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**Bull Power: Productivity and Profitability**

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INTRODUCTION

One of the biggest challenges facing cow/calf producers today is cutting their costs of production. One possible strategy for lowering costs is to increase the production efficiency of the cow herd. A key area to focus on is the reproductive function of the beef bull because natural mating accounts for over 95% of the pregnancies achieved each year in the 33.7 million beef cows in the U.S.

It is becoming apparent that perhaps because of increased selection pressure on scrotal circumference, the modern beef bull is more fertile than the bull of yesterday. Yet, according to the 1992 National Beef Cow/Calf Health and Productivity Audit (USDA), yearling and mature beef bulls are being mated at bull-to-female ratios of 1:19 and 1:29, respectively. Utilizing bulls to their full breeding potential is one of the quickest and simplest ways a producer can cut costs.

ASSESSMENT OF OPTIMAL MATING LOAD

Because of the disparaging results we saw with trying to identify individual yearling bull mating potential, and the labor intensity of serving capacity testing mature bulls, we felt it was impractical to continue to pursue this avenue. Instead we set out to determine the optimum mating load for modern beef bulls because of the considerable potential increasing mating loads offers for lowering costs of production. Using estrus synchronization we were able to place very heavy mating loads on bulls in a short period of time; plus, estrus synchronization may enhance reproductive efficiency by allowing for a shortened breeding and calving season. Earlier work by several researchers provided evidence for increased mating loads for beef bulls both with and without estrus synchronization.

We initiated a two year study in cooperation with Noffsinger Ranches of Walden, Colorado, to try and answer the earlier stated objective. Fortunately, this cattle operation owns their own feedlot and traditionally have a short breeding season for heifers and then feed out all open heifers, therefore we were able to impose some rather nontraditional bull-to-female ratios without ending up with an economic disaster.

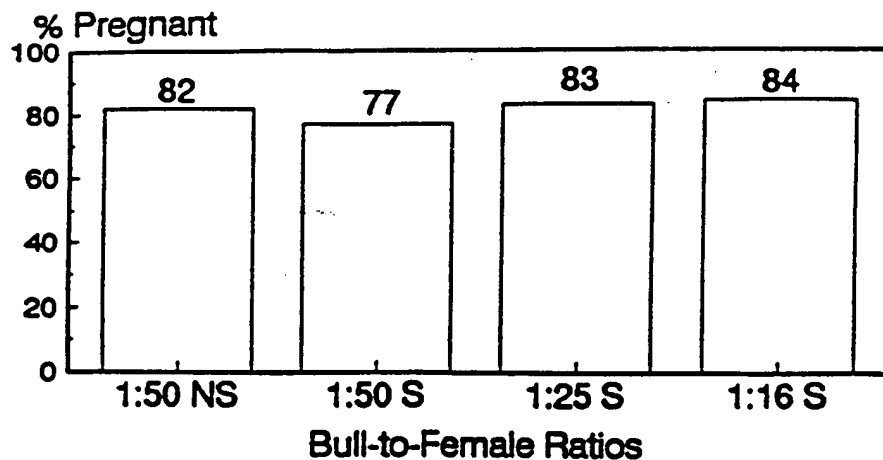
During the first year a group of 800 cycling heifers were divided into four experimental groups: (1) non-synchronized heifers with two bulls per 100 heifers (control group); (2) synchronized heifers with two bulls per 100 heifers; (3) synchronized heifers with four bulls per 100 heifers; and (4) synchronized heifers with six bulls per 100 heifers. Each group had two replicates. The breeding season lasted only 28 days. The 28 bulls, mostly two- and three-year-olds, were selected based on their similarity for semen quality (greater than 80% normal sperm),

scrotal circumference (greater than 34 cm) and structural soundness.

The outcome of this research was somewhat surprising. Using more bull power did increase the pregnancy rate, but only slightly, and not necessarily the profit. After 28 days, 82% of the non-synchronized heifers in the control group were pregnant compared to 77% in the two-bull synchronized group (See Figure 1). Interestingly, there was no difference in the average day of conception between the two-bull control group and the two-bull synchronized group. The non-synchronized heifers cycled as if they were synchronized, resulting in 40% conceiving with the first six day of the breeding season, compared to 38% of the synchronized heifers. Eighty-four percent of the synchronized heifers in the six-bull group were pregnant by the end of the test period. The group that represented the industry standard (though these were synchronized), one bull to 25 females (4 bulls per 100 heifers), had an 83% pregnancy rate. Comparing the synchronization programs, a bull-to-heifer ratio of one to twenty-five (4 bulls per 100) was most profitable. Improving the pregnancy rate six percentage points was enough to justify using four bulls per hundred rather than two.

The first three treatments (1:50 non-synchronized; 1:50 and 1:25 synchronized) were repeated in an identical experiment at the same location during the second year and the results were similar. Eighty percent of the non-synchronized heifers were pregnant (BFR 1:50) compared to 82 and 86% of the synchronized heifers in the two bull and four bull groups, respectively.

Figure 1. Pregnancy results by different bull-to-female ratios.



NS = Non-synchronized  
S = Synchronized

By extrapolation, the results of this research suggest that many mature bulls are capable of much greater reproductive efficiency than is currently being required of them. Observations at select ranches which are successfully using mature bulls at ratios of 1:50 or greater bear this out.

## HOW DOES TERRAIN AFFECT MATING LOADS?

Breeding pasture topography and size is generally thought to have a profound effect on bull-to-female ratios. But, after hundreds of hours spent observing cattle behavior during the breeding season, it is this author's opinion that estrus females generally seek out the bull despite the terrain. Most cattlemen however, feel that the rougher the terrain and the more extensive the stocking rate, more bulls will be required to effectively find and service estrus females. No literature has been found by the author which investigates this effect on mating load. Therefore, in an attempt to assess this effect on bull mating loads, a large cow/calf ranch in Northwest Colorado which operates under semiarid to mountainous terrain with extensive stocking rates was enlisted. Because of topographic constraints this ranch has two distinct herds. On the west side of the ranch, 500 cows remained with the traditional bull-to-cow ratio of 1:16. On the east side the ratio for another 500 cows was increased to 1:26. The ten year average bull-to-female ratio on this ranch was 1:16 and the average calving rate for the same ten year period was 90%.

The results over both years the experiment was conducted, showed that there was no difference in pregnancy rate (96%) or average day of conception between the two herds, providing evidence that at least in this particular type of rough terrain the mating load could be increased by over half with no adverse effects on pregnancy rates.

## HOW DO MATING LOADS DIFFER FOR YEARLING VS. MATURE BULLS?

Because of the inexperience factor and incomplete physiological development associated with the use of virgin yearling bulls one would expect lower yearling bull fertility as measured by pregnancy rates compared to mature bulls. Our data bears this out. Using 2200 similar type heifers across years, yearling bulls achieved an overall pregnancy rate of 78% in a separate experiment during a 44-day breeding season. In contrast, mature bulls achieved an overall pregnancy rate of 82% in the aforementioned experiments during only a 28-day breeding season. These experiments were not designed to directly compare the fertility of yearling vs. mature bulls and, thus, the results are confounded by factors such as year and bull-to-female ratios. Yet, these results coupled with pasture observation, provide an indication of the greater mating efficiency and fertility of mature bulls.

## SUMMARY

In summary, our research has demonstrated that: 1) the optimal bull-to-female ratio for estrus synchronized heifers is 1:25; 2) that most mature bulls are capable of greater mating loads than is required of them in most situations (considerable other research also supports this conclusion), and; 3) that excess bull power may not be required where stocking rates are extensive or the topography is less than ideal.

## CONCLUSIONS

I'm often asked what my recommendation is for mating loads of mature experienced bulls

with adequate scrotal circumference during a short breeding season (60 days). Based on previous research, our research, and observations at numerous ranches in both the U.S. and Australia, that are placing bulls under heavy mating loads and operate under varying types of terrain, I feel confident recommending a bull-to-female ratio of 1:50 in multiple sire breeding situations. In the case of those few bulls that cannot handle this mating load, there will likely be other bulls in the pasture capable of impregnating even more than 50 females. By stretching their bull power these producers have been able to concentrate on buying quality bulls because they are able to pay more for them since they have found they need fewer bulls than in the past.

If you are now at a bull-to-female ratio of 1:20 or 1:30, should you go to 1:50 in one year? NO! Because there are so many factors that vary from one operation to the next, especially terrain, I recommend you increase bulls mating load gradually. Specifically, an increase of 5 to 10 cows per bull per year until pregnancy rates decline or you can't sleep at night, whichever comes first!