

BULL MANAGEMENT FOR OPTIMAL REPRODUCTIVE PERFORMANCE

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Introduction

The topic of appropriate bull management for optimal breeding performance has been researched intensively during the last third of the previous century and little new knowledge has been generated since. Excellent reviews on the subject have been compiled and serve as the basis for this paper. (Chenoweth, 2002; Ellis, 2008; Hopkins and Spitzer, 1997; Parkinson, 2004). Other elements of this presentation are based on the author's personal experiences and include some useful "tricks" learned from experienced producers.

Bull **selection** is the first step towards good bull management. When buying/selecting a bull for the next breeding season the following general guidelines ought to be followed:

- a. Formulate a **goal** for the use of the bull:
 - Calving ease may be the single most important goal when selecting a bull that is to breed heifers.
 - A lighter (younger) bull is less likely to become injured or cause injury when breeding heifers.
 - When using the bull as a clean-up bull after initially breeding the herd by artificial insemination (AI) some select a bull whose offspring have a specific coat characteristic that allows for the distinction between calves born from AI and calves born from bull breeding. For example, using a Hereford bull as a clean-up bull after inseminating Angus cows with Angus semen will produce white faced (bull sired) calves. Regardless of gender, such calves will usually all be marketed in order to retain a pure-bred herd of Angus. Replacement heifers will thus only be selected from the all-black heifer calves, sired by AI.
 - Is the bull to be used immediately? If so, avoid an excessively young bull whose semen quality and breeding experience are still developing. Also avoid a bull that comes straight out of a feedlot for immediate use, because such bulls often suffer significant setbacks and lose condition as they are turned out to pasture. Bulls that have lacked exercise in recent months and are obese are more likely to suffer musculo-skeletal injuries when suddenly required to exercise heavily while breeding.
 - Is the bull to be used in a herd in which tritrichomoniasis has been diagnosed. For such herds it may be most prudent to buy a more affordable bull that can be culled if he becomes infected in case the disease eradication efforts fail.
 - Is the bull to be used in a multi-sire herd? If so, try to obtain a bull that is weight and/or age matched with those already in the herd. This will ensure that the newly added bull can compete successfully for territory, feed and breeding females.

- b. Determine the **number of bulls** needed for the breeding season: Each bull should be able to breed at least 25 females, achieving a cumulative pregnancy rate of >90% in three cycles. When pastures are small (everywhere in the USA except in the more arid western regions), most bulls can, however, be used at a ratio of 1:40. Inexperienced young bulls should not be expected to breed more than 25 females in their first season.
- c. Have the bull examined for **breeding soundness**. Many bull producers offer their bulls for sale at such a young age (12-14 months) that they will not yet be producing normal sperm and hence are sold without a breeding soundness certificate or with one that contains no information on the bull's semen quality. Many bull producers provide a guarantee of breeding soundness for the bulls they sell. It is wise to test them for breeding soundness BEFORE turning them into the cows, rather than to discover at the time of pregnancy examination that the bull appears to have failed at his task. As young bulls attain sexual maturity very rapidly once puberty has set in, it is often impossible to determine retrospectively whether or not a young bull was optimally fertile at the onset of a breeding season that resulted in disappointing pregnancy rates. Alternatively, it is also not easy to determine at what stage prior to or during the breeding season a bull became subfertile if he is found to be unsound for breeding at a later stage.
- d. Keep in mind that a customary breeding soundness evaluation as proposed and advocated by the Society for Theriogenology (Hopkins and Spitzer, 1997) does not include the **examination of the bull for infectious diseases**. While virgin bulls can be assumed free of the most feared venereal disease of cattle, tritrichomoniasis, they may still introduce other pathogens into a closed herd that is free of certain diseases (examples include bovine viral diarrhea, tuberculosis, Johne's disease or bovine leukosis).

Preparing Bulls for the Breeding Season

Preparing the bull(s) for the breeding season is often neglected, resulting in last minute surprises, suboptimal bull performance or costly purchases of breeding-ready bulls to replace those that could have been used had they been prepared appropriately.

- a. **Deworming, vaccinations and parasite control:** Annual booster vaccinations against respiratory diseases, BVD, clostridial diseases, pink eye and Campylobacter should be administered at least 8 weeks before the breeding season, particularly if modified live virus vaccines are used. In the event of a fever in response to the vaccine virus, bulls whose sperm production was affected will have enough time to recover by the time they are turned out for breeding. Deworming is probably of greatest benefit if it happens at the onset of any concentrate feeding period aimed at improving the body condition of breeding bulls (see below). Treatments against external parasites usually consist of either ear tags impregnated with an insecticide (against flies) or by means of a pour-on product containing an insecticide (against mites and fleas). As yet unpublished, but well documented observations on several cases dealt with by the author have revealed that several pyrethroids (very commonly used insecticides) can have devastating effects on semen quality of bulls and rams. Aerial sprays as well as pour-on formulations have been implicated in the development of severe secondary sperm defects and very poor sperm motility in exposed breeding animals. Several very informative research papers published in recent years have reported that many pyrethroids act as endocrine disruptors

(Kim et al., 2005; Perry et al., 2007; Sun et al., 2007; Wang et al., 2007; Zhang et al., 2008). In laboratory animals the mechanism of action has been shown to be the inhibition of the enzyme responsible for the conversion of testosterone to dihydrotestosterone, an important driver hormone for accessory sex gland function (in bulls these glands include the seminal vesicles, ampulli, bulbo-urethral glands and the prostate), as well as the epididymedes. While we cannot tell which of the accessory sex organs are affected, the observation of a massive increase in secondary sperm abnormalities fits well with disruption of either epididymal or seminal vesicular functions. The toxic effects have been observed within a few days after the first exposure of bulls and rams to the insecticides and lasted for as long as the pyrethroid exposure continued. After the last exposure the sperm quality and motility of the vast majority of bulls and rams recovered to normal, but only after two to four weeks. The author advises that all pyrethroid treatment be discontinued or avoided no later than 4 weeks before the onset of the breeding season. It is noteworthy that many clients routinely bring their bulls to their veterinarians for a breeding soundness examination 2-4 weeks before the beginning of a breeding season and request that “if they pass, they must get their shots, fly tags and they must be poured”. In accordance with the above mentioned concerns, no life virus vaccines or any type of pyrethroid insecticides should be administered this late before the onset of a breeding season.

- b. Every bull should be subjected to a **full breeding soundness examination** (BSE) at least once per year. This examination should be performed 4-8 weeks before the start of the next breeding season so that there is sufficient time to take remedial action if any bull is found to be an unsatisfactory potential breeder. The scope of this presentation does not provide space for a discussion of all the components of a BSE (as advocated by the Society of Theriogenology), but it must be kept in mind that the typical BSE in the USA does not include the following:
 - Bulls are usually not examined for any infectious diseases. Lately, an increased awareness of the venereal disease, tritrichomoniasis (“trich” as the farmers know it), has prompted many in the industry to include the collection of a preputial sample for the diagnosis of this disease. Collection of samples has been made a little easier and safer by the introduction of a modified pipette (Trichit®, Williams Company, Lincoln, NE) that allows the operator to obtain a deep mucosal sample from the very caudal aspect of the preputial cavity. The widespread availability of a rapid pcr test has made the turn-around time of the laboratory test much faster than it used to be when samples had to be cultured to find the organism.
 - In the USA bulls are usually also not subjected to a serving capacity test, a measure of the bulls’ libido and mating ability.
 - As bulls are not observed during actual test matings, the BSE also does not evaluate bulls for any defects that could render animals unable to complete a mating despite having the desire to breed. Deviations of the penis, short penis and spinal or locomotor lesions that are not apparent during the cursory examination of the restrained bull in a chute are examples of conditions that may easily be missed during the typical BSE.

- c. **Trim the bulls' feet** if they are overgrown even if they are not associated with obvious lameness. Overgrown claws will exert greater strain on the joints of the lower limb during mating.
- d. Ensure that all bulls are in **good body condition** by supplementing their diets with grain if necessary. A body condition score of 6-7 on a scale of 0-9 is best at the beginning of the breeding season. Just as some bulls are too lean at the beginning of a breeding season, others are too fat. This is particularly relevant in recently purchased animals that were kept in feedlots in preparation for a sale. Such bulls may not only be too heavy, they may also be in poor physical shape, reducing their breeding capacity.
- e. Try to **adapt bulls to** the anticipated **nutritional conditions** that they are expected to breed under. For most bulls that means just grazing, but if they were kept in feedlots until the start of the season they will rapidly lose condition when turned out to pasture.
- f. When planning to use a group of bulls in multi-sire herds it will be best to **co-house** them before the beginning of the season so that their social order is well established before they start competing for breeding females. This will reduce fighting amongst bulls, limiting the risk of injury or damage to infrastructure upon turn-out.
- g. If the opportunity exists, **allow young bulls to "practice breeding"** by running them with a few females destined for the market so that they have developed breeding skills and dexterity prior to the onset of the real breeding season. This will also aid in the timely detection of problems associated with the inability to complete a mating.
- h. Carefully **assess the number of bulls required** for the breeding season. Unless an owner only has a small herd of cows (40 or fewer) and hence only needs one bull it is good practice to have at least one spare bull for every three to four bulls that are actually intended for breeding. Finding suitable replacements for injured or otherwise diseased bulls during a breeding season can be difficult and can result in loss of breeding performance in the herd.

Monitoring Bull Performance and Health During the Breeding Season

Monitoring bull performance and health during the breeding season is an extremely useful activity that allows for the timely correction of many problems.

- a. For the first few days after introducing bulls into breeding herds each bull should be observed for long to enough to **see him pursue and breed** at least one or two cows. This will prevent a bull from remaining in the herd when he does not want to or is unable to breed for any reason.
- b. Arrange for the regular, preferably daily, observation of each bull's **wellbeing and health**. This can be achieved by riding the pasture on horseback or motorized vehicle or by feeding the bulls a small amount of grain at a set time and place each day. Bulls rapidly become trained to such a feeding routine and will come to the feeding place in anticipation of their daily meal of grain. Any bull that fails to show up at feeding time should be suspected to have sustained some injury that impairs his ability to move, to have fallen ill or to have jumped the fence into an adjoining pasture (in fact, he may be in the neighbor's herd contracting tritrichomoniasis). The daily inspection should allow the observer to get close enough to each bull to consciously verify that no bull has any swellings along the prepuce (penile hematoma, preputial injury or abscess) or sudden change in the size of his scrotum (hernia, snake or insect bite). Grain supplementation

will not only allow for the regular inspection of all bulls, it will also help to maintain the animals in good body condition.

- c. When **rotating groups of bulls** during the breeding season (a practice that is advocated by many to keep bulls “fresh” and provide them with opportunity for recuperation after spells of heavy breeding) it is always advisable that groups are kept as uniform as possible to avoid the physical dominance of one bull over the others. Dominance is unavoidable and it is critical that especially the dominant breeding bull is not only fertile, but also willing and able to breed a larger number of females than the other bulls in the herd.

Managing Bulls after the Breeding Season

At the conclusion of the breeding season ranchers have a few options for their out-of-season management.

- a. **Testing bulls for tritrichomoniasis** in herds in which the disease has been diagnosed in previous seasons is best done immediately after the end of the breeding season. As young bulls are likely to overcome the infection after some time of sexual rest, it is best to test them immediately after they stop breeding so that false negative results can be avoided when testing is delayed until a later time. Discovering that the disease has or has not been eradicated successfully at the earliest possible time is also useful in the planning of further interventions required for the complete control of this dreaded problem.
- b. Some ranchers **place bulls in dedicated bull pastures** or lots when they are not breeding. This saves the infrastructure on the remainder of their farm from bull sparring and fighting and allows for easy access to the bulls for regular health inspections and any supplementary feeding practices. Others, however, **leave the bulls in the cow herd** after the end of the designated breeding season. This practice keeps bulls from fighting in confined spaces and is deemed to contribute to calmer attitudes amongst bulls. It also obviates the need for a designated bull holding facility or pasture. The advent of ultrasonography has provided veterinarians with the ability to accurately determine which cows became pregnant during the designated breeding season and which have fallen pregnant outside the breeding season or not at all. Cows that conceived outside the breeding season can be sold as pregnant cows, often fetching better prices than non-pregnant slaughter cows. Potential pitfalls of keeping the bulls in the cow herd include the lack of daily inspections and the risk of bulls jumping into adjoining pastures or farms in search of cows to breed when they run out of estrous females in their own herd.

Summary

In conclusion, bulls contribute 50% towards the success of any breeding program, implying that they also contribute at least 50% towards the risk for a lower than expected pregnancy rate. Appropriate and diligent bull management is therefore a sound and rewarding practice.

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