

Optimizing Reproductive Efficiency in the Beef Herd

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Introduction

It is generally accepted that improving the fertility of a beef herd has the greatest potential for increased profitability. Optimum is a term used to define the best or most favorable condition, degree or amount for a particular situation.¹⁸ Therefore, optimizing rather than maximizing reproductive efficiency offers the greatest potential for increased profitability in the beef herd. Maximizing reproductive efficiency and attaining a 100 percent conception rate on a yearly basis may be attainable, but the input costs necessary to attain this rate may not be justified from an economic standpoint.

This paper is not meant to be an all-inclusive review of methods to improve reproductive efficiency; rather, methods to increase inherent fertility and environmental factors that play key roles in fertility will be discussed.

Inherent Fertility

Some herds are more innately fertile than others. It is not unusual to see cows that are too thin, poorly vaccinated, and never dewormed, conceive and calve on a yearly basis, while a very well managed herd may have many open cows. Cattle breeds and other inherent factors play a role in fertility.

One of the best methods of increasing the inherent fertility in a beef herd is selection of bulls with large scrotal circumferences.⁶ Daughters of bulls with larger scrotal circumferences reach puberty at an earlier age and can be bred earlier in the breeding season.¹⁹ Use of scrotal circumference expected progeny differences (EPD's) have been shown to be more effective than phenotypic selection in reducing heifer age at puberty.¹¹

Another factor has recently been identified that may help to explain why there is a difference in the fertility of bulls that have passed a Breeding Soundness Exam.¹⁵ Sperm are coated with heparin-binding-proteins at ejaculation and a specific fertility-associated antigen (FAA) has been shown to make bulls carrying this factor more fertile. Bulls with sperm that are coated with FAA have been shown to be 9 to 40 percentage points more fertile than herd-mates producing sperm lacking

the FAA protein.⁵ The FAA can be identified by a biochemical analysis.

Another method to increase the inherent fertility is with a good crossbreeding program. Heterosis has been shown to have a significant effect on both scrotal circumference in bulls and age at puberty in heifers.⁸

Overall herd fertility can be improved by the use of reproductive tract scoring of potential replacement heifers. This technique helps eliminate less fertile individuals from the population and select for those animals that are earlier maturing and more fertile.² Added benefits to this selection technique include a favorable response to heat synchronization programs, an earlier conception date, and a higher pregnancy rate at the end of the breeding season. In addition, heifers with the most mature tracts were found to be better milkers than their less fertile counterparts.

Environmental Factors

Environmental factors can affect the fertility of the beef herd. It is well documented that bull exposure helps to initiate cycling in the postpartum beef cow.⁷ Exposing postpartum beef cows to teaser animals or bulls can shorten the anestrus period by as much as three weeks.

Calf suckling delays the onset of estrus in the cow and temporary weaning (48 hrs) has been shown to decrease the postpartum interval in cows that are moderate in condition, but reports are conflicting for cows in either poor or ideal condition.²⁰ Cows with a condition score greater than 5 will probably not benefit from temporary weaning.

Many beef cows in the southeast and midwest United States graze pastures comprised of tall fescue during the breeding season. It has been estimated that there are approximately 35 million acres of fescue in the US. Fescue is an excellent grass for erosion control and is very easy to establish. It will tolerate a wide range of management regimens and is an excellent yielding forage. However, fescue that is infected with the endophyte *Acremonium coenophialum* has many harmful effects. Cattle ingesting endophyte-infected fescue have elevated body temperatures and depressed prolactin levels.¹⁰ Elevated temperatures can negatively affect reproduction and depressed prolactin levels decrease milk production and thus weaning weights.

Several management techniques can be used to decrease the estimated \$600 million loss attributed to grazing endophyte-infected fescue.¹⁶

1. Destroying infected fescue pastures and replanting endophyte-free fescue or some other type of grass.⁴
2. Removing livestock from the infected pastures during the hot summer months when high temperatures can increase the toxic effects.⁴
3. Interseeding with legumes, such as red clover, to dilute the effects of fescue.³
4. Supplementing with corn during the breeding season reduces the toxic effects of endophyte.¹²

Overall nutrition and condition score of the cow and heifer is probably the most important environmental factor influencing the reproductive status of the entire herd.¹⁷ Energy, protein and trace mineral status have all been researched extensively and proper amounts have been recommended. Interestingly, the addition of chlortetracycline in a trace mineral-salt mix prior to and during the breeding season has been shown to increase reproductive efficiency.¹⁴ There is evidence of improved pregnancy percentage and time of conception during the breeding season. The mechanism of action is not clear, but may be related to daily gain and not some predisposing disease condition.

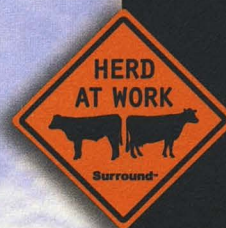
Heat can have deleterious effects on fertility of the beef cow.⁹ Cows and heifers grazing endophyte-infected fescue are especially affected by the combination of high environmental temperatures and the hyperthermia produced by the endophyte.¹ The length of standing estrus declines during periods of heat stress, making artificial insemination particularly difficult. Ovulation synchronization with fixed-time insemination without estrus detection may help to increase conception rates. Artificial insemination can eliminate infertility seen in heat-stressed bulls, and implanting embryos seven days post-estrus in heat stressed cows is more successful than breeding heat stressed cows during estrus.¹³ Artificial cooling of beef cows during the breeding season is not economically feasible; however, changing the calving season to take advantage of cooler temperatures during the breeding season is probably prudent.

Conclusions

Increasing the inherent fertility in the beef herd is not something that can be accomplished instantly. Progress will be slow, but with good records advancement can be measured. In contrast, changes in environmental factors may affect fertility very quickly and be evident on a monthly or yearly basis.

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