight potential. Values are averaged across bull and heifer calves as statistical analysis of 2010 data showed no interaction between calf sex and sire birth weight potential.

Sire Birth Weight Potential	Birth Wt.	Calving Difficulty	Turnout Wt.
	(lb.)	(Score 1 to 4)	(lb.)
Moderate	79 ^a	1.5 ^a	164 ^a
Low	73 ^b	1.1 ^b	169 ^a
Very Low	67 ^b	1.1 ^b	142 ^b
Values in the same column with different superscripts differ ($P \leq 0.05$). For birth weight and calving difficulty, calves from Moderate birth weight potential sires were significantly heavier at birth with significantly greater calving difficulty than calves from Low or Very Low birth weight potential sires which did not differ significantly from each other. For pasture turnout weights calves from the Very Low birth weight potential sires were significantly lighter than calves from the Low and Moderate birth weight potential sires which did not differ significantly from each other.			

Table 3. Residual value of 2008 medium-frame steer calf at weaning when backgrounded for 218 days, grazed for 49 days, then finished on a corn-based diet for 123 days. Costs do not include interest. Steers graded 100% Choice with an average yield grade of 2.8.

Revenue		Costs	
Steer Value at Slaughter		Trucking	\$50
1354 lb. X \$0.81	\$1,096.74	Feedlot gain	
		427 lb. X \$0.70/lb.	\$298.90
		Pasture Gain	
		108 lb. X \$0.59/lb.	\$63.72
		Backgrounding Gain	
		327 lb. X \$0.51/lb.	\$166.77
		Total Costs	\$579.39
Residual Value of Steer Calf at Weaning			
Per head			
\$1096.74 - \$579.39	\$517.35		
Per lb.			
\$517.35 / 499 lb.	\$1.04		

Table 4. Residual value of a small-frame 2008 steer calf at weaning when backgrounded for 218 days, grazed for 49 days, then finished on a corn-based ration for 133 days. Costs do not include interest. Steers graded 100% Choice with an average yield grade of 2.8.

Revenue		Costs	
Steer Value at Slaughter 1127 lb. X \$0.81	\$912.87	Trucking	\$50
		Feedlot Gain 392 lb. X \$0.70/lb.	\$274.40
		Pasture Gain 83 lb. X \$0.59/lb.	\$48.97
		Backgrounding Gain 262 lb. X \$0.51/lb.	\$133.62
		Total Costs	\$506.99
Residual Value of Steer Calf at Weaning			
Per Head \$912.87 - \$506.99	405.88		
Per lb. \$405.88 / 399 lb.	\$1.02		

Table 5. Residual value of a medium-frame 2008 steer calf at weaning when backgrounded for 218 days, grazed 151 days, and finished on a high-forage drylot ration for 127 days. Costs do not include interest. Steers graded 60% Choice with an average yield grade of 2.

Revenue		Costs	
Steer Value at Slaughter		Trucking	\$15
1292 lb. X \$0.82	\$1,059.44	Slaughter & Grading	\$85
		Finishing Pen Gain	
		166 lb. X \$0.94/lb.	\$156.04
		Pasture Gain	
		294 lb. X \$0.66*	\$194.04
		Backgrounding Gain	
		327 lb. X \$0.51/lb.	\$166.77
		Total Costs	\$616.85
Residual Value of Steer Calf at Weaning			
Per head			
\$1,059.44 - \$616.85	\$442.59		
Per lb.			
\$442.59 / 499 lb.	\$0.89		
* Average of \$0.59/lb cost of gain non-supplemented steers and \$0.73/lb cost of gain supplemented steers.			

Table 6. Residual value at weaning for a small-frame 2008 steer calf backgrounded for 218 days, grazed for 151 days, and finished on a high-forage diet in a pen for 145 days. Costs do not include interest. Steers graded 50% Choice with an average yield grade of 2.

Revenue		Costs	
Steer Value at Slaughter		Trucking	\$15
1040 lb. X \$0.82	\$852.80	Slaughter & Grading	\$85
		Finishing Pen Gain	
		149 lb. X \$0.94/lb.	\$140
		Pasture Gain	
		222 lb. X \$0.66/lb.*	\$146.52
		Backgrounding Gain	
		262 lb. X \$0.51/lb	\$133.62
		Total Costs	\$520.14
Residual Value of Steer Calf at Weaning			
Per Head			
\$852.80 - \$520.14	\$332.66		
Per lb.			
\$332.66 / 399 lb.	\$0.83		
*An average of the \$0.59/lb. cost of gain for non-supplemented steers and the \$0.73/lb. cost of gain for supplemented steers.			

Table 7. Residual value at weaning of a calf-fed 2008 large frame CGREC steer calf custom-fed in the 2008-2009 Eastern Dakota feedout. Steers averaged 33% choice with average yield grade of 2.3 on a set of 6 steers.

Revenue		Cost	
Steer Value at Slaughter		Trucking to Feedyard	\$15
1350 lb. X \$0.8358	\$1,128.33	Total Feedyard & Marketing Costs	\$594.83
		Total Cost	\$610
Residual Value of Steer Calf at Weaning			
Per head			
\$1,128.33 - \$610	\$518.50		
Per lb.			
\$518.50 / 710 lb.	\$0.73		