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DEVELOPING A MANAGEMENT SYSTEM TO IMPROVE BEEF HERD REPRODUCTIVE EFFICIENCY

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Beef producers must improve efficiency in order to compete as food producers. Only about 80% of the beef cows in the U.S produce a calf each year, and weaning weights average in the low 400's. At this level of performance, about 90% of the total energy used in producing beef goes for animal maintenance. With present technology, we could increase average calving rate to 90% and average weaning weights to more than 500 lb., which would have a large impact on improving efficiency. In making these improvements, we must also capitalize on the ability of beef cattle to convert into highly nutritious beef for human food forages that otherwise would be wasted.

Maximizing Herd Fertility

On the average, 90% of the difference in fertility between females is due to environmental factors. Thus, management practices have a large impact on herd fertility. Four factors have been identified as having the greatest influence on fertility: Calving difficulty, cow condition at calving, nutrition between calving and the breeding season, and nutrition and growth of replacement heifers.

Reducing Impact of Calving Difficulty

The primary cause of calving difficulty is increased birth weight. Using sires selected for their faster growth rate and greater mature size usually also results in selection for increased birth weight. However, there are some sires that will improve weaning and yearling weights without increasing calving difficulty. So, in an A.I. program, proven sires can be used that have potential for improving weaning and yearling weights without increasing calving difficulty. Bulls purchased for natural service should be chosen on the basis of their own performance as well as a birth weight that is acceptable for the size of cattle on which they will be used.

Nutritional management is also a consideration. Recent studies have shown that excess energy does not increase calving difficulty, as long as it is not extreme enough to cause excess fat that constricts the birth canal. Underfeeding energy will not reduce calving difficulty. Protein intake, however, apparently can influence fetal growth. In a study by Dr. Robert Bellows at the USDA Range Research Station, Miles City, Mont., heifers fed about 50% more protein than recommended had calves with an average of 11 lb. heavier birth weights, which resulted in greater calving difficulty. This indicates protein fed to heifers should not greatly exceed recommended levels.

Giving proper assistance at calving also can increase fertility. Montana studies show that each 10 minute increase beyond normal for the second stage of labor decreased pregnancy 6% in a 45-day breeding season. (The second stage of labor starts at the first abdominal press and ends when the calf is on the ground.) This second stage averaged 55 minutes in first-calf heifers and 25 minutes in 4-7-year-old cows. Pulling the calf is recommended if progress is not made after one hour of intense labor.

Effect of Condition at Calving

Cows in good flesh at calving have body stores of energy that can be used efficiently to help meet their requirements between calving and the start of breeding. Studies have shown that only 40-50% of cows in thin condition will be cycling by 60 days after calving, but 90-100% in good condition will be cycling by this time. Further, Ohio and Canadian studies show that winter maintenance costs in cold climates are lower for cows in good body flesh since the outside fat has insulative value. Also since excess energy intake can be efficiently stored as fat and used later, flesh condition can be increased during gestation whenever feed cost is lowest.

Thin cows will have a prominent backbone with ribs showing and the hip bones and tailhead will appear especially sharp and prominent. The brisket area will be quite loose, and the cow will be shallow in the flank area. A fat cow will have a full brisket and flank, and will appear very smooth over the back and hip areas. Cows in desirable condition will be somewhere between these two.

Effect of Nutrition between Calving and Rebreeding

Cows in good condition can meet their requirements on excellent forage (very early cut hay or good pasture) between calving and rebreeding. However, if they are thin, then supplemental energy must be fed or they will be much slower to cycle. State university recommendations for appropriate feeding in your area can be obtained from your county or area extension office. These will be based on feedstuffs available in your area and any unique mineral deficiencies likely to exist there.

Effect of Nutrition and Growth of Replacement Heifers

A goal should be to have heifers calve at two years of age and be rebred to calve the next year at the same time as the mature cows. Growth should be maximized prior to first breeding without allowing excess fat deposition in the udder. With maximum growth, heifers are more likely to cycle and

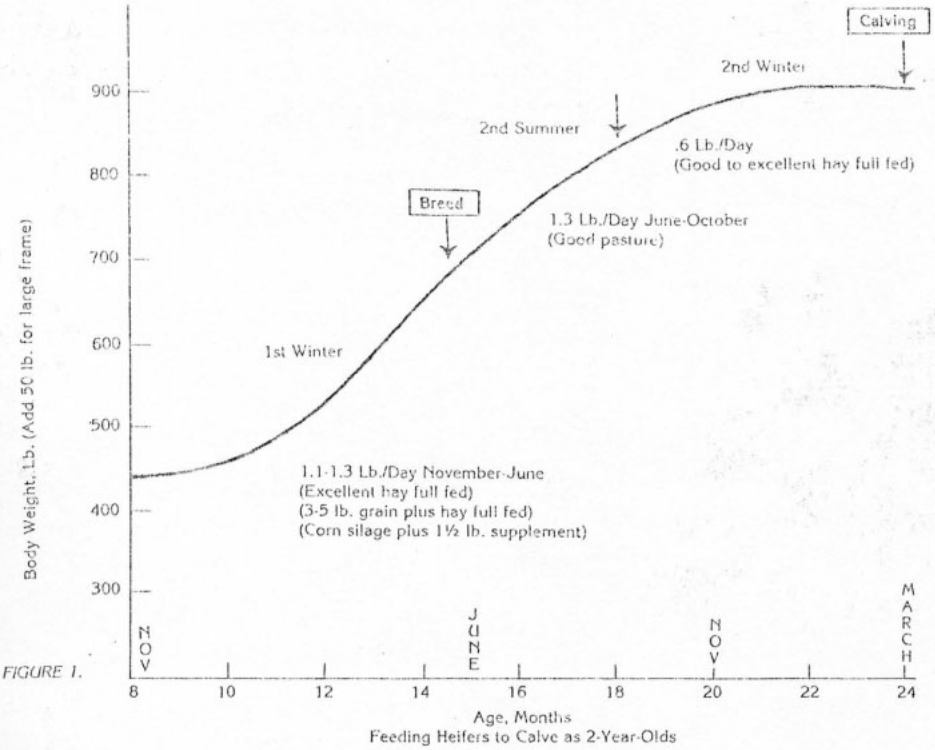

FIGURE 1.

conceive early in the breeding season and consequently have more time to settle following first calving.

Average frame size Angus heifers should weigh at least 550-600 lb. at a year of age; large framed Angus heifers should weigh at least 650 lb. They should continue to grow after first breeding, since heifers that have a large proportion of their growth before calving are likely to have a larger pelvic size. Special attention should be given to heifers in the last 60 days of pregnancy to be sure they go into calving in good condition. Figure 1 gives a plan for feeding replacement heifers in a spring calving program. Rations appropriate for an area are available from local extension services.

I believe if management practices outlined here are followed, progress can be made in selecting for fertility in females. With good management, the impact of environmental factors is reduced so more of the fertility differences between females are due to genetic factors.

Optimizing Forage Use and Beef Cow Reproductive Efficiency

To optimize beef cow reproductive efficiency but still maximize use of forages, three biological systems must be synchronized: The beef cow reproductive cycle; growth of the nursing calf; and the area's annual forage production and availability pattern. Figure 2 compares the annual reproductive cycle of the beef cow to combinations of feedstuffs that can be used to meet nutritional requirements during each phase of the cycle. If forage quality for the 60-90 days after calving will be low, supplemental feeding must increase or reproductive efficiency will decline. However, if calving occurs when the cow has excellent pasture beginning 4-6 weeks before breeding and she was in good flesh condition at calving, her needs can be met entirely on forages.

Optimum forage use by the nursing calf also must be taken into account. Figure 3 shows the results of an experiment at Cornell University where we individually fed three groups of Angus cows in dry lot according to their requirements. One group of nursing calves received only their mother's milk, the second group also had access to a supplemental feed similar in energy to average grass (61% TDN) and the third group had access to supplemental feed that was 75% TDN. These studies show that nursing calves begin consuming additional feed by about 60 days of age and become increasingly dependent on it as they increase in age and their dam's milk production declines.

Milk production and growth of nursing calves is usually cheaper on pasture than harvested feeds. An effort should be made to meet cows' requirements with pasture and also have calves old enough to use grass for as much of the growing season as possible. Having calves 4-6 weeks old by the start of grazing appears to optimize pasture use. This also allows use of feeds with little alternative use (such as crop residues or other lower quality forages) as part or all of the beef cow diet for the first 60-90 days after weaning. If calving is not synchronized with the pasture season, it is difficult to maximize use of low quality forages.

Those who wish to calve at other times because of marketing purposes should consider increasing their marketing alternatives by keeping calves for various lengths of time following weaning rather than calving out of season.

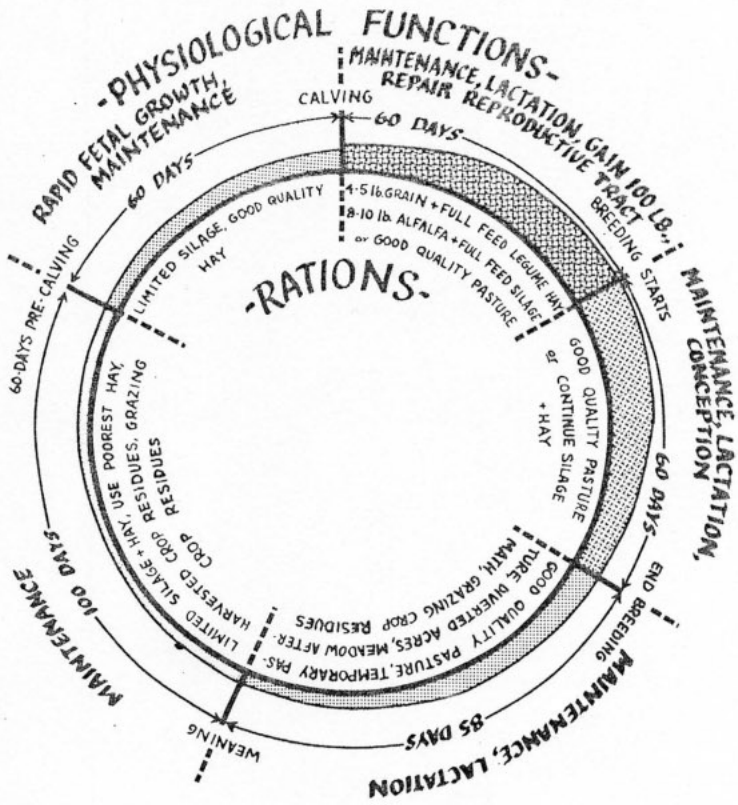

FIGURE 2. BEEF COW REPRODUCTIVE AND FEEDING CYCLE TO OBTAIN ONE CALF PER COW EVERY 12 MONTHS.

Short Calving Season Key to Good Management

A key component of most good management systems is a short calving season, for the following reasons:

1. It is hard to optimize nutrition and use of various feeds available if cows are widely varying in their stages of the reproductive cycle.

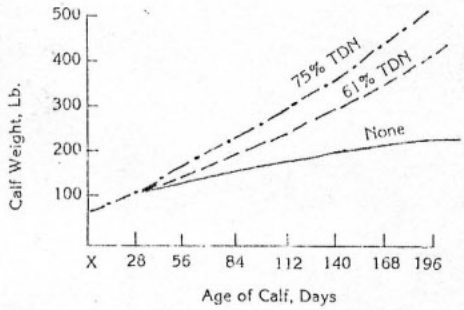

FIGURE 3. Effect of feed available to calf on growth of nursing calf.

2. It is more difficult to give proper care and assistance to late calving cows and their calves. The herd probably will be moved to pasture and away from the calving area which is apt to be close to handling facilities and where easy observation is possible.
3. Breeding is more difficult to manage with a long calving season. If A.I. is used, heat checking must continue over a longer period of time. The primary keys to a high conception rate with A.I. are finding cows in heat, identifying the stage of heat cows are in and breeding at the optimum time. The longer the breeding season, the more difficult it is for most producers to have the time and motivation to accomplish these tasks. If natural service is used, cows still should be observed and breeding dates recorded to organize calving and see if the bull is settling cows. For culling purposes, it is important to know if a cow is open in the fall due to bull infertility or her own failure to conceive.
4. Since most producers wean all calves the same day, weaning weights of late calves will be lighter. Table 1 shows the impact of a long calving season on calves from a group of cows that began calving in mid-March and didn't finish until the end of June. Adjusted 205-day weights of early and late calves were similar. However, actual weaning weights of the late calves were considerably lower, and returns per head were considerably less when all sold at weaning.

   In other years when all calves were kept, it was more difficult to manage the late calves in our feedlot. They couldn't be fed with older, heavier calves strictly on corn silage treated with ammonia, but had to be supplemented with a low solubility protein because of their light weight.

Table 1. Effect of Late Calving on Weaning Weights

	No. head	Actual weight lb.	Adjusted weaning weight lb.	Actual value at weaning $/head[c]
Calves weaned born first 50 days of calving season	16[a]	513	454	$338
Calves weaned born last 50 days of calving season	14[b]	419	452	$276

[a] *8 steers and 8 heifers.*
[b] *6 steers and 8 heifers. Actual weaning weights adjusted to 7 steers and 7 heifers.*
[c] *Average price received = 70¢ for steers and 62¢ for heifers/pound.*

   Also, most replacement heifers had to come from the early born because the late born could not catch up in growth by breeding time, even with equal adjusted 205-day weights.
5. Selecting for fertility is more difficult if cows are not together in stage of reproductive cycle. It is hard to separate variations in environment from genetic variation when cows are entering the interval between calving and breeding at widely varying times. With a short calving season and good management program, cows can be pregnancy tested at weaning time and those open can be culled with some assurance that they are open because they are less fertile and not because of mismanagement or environmental factors.