



Repro Tracks

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How to get the most out of a good bull

Recommended stocking rates of bulls placed with females during the breeding season vary depending on several factors that influence pregnancy rate. With appropriate precautions, bulls that have passed a breeding soundness exam (often referred to as a BSE) can handle considerably more females in a breeding pasture than has traditionally been recommended. Increasing the mating opportunities for young bulls that have proven their breeding ability decreases the cost per pregnancy and may enhance the rate of genetic improvement.

Bull-to-female ratio

Recommendations for stocking rates of bulls with females during the breeding season vary widely. Most of the variation in the recommended bull-to-female ratio (BFR) stems from the possible effect of differences in:

- bull age(s),
- social dominance effects,
- bull body condition,
- pasture conditions,
- pasture size,
- terrain,
- water source(s),
- breeding season length, and
- estrous synchronization/artificial insemination (AI).

These and several other possible factors can influence the ability of bulls to achieve high pregnancy rates and to get cows or heifers pregnant early in the breeding season.

A quick Internet search for “bull-to-female ratio” turned up one recommendation from Oklahoma State University that suggested, “A time honored rule-of-thumb is to place about the same number of cows or heifers with a young bull as his age is in months.” That would limit yearling bulls to breeding only 12-15 cows. Another university source presented the more liberal guidelines for BFR shown in the table below.

The more liberal BFR recommendations

Table 1: Recommended bull-to-female ratio (BFR) for bulls of various ages

Age of bull	BFR
12-18 months	1:15-25
2 years	1:30-35
3-7 years	1:35-60
Aged (>7 years)	1:30-40

Source: Hansen, G.R., Dept. of Animal Science, University of Florida.

were justified by research studies showing fertile bulls can settle a large number of cows in a short period of time. One of the most impressive studies demonstrated that young 2-year-old bulls were able to mate successfully with up to 60 cows or heifers in a short period of time. When the BFR was varied from 1:25 up to 1:60, there was not a large difference between groups in the percent of heifers pregnant within 21 days, regardless of the BFR.

Based on this research and these recommendations, it may be wisest to start mating yearling or 18-month-old bulls to smaller numbers of females (15-25). However, if they are successful in achieving high pregnancy rates and breed cows early in the breeding season, the number of cows to be mated per bull in the future can be increased (30-60). Obviously, increasing a bull's breeding load would depend on his passing a breeding soundness exam prior to the next breeding season.

Florida researchers suggested a simple method to verify that a bull used at a higher BFR is covering females and is fertile. They referred to it as the “pass-over rule.” The method consists of observing the first 8 to 10 cows that a bull mates and recording the date of service. Starting 16 days later, observe these same cows for eight to 10 days, recording those that return to estrus. If the percentage of cows that have “passed over” the expected estrous date without returning to estrus is more than 50%, the serving capacity and the fertility of the bull at the higher stocking rate has been verified.

Increasing the mating opportunities for young bulls that have proven their ability to breed at a lower BFR increases the value of the bulls by decreasing the cost per pregnancy. Furthermore, if higher prices are paid for genetically superior bulls, stocking

rates need to be increased to maximize the rate of genetic improvement by getting more offspring from the genetically superior sires.

In addition to these general recommendations, breeders often have questions that relate to the specific situation in which they place bulls in their breeding pastures. At a recent field day, two breeders approached me with interesting questions.

Breeder question No. 1

I synchronize estrus in my heifers and breed AI once at the beginning of the breeding season. I want to use yearling bulls for natural service during the rest of the breeding season. If I synchronize and AI 75 heifers, how many bulls do I need to do the cleanup breeding by natural service?

Response: One way to approach this decision is to ask, “How many yearling bulls would you need to breed 75 heifers if you didn't use synchronization and AI?” and then reduce that number by the proportion that you expect to get pregnant to the AI.

If you follow the general guidelines for using 12- to 18-month-old bulls, it would take three to four bulls to successfully breed 75 heifers. Most estrous synchronization and AI programs are considered to be successful if 50% of the animals become pregnant to the synchronized breeding. Usually, the success rate is a bit higher, but being conservative makes sense when determining the bull power that is needed to follow synchronized AI.

If half the heifers (38 head) are open after the synchronization and AI, two bulls should be adequate to breed the heifers by natural service. The biggest question about their ability to do so is raised by the fact that most of the open heifers will show heat around the same time, approximately 21 days after the AI breeding. Can the young bulls handle this many heifers in heat at once?

Consider the results of a trial performed at Colorado State University where groups of 10 to 38 synchronized cows or heifers were placed with each 2-year-old bull. The bulls were observed during the peak 30 hours of synchronized estrous activity. In that day and a half, the average 2-year-old bull mounted 144 times and ejaculated 55 times. After the trial had been replicated for three years, researchers found that pregnancy rates of synchronized cows and heifers mated with bulls using a variety of single-sire BFRs (1:7 to 1:51) were not significantly affected by the BFR.

That said, when it comes to breeding your 75 heifers, splitting the heifers and placing each yearling bull with half of them in a single-sire mating pasture, rather than turning the bulls out together, is recommended.

Breeder question No. 2

I have 90 commercial cows and have been using three Angus bulls I purchased two years ago to breed them. One of my bulls got hurt and I sold him as a cull bull. Can I purchase a new 18-month-old bull and turn him out with the two older bulls I have been keeping together for the past two years?

Response: Mixing bulls of different ages can create numerous problems. The first and most obvious potential problem is the risk of injury during the establishment of a new social dominance order (SDO; “pecking order”) among the bulls. The two older bulls you own have been together and have an established SDO. It is most likely that if you introduce a new, younger bull into the group, the younger, lighter bull will be subordinate to the two older, dominant bulls.

Establishment of the dominance order may involve fighting among the bulls. All the bulls are at risk of injury if they fight, but the young bull is likely to be the subordinate and may have the greatest risk of injury.

If the bulls are mixed, it should be in a pasture that allows as much room as possible for the young bull to get away from the older bulls, not in a corral where the subordinate bull can be cornered. Some breeders recommend that a new, young bull should be introduced when the older

bulls are preoccupied with a change in their location or some other management change that allows the introduction of the new bull to be just one of several changes that occur simultaneously.

None of the producers I talked to claimed 100% success at introducing new bulls to a group without problems. Most indicated that the new bull should be watched closely, and if the subordinate bull is at risk of being injured, he should be removed.

The other problem with introducing a younger, subordinate bull into a breeding pasture is that the dominant bull will not allow the young bull an equal chance to mount and breed cows in the herd. The older, dominant bull is likely to do the majority of the breeding, and, therefore, is likely to sire the greatest proportion of the calves.

In a five-year study, investigators recorded the percentage of calves sired by each of four bulls mated each year to a large group of cows. The bulls varied in age from 2 to 10 years old throughout the study. They reported that a single dominant bull sired 62%-70% of the calves born in the herd each year.

Therefore, don't expect to introduce a new, young bull and have him sire as many calves as either of the two older bulls you own. The dominant bull will “guard” the cows in heat

each day and prevent the subordinate bull from mounting and breeding. Cows make this process easier by grouping together when they come into heat. In the study cited above, the bull that was lowest in the SDO sired only 6%-12% of the calves each year.

If you have a choice, it would be better to split your cows and allow the older bulls to breed one group while the younger bull breeds a separate group. Another alternative is to buy a group of young bulls that are all the same age to replace your whole bull battery. Groups of same-age bulls kept together in one breeding pasture have a more complex SDO and are more likely (but not guaranteed) to share the breeding more evenly.



Editor's Note: *Bill Beal is a beef cattle reproductive physiologist and professor emeritus at Virginia Tech. He conducts research involving estrous synchronization, artificial insemination, embryo transfer and the use of ultrasound technology. This column is designed to provide answers to questions about reproductive management commonly posed by commercial and purebred breeders. If you have questions or comments related to the reproductive management of cows or bulls, e-mail them to him at wbeal@vt.edu.*