

# **ECONOMICS OF RAISING BEEF REPLACEMENT HEIFERS**

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## **Introduction**

The general rule of thumb for successful replacement heifer development has stated heifers should be fed to achieve 60 to 65% of their expected mature body weight (MBW) at time of first breeding (Wiltbank et al. 1966; Short and Bellows 1971). Developing heifers is a costly endeavour; the 2 year biological time lag means a 2014-born heifer calf will not generate revenues until fall 2016 when her first calf is weaned if she is successfully bred. With ever increasing production costs, producers are looking for ways to reduce costs while maintaining or improving performance.

A study was conducted at the Western Beef Development Centre (WBDC) (Lanigan, SK) to compare heifer reproductive performance, calf performance and system costs for heifers developed to 55% MBW (moderate gain) versus 62% MBW (high gain) in either a bale graze or drylot setting. Over three years, heifers (n=174) were evaluated on animal, reproductive, progeny and economic performance.

## **Results**

### **Trial Management**

The average mature cow weight at the Western Beef Development Centre is 1410 lb.. The retained heifer calves in this study averaged 558 lb at weaning. Therefore, the moderate-gain heifers needed to gain 1.1 lb/d in order to reach 775 lb (55% of 1410 lb) by first breeding and the high-gain heifers needed to gain 1.5 lb/d in order to reach 874 lb (62% of 1410 lb).

The post-wean diet consisted of smooth bromegrass-alfalfa hay and rolled barley (free choice salt and mineral were also provided). Each weight group's diet formulation was based on NRC (1996) requirements for growing heifers and the targeted rate of gain. All heifers were placed on their respective post-wean diets in early November and were fed those diets for approximately 200 d until spring pasture turnout at the start of June. The heifers were exposed to a 63 d natural service at a bull: heifer ratio of 1:25. From pasture turnout onward, the heifers were managed together; first on mixed crested wheatgrass/smooth bromegrass

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pastures, then on barley greenfeed swaths (November 1 to mid-Feb) and then on grass-legume hay with range pellet supplementation (mid-Feb to May 30).

### **Economic Analysis**

WBDC recognizes the importance of validating the management practices it investigates with economic assessment. A new practice is not worth adopting if it is not both practical and profitable.

Animal performance measures (body weight, calf birth date, calf birth weight) were combined with details on feed intake and feeding occurrence to compare the moderate-gain and high-gain heifer development costs. For full details on animal performance, please read Fact Sheet 2014-02 "Effect of development system on growth and reproductive performance of beef heifers".

As expected, the moderate-gain heifers had lower development costs in the post-wean backgrounding phase. The moderate-gain heifers were fed 12 lb/hd/d (DM basis) of hay and 2.5 lb/hd/hd rolled barley (on 172 of the 200 d). The high-gain heifers were fed 10.15 lb/hd/d (DM basis) hay and 4.95 lb/hd rolled barley daily. Hay was valued at \$0.03/lb and the rolled barley was valued at \$0.083/lb (\$182.57/tonne).<sup>1</sup> Feed costs were 28% lower for the moderate-gain heifers.

Yardage costs - equipment, labour, repairs, depreciation and manure - factor in the number of times the heifers were fed as well as the system infrastructure and inputs (e.g., bale graze vs drylot). Yardage costs were 6% lower for the moderate-gain heifers, which is largely a function of the fewer number of days they were fed rolled barley.

As shown in Table 1, the moderate-gain heifer program cost \$1.06/hd/d while the high-gain program cost \$1.35/hd/d, a difference of \$57/head or 21% over a 200-d post-wean development phase.

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<sup>1</sup> Hay and rolled barley costs are based on actual prices paid for these feedstuffs.

**Table 1. Moderate-gain vs High-gain Heifer Development (Post-Wean Phase)**

	Moderate-Gain	High-Gain
	-----\$/hd/day-----	
<b>Feed Costs</b>		
Hay	\$0.45	\$0.42
Barley	\$0.19	\$0.49
Salt & Mineral	\$0.056	\$0.057
<b>Total Feed Costs</b>	<b>\$0.70</b>	<b>\$0.97</b>
<b>Bedding</b>	<b>\$0.04</b>	<b>\$0.04</b>
<b>Yardage Costs</b>		
Machinery Cost (incl. fuel)†	\$0.10	\$0.10
Labour	\$0.16	\$0.18
Repairs - Bldgs & Fence	\$0.02	\$0.02
Depreciation	\$0.02	\$0.03
Manure Cleaning	\$0.02	\$0.02
<b>Total Yardage Costs</b>	<b>\$0.32</b>	<b>\$0.34</b>
<b>Total Costs</b>	<b>\$1.06</b>	<b>\$1.35</b>
<b>200-d Cost</b>	<b>\$212.11</b>	<b>\$269.27</b>

†Machinery included a tractor and bale shredder to bed straw, tractor to feed hay in drylot and truck to feed barley in bale graze system.

### Cost of a Bred Heifer

Factoring in the conception rate for the first two pregnancies, revenues from open cull sales and revenues from the first weaned calves is required to determine the cost effectiveness of replacement heifer development strategies. If the economic analysis is only till 1<sup>st</sup> conception, the moderate gain heifers will always be the most economical (Feuz 1992).

To estimate the cost per bred heifer, additional costs related to grazing (180 d x \$0.60/hd/d), vet/med (\$5/hd) and bull service (\$55/hd) must be considered. The total production costs were reduced by the sales revenues from open heifers (actual weight x \$1.09/lb which was the average SK weekly price for 800+ lb heifers for the weeks the open heifers were marketed in 2011 and 2012). This net cost is then adjusted by the actual conception rate less a standard death rate (2%). Table 2 shows the moderate-gain bred heifers ranged from \$1085-1183/hd (\$1109 average) and the high-gain bred heifers ranged from \$1148-\$1158/hd (\$1153 average).

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### **Cost of a Bred 2-Year Old**

When extending the analysis to 2<sup>nd</sup> pregnancy diagnosis, fall and winter feeding costs of the bred heifer as well as summer grazing with calf at side are accounted for. The bred heifers swath grazed (\$0.76/hd/d x 72 d) and then were fed a hay and pellet ration in the drylot for 110 d (total cost of \$181/hd). Summer grazing was valued at \$122/hd (\$0.80/hd/d x 153 d). Total production costs are reduced by the sales revenues from any open 2 year olds.<sup>2</sup> Costs are then reduced by the weaned calf sales.<sup>3</sup> Net production cost was divided by the conception rate less a standard death loss rate (1%) to estimate the per head cost of a bred 2-year old. The moderate-gain heifers ranged from \$879-940/hd and the high-gain heifers ranged from \$846-922. The lowest cost 2 year olds (\$863/hd average) were those backgrounded in the bale graze system.

### **Conclusions**

Moderate weight gains of replacement heifers during the post-wean phase will result in reduced feed costs. WBDC's study results shows there was no effect on the heifer's first, second and third pregnancy rate or on first and second calf performance (WBDC Fact Sheet 2014-02). However, making changes to diet composition and targeted weight gains of replacement heifers requires sound management. Producers need to use feed quality tests to develop rations for their targeted rate of gain, they need to weigh their heifers throughout development to ensure gains on track to meet targets and they need to know how past heifer cohorts have performed (e.g. conception rates) before considering a moderate-gain heifer development system.

### **References**

Feuz D.M. 1992. Replacement beef heifer economics: When prices and reproductive performance are uncertain. *Am. Soc. Farm Managers Rural Appraisers* 56:61-66.

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<sup>2</sup> The average SK Weekly D1, D2 Cow Price for the months of October and November through 2011-2013 was \$62.025/cwt was multiplied with the actual weights of the open culls.

<sup>3</sup> Calf wean weights ranged from 464 to 497 lb (unadjusted). A slide-adjusted price was estimated from Saskatchewan's average weekly steer and heifer prices during the fall run for 2011-2013.

**Table 2. Net Cost of Raising Replacement Heifers to Weaning of First Calf, 2011-2013**

	Targeted BW (TBW) <sup>1</sup>			
	Moderate gain		High gain	
	BG <sup>2</sup>	DL	BG	DL
	-----\$/hd-----			
Opportunity cost of heifer <sup>3</sup>	\$702	\$702	\$702	\$702
Winter Feed Costs				
Hay & Barley	\$124	\$134	\$182	\$182
Bedding	\$8	\$6	\$8	\$6
Mineral & Salt	\$12	\$10	\$10	\$12
Vet/Med/Bull Service	\$65	\$65	\$65	\$65
Yardage Expenses	\$62	\$68	\$62	\$74
Summer Grazing <sup>4</sup>	\$108	\$108	\$108	\$108
1 <sup>st</sup> Conception (% Pregnant)	84%	88%	91%	85%
Less Value of Cull Heifers <sup>5</sup>	\$167	\$95	\$97	\$160
Net 1st Year Costs	\$914	\$998	\$1,040	\$989
Net Cost for 1 Bred Heifer	\$1,085	\$1,133	\$1,148	\$1,158
<b>Adjusted for 2% Death Loss &amp; Opens</b>				
Feed & Yardage Expenses				
Fall Swathgrazing <sup>6</sup>	\$57	\$57	\$57	\$57
Winter	\$181	\$181	\$181	\$181
Summer Grazing <sup>7</sup>	\$122	\$122	\$122	\$122
Total 1st and 2nd year Costs	\$1,445	\$1,493	\$1,508	\$1,518
2 <sup>nd</sup> Conception (% Pregnant)	95%	95%	97%	95%
Less Value of Cull 2 Yr Olds <sup>8</sup>	\$39	\$41	\$23	\$38
Less Value of Weaned Calf	\$583	\$572	\$672	\$613
Net 1st & 2nd Year Costs	\$824	\$880	\$812	\$867
Net Cost for 1 Bred 2-Yr-Old	\$879	\$940	\$846	\$922
<b>Adjusted for 1% Death Loss &amp; Opens</b>				

<sup>1</sup>Targeted BW; moderate gain = 55% of mature BW at start of breeding; high gain = 62% of mature BW at start of breeding season.

<sup>2</sup>Development system (SYS); BG = heifers developed in field paddocks bale grazing and supplemented barley grain; DL = heifers developed in drylot pens and supplemented barley grain.

<sup>3</sup>557 lb x \$1.26/lb (2010-2011 Saskatchewan 5-600 Fall Run Average Heifer Price).

<sup>4</sup>180 d (Jun 1-Nov 30) valued at \$0.60/hd/d; based on WBDC COP Study and SK Ministry of Agriculture Pasture Lease Rate Survey (2012).

<sup>5</sup>SK Weekly average price for 800+ lb heifers \$1.09/lb x avg weight of open heifers.

<sup>6</sup>Swathgrazing valued at \$0.76/d (Kelln et al 2011) plus pellet supplementation for 9 d.

<sup>7</sup>June 1 - Nov 1 \$0.80/hd/d (Girardin, 2011).

<sup>8</sup>Avg SK Weekly D1,D2 Cow Price for Oct/Nov 2011-2013 x actual cow weights.