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Management and Evaluation Considerations for Range Beef Bulls (7-Nov-2001)

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Introduction

The success of most, if not all, cow-calf enterprises depends on the satisfactory reproductive performance of the bull. According to a recent survey 91.9% of cow-calf operations utilize live-cover breeding exclusively [1]. Traditionally, a bull has been considered fertile if he successfully impregnated cows. Successful impregnation of cows will of course remain a minimum requirement. The goals for reproductive performance of an individual operation will vary. With proper management it is not unrealistic to expect a 95% conception rate with 75% of the calves born in the first 21 days of the calving season. In order to achieve these it is essential that herd sires are managed properly. We will focus on developmental influences on bull fertility, key management principles of range bulls and how to identify and maintain fertility in the bull battery.

Fertility Assessment

Currently, the commonly used fertility assessment techniques are quite subjective and error prone [2,3]. The unreliability of these techniques may be the reason why less than 3% of cow producers routinely have bulls fertility evaluated [1]. New technologies such as the assessment of heparin-binding proteins in semen may provide more objective data to assess fertility prior to the onset of the breeding season [4].

Currently a breeding soundness examination conducted by the guidelines set forth by the Society of Theriogenology is the most practical and reliable method of determining bulls' functional reproductive capacity prior to the breeding season [5]. The breeding soundness exam should be complete, and assess not just reproductive and seminal characteristics but also a complete assessment of physical parameters. Abnormalities are commonly found with the eyes, feet, and legs. One should watch for chronic ailments (such as lumpy jaw and ocular squamous cell carcinoma). The examination should be timed approximately 60 days prior to the breeding season. By performing the exam early, there is time to correct any problems noted and purchase bulls to replace those with irreparable conditions. The cost of these exams varies from \$15.00 to \$60.00 us. With an average cow representing a \$2,000 dollar investment in land, equipment, facilities and animal unit price and the bull being responsible for approximately 25 cows, it is easy to see that, even despite the inherent subjectivity of these exams, they are still well worth the investment [6].

A number of recent publications from the University of Arizona have shown that heparin-binding proteins on the sperm are positively correlated with fertility [4,7,8]. Heparin-binding proteins are produced by the male accessory glands, secreted into the seminal fluid, and upon ejaculation bind to sperm [9]. In a study conducted at King Ranch, the bulls that passed a standard breeding soundness examination were also tested for seminal heparin-binding protein. They were then placed into groups based on the level of heparin-binding protein in the sperm membrane and seminal fluid. Groups with the largest amount of heparin-binding protein in sperm membranes but not in seminal fluid had greater fertility than did groups with other heparin-binding protein profiles. The heparin-binding protein assay is now commercially available and is being used by cow-calf producers. Additional research needs to be done to conclusively establish if there are genetic, management and or environmental factors that influence the production and distribution of the heparin-binding proteins. Testing bulls for heparin-binding protein may prove to be a valuable selection and management tool in the future.

Nutrition

There is an abundance of good research data on how nutrition affects the reproductive performance of heifers and cows. Unfortunately, there is very limited data available on beef bulls. It has been documented that severe dietary restriction results in impairment of fertility. In some cases, the damage has been shown to be permanent [10]. With the current popularity of bull performance testing, it is more often the case that bulls are developed in conditions of dietary energy excess rather than deficiency. It has been shown that excessive dietary energy in developing beef bull rations can have deleterious effects on sperm morphology and motility [11-13]. These effects may be transitory and are thought to be the result of impaired

thermoregulation of the testes due to fat deposition in the scrotal region. However, there is a valid concern that bulls developed in this fashion may be predisposed to certain reproductive career-ending musculoskeletal disorders such as osteochondrosis dissecans and laminitis [14].

Ideally bulls should be in a body condition score of 6 to 7 prior to the onset of the breeding season. Often young bulls purchased at sales are in excessive body condition. If this is the case it has been recommended that young bulls carrying excess flesh should be "let down" from the time of purchase until they are turned out with the cow herd [15]. It should be stressed that both over-fat and over-thin bulls may have reduced libido and fertility. During the breeding season, old and/or thin bulls may benefit from supplementation through hand feeding of small amounts of grain, given daily or every other day [16].

Bull to Female Ratio

The standard recommendation for a bull-to-cow ratio is 1:25 and this is typically adequate although it makes allowance for sub-standard bulls. Research has shown that this ratio can under-utilize bull power [17,18]. Under-utilization of bull power with a 1:25 ration is especially true in situations where the stocking density is high due to an abundance of high quality native forage, and when the bull is highly fertile. Libido and serving capacity of bulls are helpful components to assess in order to optimize the bull to female ratio [19].

Vaccination

Health care management for breeding age bulls varies according to their age. To facilitate the delivery of a well designed health program it is helpful to manage the bulls in age groups. The suggested groups would be yearling to two-year-olds and mature bulls. Each group has its own unique health concerns. The program should be targeted at disease prevention and reproductive development and efficiency [20].

Vaccination programs for the two groups are similar. In the yearling bull the focus is establishing a long-term immune base for the common viral and reproductive diseases. For the viral diseases IBR and BVD, modified live vaccines (MLV) have been shown to provide long term immunity, up to five years. However, MLV IBR vaccination may compromise the export of frozen semen. Initial vaccination for campylobacteriosis and leptospirosis should also be administered. Timing of the vaccination is very important. Usually, it is best to administer vaccines to yearlings at the time of semen evaluation and booster two to three weeks prior to the onset of breeding season. Mature bulls should not require a booster and can be vaccinated at either of the two previously mentioned times. Other vaccines that maybe considered are anaplasmosis, trichomoniasis, and any other disease that maybe endemic for a particular area. In order for vaccinations to be effective a sound management and nutrition program must be in place.

Parasite Control

Parasite control will vary from region to region. Generally, bulls will require deworming once yearly. However, in climates such as that in the Southeastern United States, it may be necessary to deworm bulls two to three times per year. Fly control is an essential part of any bull management program. Fly strike in the scrotal region can lead to enough heat and inflammation that thermoregulation of testes is altered and fertility is subsequently impaired.

Observation during the Breeding Season

It is essential that bulls be observed closely during the breeding season. The producer should observe that the bull not only mounts the cow but also that copulation is taking place. Observation is of particular importance in the first several days of the breeding season in multiple sire pastures because injuries are common as dominance is being established. Range bulls are prone to back, feet and leg injuries during the breeding season. Bulls may also have injuries to reproductive structures. Common reproductive injuries include preputial lacerations and penile hematomas (broken penis). Any of the previous conditions can result in reduced pregnancy rates and an altered pattern of conception. If a bull fails to breed a cow early in the breeding season this will result in the cow remaining open until at least the next estrous cycle resulting in a minimum 45 to 50 pound reduction in weaning weight [20].

Culling

Age is a major consideration when making culling decisions for beef bulls. Semen quality begins to decline after age 6 and this also about the same age when mature bulls lose their social dominance rank to younger more aggressive bulls. If a bull over age 7 has exceptional value it is recommended to utilize that bull in single-sire pastures, or by hand mating, and ensure that he passes a thorough breeding soundness exam [21].

Other factors that should be considered when making culling decisions are vision, conformation and disposition. Also bulls that produce poor performing calves should be ear marked for culling.

Summary

Listed below are key management techniques recommended to obtain optimum fertility from range beef bulls [21].

- Control disease with appropriate vaccinations.
- Provide a well-balanced nutritional program year round.
- An annual breeding soundness exam six to eight weeks prior to the onset of the breeding season.
- Observe bulls throughout the breeding season for their ability to mate.
- Use separate pastures for bulls less than four years of age and greater than six years of age to avoid dominance problems.
- Cull bulls with poor vision, low semen quality, lack of desirable conformation and those producing inferior calves.

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