HERD REPLACEMENTS: HEIFERS OR OPEN COWS?

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INTRODUCTION

It is common to find opinions, rules of thumb or suggestions for livestock operations that simply do not fit all situations. It seems that the more removed an individual is from the activities of the operation the more general their opinions. Recommendations in the cow/calf segment of the beef cattle industry can serve as a good example. This segment is composed of a variety of management systems with different opportunities and goals. The variety is so diverse that general management recommendations are difficult to make.

Selection of females to save for breeding the next year is one activity where general recommendations flourish. Since pregnancy determination is often done at weaning time most sources recommend that all nonpregnant cows be culled at this time. This presentation will suggest that there are really many factors that should be considered before this recommendation is followed for most cow/calf operators.

There are three sections to this presentation. These sections will consider: the herd resources and farm variables; biological and economic factors with positive and negative influences; and then a review of several research projects. Even if we consider only situations appropriate for Florida it will be necessary to make some general assumptions to narrow down the endless possibilities of interactions and therefore, draw some conclusions.

FARM AND HERD RESOURCES

Everyone has a unique set of circumstances that they must work within to accomplish their goals. These resource factors will influence your decision about which females to retain for breeding. These resources include, but are not limited to, the following: current herd size, expansion or downsizing plans for the herd, age structure of the herd, annual feed resources for expected conditions, sex ratio of current calf crop, previous levels of productivity, average length of calving season, average date (age) at which heifers are first exposed for breeding, overall pregnancy rate, and marketing opportunities. The next several paragraphs will demonstrate how these resources interact and influence the decision process.

At certain times of the year quality replacement heifers may be difficult to obtain if not enough were produced within the herd. If the herd size is stable and additional heifers would be needed from an outside source to maintain the current size then availability can be an important consideration. There are several reasons in addition to culling why additional heifers may be needed, such as unusual sex ratio, higher than expected calf death loss, poor or low pregnancy rate due to low nutrition or infertile bull, etc. Selected replacement females from special breeding cattle sales will often times be more expensive then the price received for the cull cow. The culling of an open cow and replacing her with an outside heifer from a livestock auction increases the chance of disease, as well buying the cull from some other farm.

In many operations it is often necessary to replace 10 to 35% of the mature cows for reasons unrelated to current pregnancy status.

Rohrer et al. (1988) reported that breed and age of cow were significant factors in determining reason for removal from a breeding herd in Texas. Culling was necessary because of calving difficulty, mammary problems, structural unsoundness (lameness, back injury, loss of teeth, etc), prolapse, severe illness, cancer eye, bloat, grass tetany, accidental injury, in addition to failure to reproduce. Table 1 is a summary of a long term project in which cows were not culled for production level, but were culled for the other reasons listed. In many commercial farms it would be desirable to cull for poor performance of the calf due to low milk production or poor mothering ability. If you need to make a decision between keeping an open heifer, an open cow or a pregnant cow that weans very light, poor calves you may prefer one of the non-pregnant animals.

Marketing of cull cows may be a significant source of income to many cow/calf producers. It may account for as much as 10 to 20% of the income from cattle. To get the best price you need to consider the market fluctuations during the year for your particular area. If prices are traditionally low during the late fall when you determine which cows are not pregnant you must determine if you have sufficient feed resources to hold the cull cows until prices go up. Short term feeding (45-60 days) to improve body condition (canner/cutter to utility) and increase selling price with an upturn in the market may be beneficial. This can be determined by looking at the prices from a historical perspective. Brown (1992) reported that in central Georgia prices for cull cows were at there lowest in November and December, rose through March and April, and began a gradual decline from May to August with sharp declines to December. If you cull during the early fall the feeding would take place during the lowest prices and highest feed costs. Therefore marketing of cull cows interacts with feed resources, time of year and need for income.

Kress et al. (1988) used simulation procedures to evaluate effects of mating system and culling policy on economic and biological efficiency. Mating system had a greater influence on economic efficiency than either cow culling policy or maximum cow age. The use of organized crossbreeding programs, such as three breed terminal and two breed rotational with terminal sires mated to older cows, resulted in greater economic efficiency than age or culling options. The options for maximum cow age and cow culling policy were about equal in importance for influencing economic efficiency.

In general shorter breeding seasons have been recommended to improve the uniformity of the calf crop. In the more uniform calf crop the income is theoretically greater and therefore more desirable. Shorter breeding seasons result in lower overall pregnancy rates, however. In many situations the duration of the postpartum anestrus dictates whether a cow will conceive during the subsequent breeding season. Therefore nutritional inputs and length of breeding season will interact to influence pregnancy rates. The necessity for increased feed inputs may offset any increase in income. Kress et al. (1988) indicated that individual situations may vary, which is why it was stated earlier in this presentation that general recommendations often don't fit.

Werth et al. (1991) concluded that longer breeding seasons result in light calves being weaned that were born late in the calving season. However, they concluded that selling a light calf is more profitable than selling a non-pregnant cow and replacing her with a heifer calf. In the study by Werth et al. they found that reproductive and economic efficiencies were optimized when a greater percentage of mature cows were maintained in the herd. This study was a computer simulation in which the most profitable situation was a 70 day breeding season with cows maintained in good to excellent body condition. This resulted in a short postpartum interval. For some reason computer cows don't always respond like real cows.

BIOLOGICAL AND ECONOMIC FACTORS

In this presentation the focus is on making a decision between saving an open cow versus an open heifer for breeding the next season. This section will outline some of the differences between expected levels of production for these two types of animal. There are numerous reports on differences between mature and young cows in maintenance requirements and performance of offspring. These well known differences serve as the basis for age of dam adjustment factors for weaning weight and NRC requirements for different ages and sizes of females. However, it is obvious that it is not the adjusted weight that is sold and it is often impossible to individually feed each animal to meet its NRC needs. The biology of these differences is useful when trying to make a decision about which animal to keep for breeding.

The Beef Improvement Federation publishes a set of guidelines for use in beef cattle improvement and testing programs. Table 2 is a brief summary of a table for weaning weight age of dam correction values from the BIF guidelines for a few breeds. Some breeds use the BIF standards or some slight modification based on within breed evaluations. Although we don't sell adjusted weight these differences should be considered when trying to decide between saving a young open heifer and an open cow. A mature cow between the ages of 4 and 10 years is expected to produce more calf weaning weight than a young cow when mated to the same bull. If a heifer is mated to a calving ease sire to help keep birth weight down and mature cows are mated to bulls with greater growth potential, then the differences in weaning weight may be even greater. This factor has not really been evaluated in the simulation studies that were reviewed for this presentation. In general bulls that sire low birth weight calves also sire calves with lower weaning weights. This is not always true but it should be considered when trying to decide which of two different age females to save and how they might be mated the next year.

The reason why a mature cow is open also needs to be considered in the decision process. If the reproductive tract is sound and ovaries are functioning properly both the young and mature females should be able to conceive early in the breeding season. The mature cow may have conceived during the previous season but for unknown reasons the fetus failed to develop past 45-60 days and therefore the cow was open at the time of palpation. If the cow had a very late calf or a difficult calving this current year she would not have had sufficient time to recover from calving and breed during a short or moderate length breeding season. Douglas and Dalsted (1991) suggested that at the time of pregnancy determination that a diagnosis should be made as to whether non-pregnancy is "normal" or "abnormal". This information would be a guide to potential reproductive performance.

Some of the biological and economic factors that will influence the decision to keep an open cow or open heifer can be summarized as follows:

a..both should conceive early in breeding season,

b. mature cow should wean a heavier calf,

c. sire selection is more flexible for mature cow,

d. mature cow needs feed for maintenance only,

e. heifer needs higher quality feed for growth,

f. past performance available for mature cow,

g. theoretically breeding value for heifer may be higher,

h. heifer can be raised for less than one can be purchased,

i. income received for cull cow depends on condition and time of year, and

j. probability of conception after calving higher for mature cow than for heifer.

RESULTS FROM SEVERAL PROJECTS

There are only a few projects that have been conducted to compare keeping an open mature cow and open replacement heifer. A majority of the published reports have been based on computer simulation of beef cattle production systems (Kress et al., 1988; Douglas and Dalsted, 1990; Clarke et al., 1984; Werth et al., 1991; and Azzam et al., 1990). The flexibility of the computer programs can restrict the application of the results and computer cows don't always perform like real cows. Each producer;s operation is unique in resources available and these computer programs use different future prices to determine the most profitable scenario. We can only use past records and trends to make our decision at the current time. The computer programs are useful to evaluate a large number of different situations and may be helpful in considering how much risk to assume.

With stable and declining calf price trends Douglas and Dalsted (1990) reported that real returns would favor the average open 6-,7-and 8-year-olds over the raised replacement with their set of economic parameters. The accumulative real return differences were small for the younger open cows (3,4,and 5) and raised replacements, and they added the decision may be one of personal preference with the price trends mentioned above. When they evaluated increasing calf prices the open young cows had an advantage over a raised replacement but the replacement had the advantage over older open cows. Douglas and Dalsted state that the computer cows represent "average cows in the herd, individual open cows must be assessed on their biological maternal production". Using their computer program and a set of economic inputs the average 5-year-old open cow returned $21.86 more profit than a raised replacement female.

Neville et al. (1990) reported results from a large and evaluation of subsequent reproduction and calf performance of nonpregnant cows compared with pregnant cows and replacement heifers. Table 3 is a brief summary of the results from their study. In this study cows were evaluated for breeding soundness by rectal palpation. Nonpregnant cows that were diagnosed as being physically sound without any disease, abnormal growth or problems associated with the previous calving were compared to pregnant cows and replacement females calving first as 2-year-olds and first as 3-year-olds. It appears from the results that nonpregnant cows between 4 and 9 years of age that have weaned calves in previous years and are physically sound should be considered for subsequent breeding. This conclusion is based on the fact that these mature cows: are less costly to maintain from the time of palpation to the next weaning, are less likely to experience calving difficulty, are more likely to conceive again after calving, and would produce approximately 70 pounds more calf weaning weight per cow exposed than compared to weaned females they could be replaced with if they were culled. In this study only a small percentage of cows skipped calving more than one year during 6 six year calving pattern. This result would also agree with calving patterns reported by Rohrer et al. (1988).

SUMMARY

All cow/calf producers are faced with the decision of whether to keep a nonpregnant mature cow or a young replacement heifer at some time during the year. It is apparent that the decision may be difficult because of the large number of unknown factors and uncertain economic future where the decision will have its effect. The results from the research studies

that have been conducted often are contradictory. The "right" decision depended on how the future prices varied. It would appear that there may be many situations when the mature, functionally sound cow should be chosen rather than the young replacement heifer. It means that each producer should evaluate each cow on a individual basis. Consider all of the following before reaching a decision: the reason she is not pregnant, past performance, age, condition, feed costs, herd size, quality of replacements, future goals, marketing options, and management skills in addition to projected cash flow.

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Table 1. Percentage of Cows in Each Breed-Type Removed and Percentage Alive at the End of the Study[a]

		Death due to			Culling for			
Breed-type	**Alive**	**Disease**	**Calving**	**Accidents**	**Unsoundness**	**Reproduction**	**Experiment**	**Injury**
Angus(An)	6.9	31.0	0.0	0.0	27.6	17.2	10.3	6.9
Brahman(Br)	16.7	23.3	0.0	0.0	13.3	33.3	13.3	0.0
Hereford(He)	5.5	14.5	12.7	0.0	36.4	20.0	7.3	3.6
Holstein(Ho)	0.0	38.9	8.3	13.9	19.4	5.6	8.3	5.6
Jersey(Je)	0.0	68.4	5.3	0.0	5.3	5.3	15.8	0.0
An Br	37.5	9.4	0.0	0.0	28.1	9.4	12.5	3.1
An He	21.7	17.4	0.0	0.0	34.8	4.3	17.4	4.3
An Ho	14.3	22.9	0.0	2.9	31.4	14.3	11.4	2.9
An Je	7.7	30.8	3.8	3.8	23.1	19.2	11.5	0.0
Br He	38.5	10.3	0.0	5.1	17.9	20.5	7.7	0.0
Br Ho	40.7	3.7	0.0	3.7	22.2	14.8	14.8	0.0
Br Je	22.2	0.0	0.0	11.1	22.2	29.6	14.8	0.0
He Ho	17.9	17.9	0.0	2.6	43.6	10.3	7.7	0.0
He Je	20.4	28.6	10.2	2.0	24.5	4.1	8.2	2.0
Ho Je	0.0	46.9	0.0	3.1	18.8	9.4	12.5	9.4
Avg	16.7	23.1	3.4	3.2	25.7	14.5	10.8	2.6

[a] Adapted from Rohrer et al., 1988.

Table 2. Weaning Weight Age of Dam Adjustment Factors[a] for Selected Breeds

		Age of Dam				
Breed	Sex	2	3	4	5-10	11+
BIF Standard	M	60	40	20	0	20
	F	54	36	18	0	18
Angus	M	45	21	9	0	9
	F	37	18	7	0	9
Brahman	M	30	20	10	0	10
	F	27	18	9	0	9
Limousin	M	50	29	13	0	0
	F	41	23	10	0	0

[a] Adapted from BIF. Other breeds may use BIF standards (Polled Hereford) or vary the age distribution (Hereford).

Table 3. Calving Performance During Six Consecutive Calving Periods of Cows that Calved First as 2-or 3-Year-Olds Compared with Other Cows that were 4- Through 7-Year-Olds at the Time of the Comparison

		Percentage of Total Cows	
Group	Calving pattern[a]	Younger cows	Older cows
Calved each yr of 6 yr	111111	44.5	39.4
Calved in 5 of 6 yr	101111	7.3	7.5
	110111	15.5	10.2
	111011	8.2	12.4
	111101	5.5	6.6
	111110	8.2	14.6
		44.5	51.3
Calved in 4 of 6 yr	101011	0	0
	101101	1.8	1.3
	101110	3.6	3.5
	110101	0	2.2
	110110	3.6	.9
	111010	.9	1.3
		10.0	9.3
Calved in 3 of 6 yr	101010	.9	
Total cows			

[a] 1=calved; 0=did not calve.

[b] Adapted from Neville et al., 1990.