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PURCHASING, PRODUCING AND MANAGING REPLACEMENT BEEF HEIFERS TO OPTIMIZE PROFITS

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INTRODUCTION

Most beef producers replace up to 20% of their mature cows each year with heifers. Those heifers represent the future genetics and profit potential of the operation. However, beef producers today are faced with several decisions that impact the productivity of their operations, of which selecting replacement beef heifers is critical to sustaining an ever decreasing profit margin. The unique challenge that each cow/calf producer is faced with is that the selection of heifers now will affect the profitability of an operation for at least a decade. The mindset for a cow/calf producer needs to take into account how the heifers that are selected now, as replacements, will affect their operation in ten to twelve years from now. This mindset is entirely different from the feedlot industry or even the poultry and swine industries where turnover and generation intervals are far shorter; thus, in these industries an error in selection or management can be noticed and remedied are a far faster rate.

It is fairly simple to purchase heifers at a discounted price either from a sale barn, neighbor or even a heifer replacement sale. However, it is imperative to keep in mind that not any heifer will become a profitable cow. Many factors dictate how an individual cow performs in a given management system, and each producer should evaluate the effects of those factors on the potential profitability of their cows. The genetic origin (i.e. breed and color), management techniques from diet to reproduction, alliances, marketability of heifers, and economics are all factors that a producer needs to take into account when purchasing or developing heifers.

HEIFER SOURCE

Proper management of possible replacement heifers is critical to future production and longevity of the cow herd. For producers selecting and developing their own heifers, the origin or source from which the heifers are purchased can dictate the ultimate profitability of the herd. For example, in the fall of 1995, a heifer development program purchased heifers from 12 different sources. Before the breeding season, 17% of all heifers were culled based on visual appraisal, average daily gain, pelvic area, and disposition. The percentage of heifers culled from each source ranged from 0 to 60%. First service conception rates for each source ranged from 38 to 100% (Figure 1) and the net profit for each source ranged from $64.00 to $145.00 per heifer

(Figure 2). Therefore, heifer source can influence culling rates, conception rates, and profit potential of replacement heifers.

Figure 1. First Service Conception Rates for Each Source

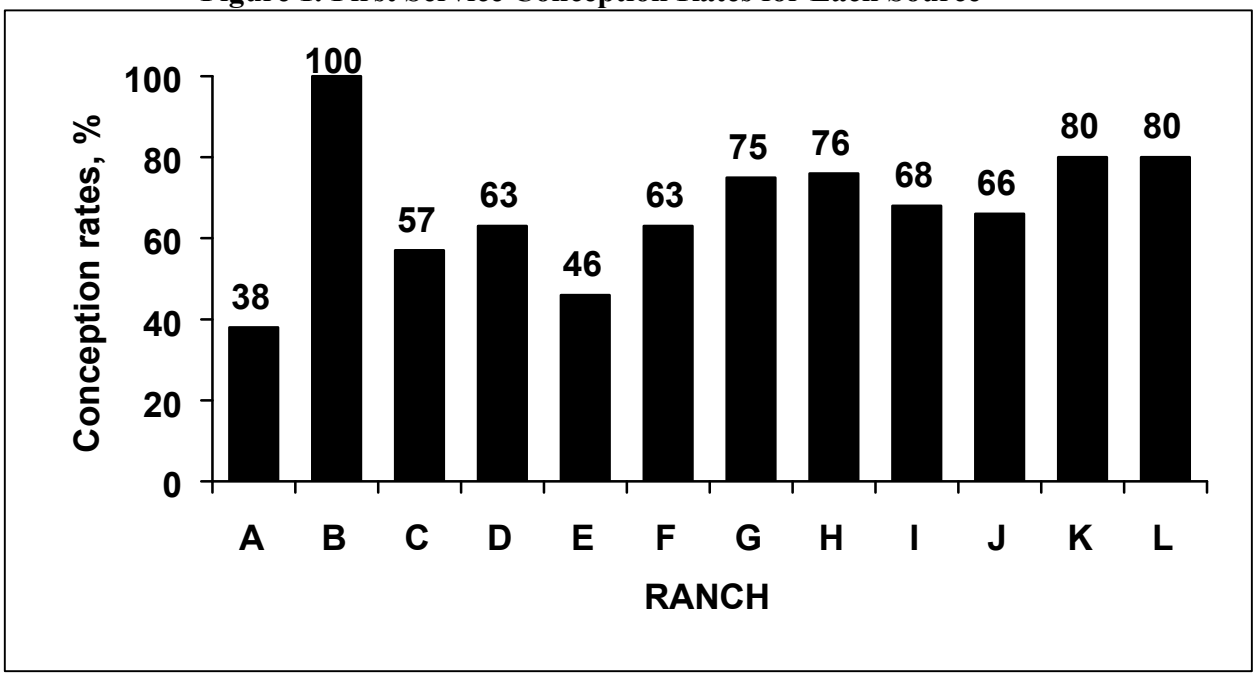
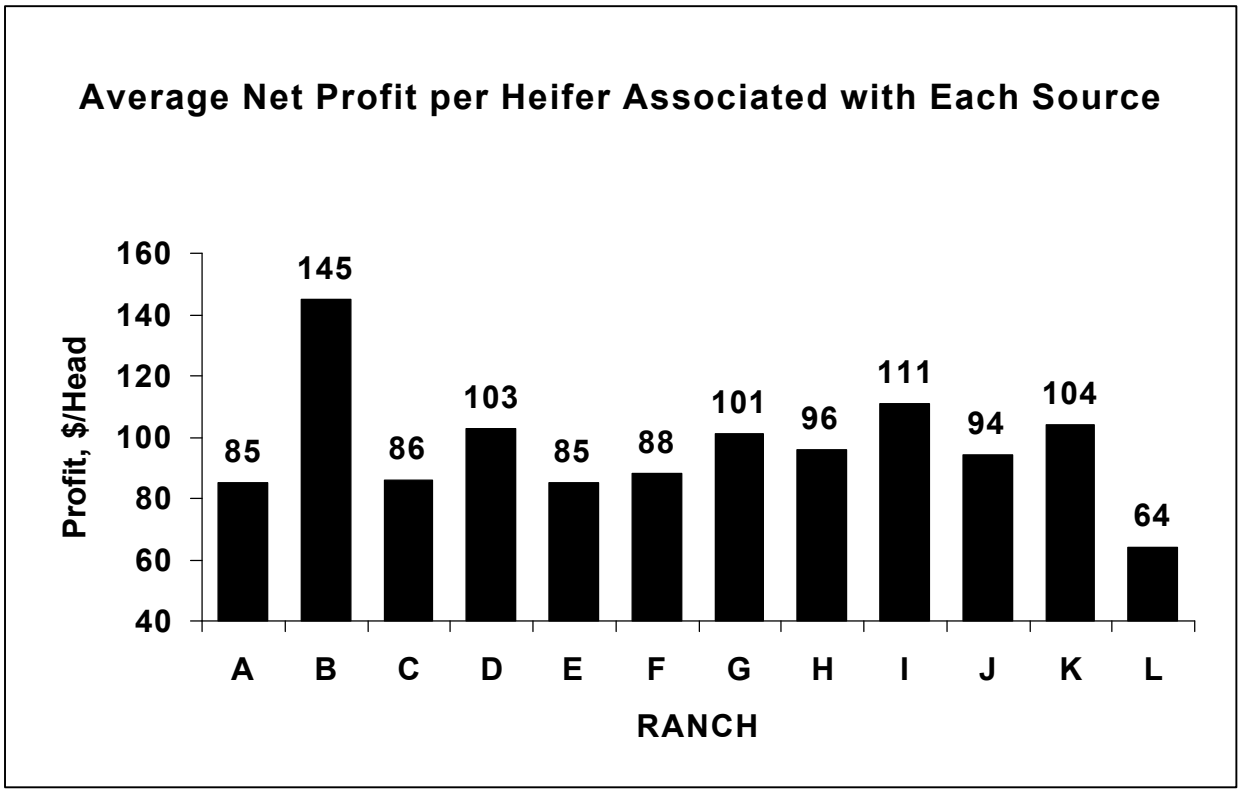


Figure 2. Overall Pregnancy Rates for Each Source



GENETIC ORIGIN

In our current market, breed is an important factor to consider. Producers need to establish whether their herd is directed towards selling offspring at weaning, retained ownership through a feedlot, producing breeding stock (purebred or commercial), or even a combination of these factors. These decisions will aid in selecting the most profitable replacement heifers. In a two-year economic evaluation we established the differences in profitability between heifers of Hereford × Angus (BWF) origin or heifers primarily of Angus (black) origin for a single producer. Profitability results are shown in Table 1. Among first AI service, pregnant heifers, BWF heifers were nearly twice as profitable as black heifers during both years. In contrast, profitability of second-service heifers did not seem to differ with genetic origin. These figures indicate the importance of knowing the market in which you sell your heifers, because that can aid a producer in purchasing replacement heifers from a genetic origin that will maximize profitability.

Table 1. The Economic Effect of Genetics on Artificially Inseminated Heifers Over a Two Year Period in a Heifer Development Operation

	First service AI heifers		Second service AI heifers	
Year	No. of heifers	Profit, $/head	No. of heifers	Profit, $/head
Year 1				
Black[a]	28	120	13	133
BWF[b]	136	235	29	175
Year 2				
Black[a]	108	112	44	198
BWF[b]	147	201	83	177

[a] Heifers of predominantly Angus origin.
[b] Heifers of predominantly Hereford × Angus origin.

MANAGEMENT

Yearling beef heifers conceiving early in their first breeding season, will have increased lifetime production and efficiency. It is critical that these heifers attain enough weight to initiate their first estrous cycle before the onset of the breeding season. Current management practices target heifers to reach 60 to 65% of their estimated mature body weight by the start of the breeding season. The primary objective of replacement heifer development should be to reach a target weight prior to the onset of the breeding season that facilitates reproductive performance, in a cost-efficient manner.

Table 2 summarizes the culling percentage, first-service AI conception rates, and overall pregnancy rates for 1542 heifers over a 3-year period. During the first year, 42% of 483 heifers were culled. In the second year, 17% of 468 heifers were culled, and 14% of 591 heifers were culled in the third year. Decreased culling percentages from the first to third year indicate improvement in initial performance evaluation and management. This is evident when considering that first-service AI conception rates and overall pregnancy rates were similar among years and averaged 68.0% and 95.1%.

Table 2. Culling, First Service Conception, and Pregnancy Rates of Beef Heifers in a Heifer Development Operation

Year[a]	No. of heifers	Culling rates[b], %	First service AI conception rates[c], %	Overall pregnancy rates[d], %
Year 1	483	42	66.8	93.8
Year 2	468	17	69.8	95.4
Year 3	591	14	67.5	95.8
Total	1542	24	68.0	95.1

[a] Year 1 = heifers bred in 1995; Year 2 = heifers bred in 1996; Year 3 = heifers bred in 1997.
[b] Culling rates = no. of heifers culled prior to breeding season/no. of heifers purchased.
[c] Conception rates = no. of pregnant heifers/no. of heifers inseminated.
[d] Pregnancy rates = no. of pregnant heifers/no. of heifers synchronized.

Many producers utilize estrus synchronization systems and AI to increase the proportion of replacement heifers that conceive earlier in the breeding season. Consequently these females produce their first calf early in the calving season and tend to continue to calve earlier throughout their productive life. In addition, the calves acquired from AI tend to be genetically superior than their contemporaries that were sired naturally. With the current direction in the livestock industry it is critical for producers to utilize every tool possible to enhance the profit potential of their operations. With the long generation intervals associated with cattle, we are unable to change are genetic base at the rate at which the swine or poultry industries can. The result is that the cattle industry always seems to lag behind when trying to compete for market share. One of the fastest methods that we have available to us to alter our genetics is through the use of AI.

In conjunction with AI is the development of new estrus synchronization protocols. There are two advantages of synchronization systems that need to be considered when developing replacement heifers. Firstly, heifers can be synchronized to conceive earlier in the breeding season, resulting in a shorter calving season. The end result is that more calves are born in a shorter period of time and the calf crop is more uniform at market time. Secondly,

synchronization programs have been developed that will initiate puberty in heifers that are not cycling by the initiation of the breeding season. This is critical to producers who aim at a short breeding season and, ultimately, a shorter calving season.

Most programs for estrus synchronization use progestins (MGA), prostaglandins ($PGF_{2\alpha}$), and gonadotropin-releasing hormone (GnRH), or a combination of these three products. Most of these systems rely on the accurate detection of estrus for acceptable results, whereas some systems use a single fixed-time insemination but results have been variable. There are obvious advantages and disadvantages to any system. Therefore, a producer who is interested in establishing a breeding program utilizing synchronization needs to consult with a reproductive specialist to establish an ideal system to suit their needs. Several articles in this publication address various potential synchronization systems which could suit any operation depending on their feeding regimen, facilities and so on.

Until recently there has not been an accurate method to determine which heifers conceived to AI or to a clean-up bull. Many producers use rectal palpation, subsequent estrus activity or the calving date to differentiate between calves that were sired by AI or the clean-up bull. Although these methods can be useful management tools to assess the results of certain synchronization systems, they very often present inaccurate conception or pregnancy rates.

The use of ultrasonography is becoming a common reproductive management tool to aid producers when selecting replacement heifers. Ultrasonography can be used to determine the presence of a viable embryo as early as 28 days after AI or natural mating. In addition, ovarian and uterine scans, and fetal sexing are all becoming useful tools for producers to increase the productivity and efficiency of their female herd. Using this technology we can accurately determine herd conception and pregnancy rates, and evaluate the viability of estrus synchronization and AI protocols.

ECONOMICS AND MARKET

Ultimately a producer remains in the cattle business if he or she has the potential to make a profit out of their operation. Therefore, any management system or selection criteria that we use needs to potentially produce a profit. To determine whether a certain breed, diet or synchronization system is effective, maintaining accurate records is the single most important method in identifying which heifers are more profitable for an operation and certainly the fastest way to make any progress. For example, we maintained sound records and summarized the net profit or loss for heifers sold during a developmental period during a three year period (Table 3). Heifers culled on the basis of pelvic area, average daily gain, reproductive tract scores, disposition, or structural soundness at the time of the prebreeding exams and finished in a feedlot had a 3-year average net profit of $9, whereas heifers diagnosed as nonpregnant shortly after the breeding season were sold for a net loss of $86. The loss for pregnant heifers that were then diagnosed nonpregnant after wintering on native pasture and sold at a sale barn was $133. These figures indicate the importance of identifying heifers that will not breed during the breeding season and culling those heifers before they become an economic liability.

Heifers that were diagnosed pregnant during the breeding season were allocated to three groups: first-service AI, second-service AI, or natural mating. Average profits were $163 for first-service AI heifers, $139 for second-service heifers, and $83 for heifers naturally mated. These figures take into account all synchronization costs. Therefore, the advantage of AI over natural mating is certainly evident from these analyses, but without sound data these results

could not have been noticed. In fact, many people would (and still do) shy away from AI because of the initial costs associated with synchronization, management, and an AI technician. Nonetheless, these results would encourage a producer to seriously consider AI, realizing that the profit potential is far greater than just using natural mating.

Table 3. Net Profit or Loss Associated with the Sale of Heifers at Various Stages of Development

Stage	Year 1, $/head	Year 2, $/head	Year 3, $/head
Prebreeding culls	8	16	4
Postbreeding culls	-33	-144	-84
Precalving culls	-213	-61	-124
First service AI	160	164	164
Second service AI	129	88	184
Naturally Mated	89	72	86

CONCLUSIONS

For each individual cattle operation certain goals should be established. Every operation will have different goals in mind; nonetheless, it is imperative to understand in what direction those goals lead. This will make clearer decisions on what breeds to purchase, where to purchase your future breeding stock, where your market will be, and what management systems will suit you. This discussion is designed to stimulate thought into the varying aspects of replacement beef heifer development. For producers who purchase replacement heifers or develop their own heifers each year, accurate records and evaluation of heifer source, breed, development costs, and marketing options are essential to optimize performance and improve overall management of the operation. Don't forget, the decisions you make now in selecting your replacements will affect you for at least another decade, in the form of mature cows and progeny!