SHOULD SMALL FARMS RAISE THEIR OWN REPLACEMENT HEIFERS?

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Abstract

In the southern Great Plains of the United States of America, farmers are trying to determine the most profitable way to restock their cow herds after the droughts that have occurred since 2003. During this time, farmers reduced their herds by nineteen percent. In 2003, this seven state area, the southern Great Plains, contained forty percent of the United States' cow herd. This paper addresses the questions relative to the profitability of a small farm raising their own replacement heifers to expand their existing cow herds. Given the resources of small farms; if a portion of the resources are used for raising replacement females, does it add or subtract from the overall financial wellbeing of the whole farm? In addition, estimates are derived for the cost of farms to create their own replacement females based on when heifers have their calves and the number of cows in a specific herd. Published data from the Kansas Farm Management Association was used to create enterprise budgets and graphs depicting the profitability of heifer retention for different sized cow herds. The results show that a small farmer using their finite resources towards internal expansion does not increase their overall farm profitability. These results show that it is more cost-effective for small farms to purchase their replacement females from larger ranches who have economies of scale, regarding replacement heifer production.

Keywords: replacement heifers, small farms, profitability

1. Introduction

The southern Great Plains have been in a drought since 2003 causing farmers to destock their cow herds to match the new carrying capacity of the land. The states that make up the southern Great Plains are: Arkansas, Kansas, Louisiana, Missouri, New Mexico, Oklahoma and Texas. These seven states collectively, from the January first cattle inventory report of 2003, to the January first cattle inventory report of 2013 showed a reduction in beef cow numbers of 2,502,000 head according to the United States Department of Agriculture (USDA, 2013). This was a drop of 19.2 percent in a region of the United States that on January 1st, 2003 contained 40 percent of the nation's beef cow herd. This decrease in cattle in the southern Great Plains has contributed to a significant shift in the United States' cattle industry.

The size of individual beef cow herds in the southern Great Plains varies dramatically. There are 235,831 farms that have 49 or less cows, 64,081 farms that have 50 to 499 cows and 1,905 farms that have 500 or more cows (USDA, 2012). These three groups respectively have a total of 3,904,532 cows, 7,305,622 cows and 1,707,632 cows. In 2007, the average beef cow herd was 43 head in the southern Great Plains. Typically, a producer will need to replace approximately fifteen percent of the breeding females each year. This equates to six replacement heifers needed for the average size herd in this region.

Farmers in the southern Great Plains are continually evaluating how and when beef cow herd expansion will begin. When rainfall returns, and the carrying capacity of the land increases, farmers of all herd sizes will be looking for the most economical way to increase their herd.

The production system of a beef cow is a lengthy process. It is longer than most meat protein sources such as goat, sheep, chicken, pork and fish. The production interval for a cow is between 16 and 30 months depending on the breed and the age of maturity of the animal. With such a lengthy production system, it is vital to a farm's financial success to have a business plan and to create strategies that make sense both from a production and financial perspective.

The predominate calving period for cow herds in the southern Great Plains is during spring. A spring calving period would typically consist of calves born between January first and May first. These spring-born calves are typically weaned in the fall, around October first. Heifers weaned at this time should weigh approximately 227 kilograms, depending on breed and growth potential. Bos taurus breeds should reach puberty at about 60 percent of their mature weight (National Research Council, 2000). However, Bos indicus breeds mature at a later age and at approximately 65 percent of their mature weight (National Research Council, 2000). This is important to know and should be used to ensure heifers are developed to reach this target weight prior to breeding. In addition, heifers have a longer post-partum interval (Taylor and Bogart, 1988) and it is generally recommended that heifers are bred to calve one month prior to the mature cow herd to increase their opportunity to rebreed. If a farmer is trying to develop a replacement female for a herd that calves the first of January, heifers will have to reach puberty and become pregnant by February 25th to calve by December first. This paper will address the production steps and costs associated with developing a heifer from bull turn out to having the first calf.

2. Methods

Published data from the Kansas Farm Management Association was used in conjunction with stated assumptions regarding scenario analysis to create multiple enterprise budgets based on various herd sizes. The results from multiple enterprise budgets were graphed to depict the profitability of heifer retention for different sized cow herds.

The costs associated with developing and breeding replacement heifers are detailed in Table 1. This enterprise budget is for a farmer developing his own replacement heifers and begins when the management decision is made to turn out the bulls to breed the heifers. Therefore, the enterprise budget shows the market value of the heifer at the time it is to be bred and the cost of pasture allocated to the heifer from the point it is bred until the calf is born. The enterprise budget takes into account the cost of supplemental feed for 90 days, mineral for 270 days, pre-breeding vaccinations, fly control, dewormer, bull expenses and the cost to check pregnancy status. Morbidity at five percent and death loss at one percent are also included. This enterprise budget assumes labor at $11 an hour with a base time spent per day of thirty minutes and two minutes per day for each additional heifer.

Both the herd and heifer bulls were assumed to be purchased for $3,500 each and have the ability to breed 25 heifers. In the situation where a herd bull is used to breed the heifers, the bull is assumed to have the ability to cover a combination of 30 cows and heifers. This is because the bulls are being turned out for 30 more days given the heifers are bred to calve 30 days prior than the cow herd. Each farmer will need to decide whether to use an existing herd bull or use a heifer-specific bull that has acceptable birth weight and calving ease for breeding heifers. To stay within the budgeted price, if a herd bull was acceptable for breeding heifers it was assumed that growth performance of each calf was decreased by 4.54 kilograms at weaning (Table 2). It is possible to purchase bulls with high growth performance and are acceptable for heifers, but at a greater purchase price.

The second part of the enterprise budget shows other costs associated with breeding replacement heifers from a farmer's own cow herd. The first line shows the value of the heifer prior to breeding. A farmer forgoes the option of selling the heifer and instead makes the management decision to have her bred. Line two shows the non-recoverable costs allocated to open heifers that did not become or remain bred until the time pregnancy status was checked. These costs have to be spread across the heifers that do get bred. The third line is the dollar amount of how much more or less the open heifers would be worth when sold, spread across the bred heifers.

Table 1. Costs associated with breeding 28 replacement heifers to calve December first using heifer-specific bulls

Operating Inputs	Unit	Price		Quantity	$/Head	
Forage	Head	$	18.00	9.00	$	162.00
Supplement	Kg	$	0.35	326.00	$	115.21
Mineral	Kg	$	1.28	30.62	$	39.19
Vaccinations	Head	$	8.00	1.00	$	8.00
Death loss	Head	$	1 337.59	1.0%	$	13.38
Sickness	Head	$	25.00	5.0%	$	1.25
Pregnancy check	Head	$	6.00	1.00	$	6.00
Labor	Head	$	11.00	14.01	$	154.15
Heifer bull	Head	$	36.79	1.00	$	36.79
Annual cost for bull	Head	$	600.00	7.0%	$	42.86
Operating Cost					$	578.81
Value of unbred heifer at breeding	Head	$	145.50	725.00	$	1 055.00
Non-recoverable cots of opens	Head	$	406.14	15.00%	$	60.92
Sale of heifer	Head	$	(192.13)	15.00%	$	(28.82)
Opportunity cost of alternative enterprise	Head	$	200.00	75.00%	$	150.00
Opportunity cost of not implanting	Kg	$	2.76	11.34	$	100.50
Total Other Costs					$	1 337.48
Total Costs (Opetating + Other) per Heifer					$	1 916.29

Next, the opportunity costs involved with retaining and breeding heifers are considered. A farmer that chooses to use his or her resources to develop replacement heifers chooses to give up other enterprise options during that same time period. The enterprise budget assumes the producer would net $200 profit per cow, each year, and is foregone because of raising replacement females. Based on animal units, a single heifer utilizes the same amount of pasture that three fourths of a cow could be using and is the ratio used in calculations.

Finally, if the farmer chooses to retain heifers, there is a missed opportunity to use a growth implant in all of the heifer calves because at the time the implant would be administered, it would be unknown as to which heifers would be retained and which ones would be sold.

These assumptions and their associated costs were used to evaluate four scenarios: breeding replacement heifers to calve December first using heifer-specific bulls, breeding replacement heifers to calve December first using existing herd bulls, breeding replacement heifers to calve April first using heifer-specific bulls, and breeding replacement heifers to calve April first using existing herd bulls.

Table 2. Costs associated with breeding 28 replacement heifers to calve April first using existing herd bulls

Operating Inputs	Unit	Price		Quantity	$/Head	
Forage	Head	$	18.00	9.00	$	162.00
Supplement	Kg	$	0.35	326.00	$	115.21
Mineral	Kg	$	1.28	30.62	$	39.19
Vaccinations	Head	$	8.00	1.00	$	8.00
Death loss	Head	$	1 535.56	1.0%	$	15.36
Sickness	Head	$	25.00	5.0%	$	1.25
Pregnancy check	Head	$	6.00	1.00	$	6.00
Labor	Head	$	11.00	14.01	$	154.15
Additional Herd bull	Head	$	3 500.00	0.00	$	-
Annual cost for bull	Head	$	600.00	4.0%	$	22.36
Operating Cost					$	523.51
Value of unbred heifer at breeding	Head	$	141.60	905.00	$	1 281.00
Non-recoverable cots of opens	Head	$	350.84	15.00%	$	52.63
Sale of heifer	Head	$	(122.52)	15.00%	$	(18.38)
Opportunity cost of alternative enterprise	Kg	$	2.76	4.5359	$	68.44
Opportunity cost of alternative enterprise	Head	$	200.00	75.00%	$	150.00
Opportunity cost of not implanting	Kg	$	2.76	11.34	$	100.50
Total Other Costs					$	1 634.66
Total Costs (Operating + Other) per Heifer					$	2 158.17

3. Results and discussion

When the budget presented in Table 1 is analyzed for different herd sizes, the costs per replacement heifer changes (Graph 1). In the first scenario, heifers are bred to calve December first using heifer-specific bulls. The cost to raise one heifer is $4,791, $2,267 per head to raise six heifers and $1,916 per head to raise 28 heifers. In scenario 2, heifers are bred to calve December first and we assume that an existing herd bull is acceptable for breeding heifers. Given the same production system and costs, the cost to raise one heifer is $3,574, $2,125 per head to raise six heifers and $1,897 per head to raise 28 heifers (Graph 1). This shows that while it is more economical to use an existing herd bull, the costs attributed to purchasing a heifer-specific bull are six percent of the total costs when raising six or more heifers.

The effect of breeding date on the costs associated with developing replacement heifers was also considered for different herd sizes. When the budget presented in Table 2 is analyzed for different herd sizes, the costs per replacement heifer changes (Graph 2). In the third scenario, heifers are bred to calve April first using heifer-specific bulls. In this case, the cost to raise one heifer is $5,029, $2,507 per head to raise six heifers and $2,156 per head to raise 28 heifers. This shows that waiting to breed the heifers at a later date increases replacement female costs for all herd sizes. In the final scenario, heifers are bred to calve April first and we assume that an existing herd bull is acceptable for breeding heifers. The costs associated with developing one heifer are $3,901, $2,390 per head to raise six heifers and $2,158 per head to raise 28 heifers.

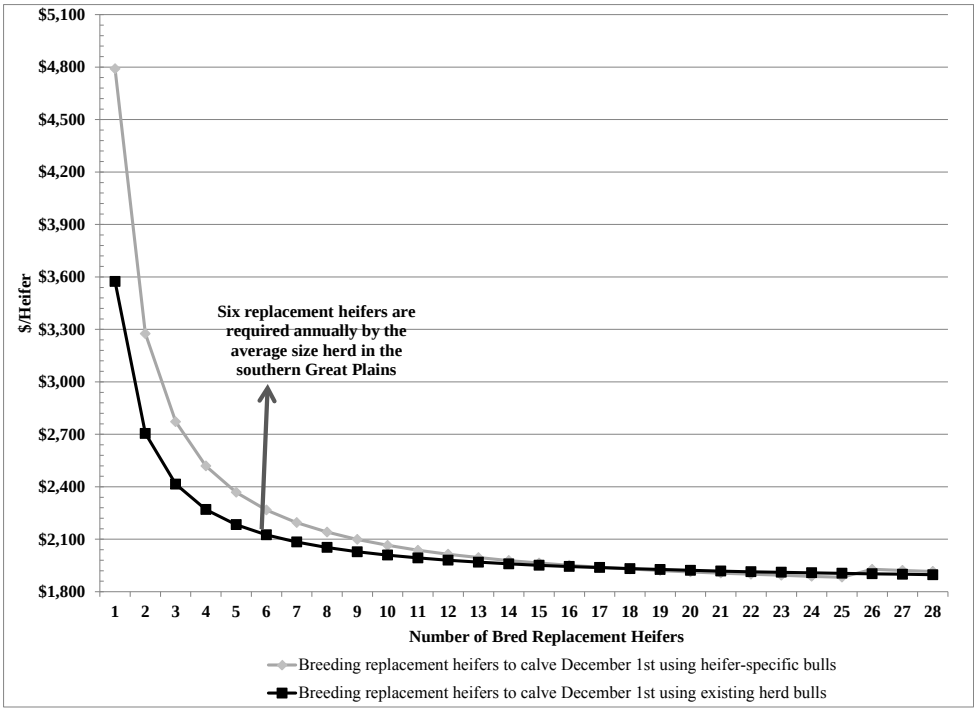

Figure 1. The Cost to Develop Bred Replacement Heifers

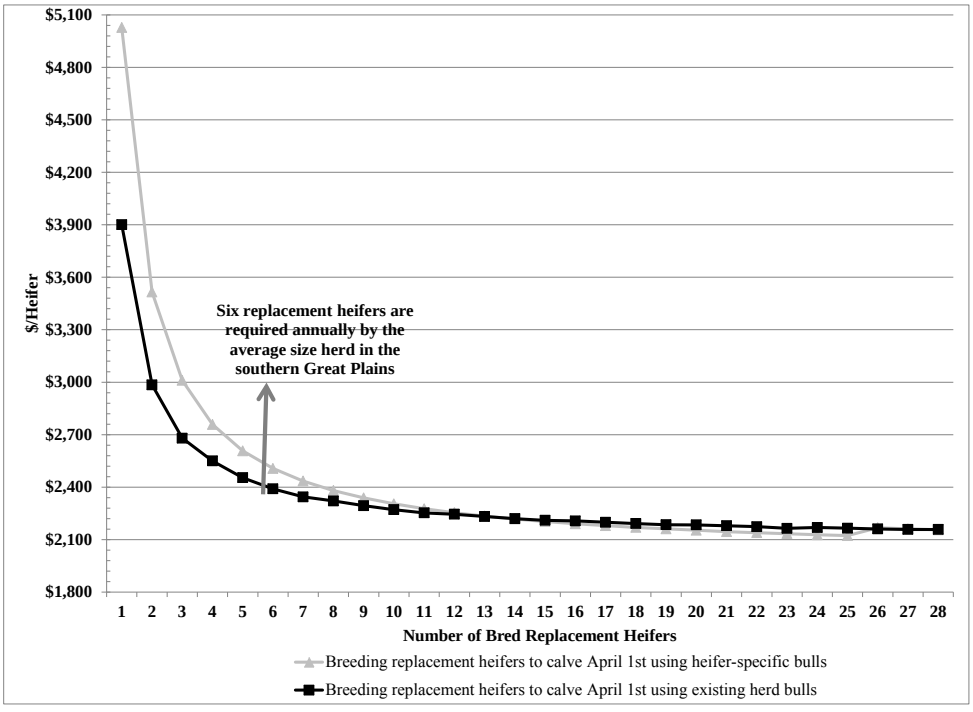

Figure 2. The Cost to Develop Bred Replacement Heifers

Based on these scenarios, heifers bred to calve December first would have the lowest cost of production and if an existing herd bull could be used, costs could be decreased further. Additionally, calves born earlier in the year will be heavier at the traditional October weaning time. However, the additional supplement required to calve at this time can be expensive and should be considered.

There are significant price differences for farmers raising their own heifer replacements depending on the number of replacement heifers produced, what bull is used and calving date. The cost of producing a replacement heifer can vary between $5,029 and $1,897 based on the assumptions used in these scenarios. As expected, the difference in production costs across scenarios is greater for the smallest herds and could be as great as $1,455 per head.

The average herd size in the southern Great Plains is 43 head, requiring about six replacement females each year. Depending on the market price and availability, it might make the most economic since for these farmers to purchase replacement heifers from a larger farm that has economies of scale. Raising six replacement heifers at a time is not the most efficient use of labor. In addition, heifers should be managed separate from the mature cows to increase production efficiency but this can add significant management complexity. Larger farms can capitalize on labor, breeding and management efficiencies to reduce production costs.

As the opportunity arises for herd expansion in the southern Great Plains, farmers will need to evaluate their resources and determine to most profitable method of expansion. For the average spring-calving herd in this region, developing heifers to calve December first is the most profitable scenario of those analyzed. However, the market price and availability of bred heifers could make it more economical to purchase replacements. Hopefully, this information will provide the information necessary to make the most profitable decision.

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