

## Minimum Breeding Target Weights for Replacement Heifers

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Reproductive efficiency measured as percent calf crop weaned per cow exposed for breeding has the greatest economic impact on the profitability of cow-calf operations. Unprofitable cow herds usually have poor reproductive efficiency. Frequently, the primary cause of the problem is a low percentage of yearling and 1st-calf heifers getting bred and rebred during the breeding season due to poor management and care. They are not cycling because they are too small and thin. Poor reproductive performance of yearling and 1st-calf heifers is very expensive. On a per head basis, a good replacement heifer development program requires more time, labor and feed resources than the mature cow herd. However, it is very cost effective, profitable and relatively simple with long term benefits. The results of a good heifer development program are more heifers get pregnant in the shortest amount of time.

Yearling replacement heifers cannot get bred early if they have not reached puberty prior to or early in the breeding season. Research has repeatedly shown age at puberty or first estrus in heifers is more dependent on weight than age. Furthermore, if 90% of a group of heifers are expected to be in heat during the breeding season, they should weigh a minimum of 65% of their expected mature weight at the beginning of the breeding season. This means the smallest heifer in the group not the average of the group should weigh 65% of her expected mature size at the start of the breeding season. The probability of getting heifers which have reached or exceeded their minimum target weights bred is 80-90%. In contrast, the odds of heifers lighter than their minimum target weight having reached puberty much less getting them bred is considerably lower and gets even lower the lighter they are.

The minimum target weight for yearling heifers at the beginning of the breeding season differs widely both among and within breeds and crossbreeding combinations. Within a breed or crossbreeding combination there are very large differences in mature cow size from herd to herd due to herd differences in genetic selection for growth and level of available nutrition. The minimum target weights at the start of the breeding season for heifers of various expected mature weights are shown in the following table:

Expected Mature Weight	Minimum Target Weight
900 lbs	585 lbs
1000 lbs	650 lbs
1100 lbs	715 lbs
1200 lbs	780 lbs
1300 lbs	845 lbs
1400 lbs	910 lbs
1500 lbs	975 lbs

These are minimum target weights for all heifers not average target weights for a group of heifers. Requiring yearling heifers to reach a minimum target breeding weight should result in at least 80-90% of heifers pregnant after 45-day breeding season. Furthermore, it is strongly recommended that yearling heifers should also be bred to start calving at least 15 days ahead of the mature cow herd and for no more than a 60-day calving season. Calving 1st-calf, 2-year-old heifers early gives them more time to recover from calving the first time.

For example, there are commercial herds of small frame cows where the average mature cow weight is 900 lbs. and purebred herds of large frame cows which average 1400 lbs. Within these two herds, a 600 lb. 15 month-old heifer has a 80-90% chance of getting bred in the first herd but virtually no chance of getting bred in the second herd.

Within a herd where mature cows average 1200 lbs., the following example also illustrates the effect of calving date on the ability of two heifers to reach their minimum target weight by the beginning of the breeding season.

Heifer	Weaning		Mature	Target			
	Age	Weight	Weight	Weight	Gain	Days	ADG
A	270 days	600 lbs	1,200 lbs	780 lbs	180 lbs	168 days	1.07 lbs/day
B	210 days	450 lbs	1,200 lbs	780 lbs	330 lbs	168 days	1.96 lbs/day
Group	240 days	525 lbs	1,200 lbs	780 lbs	255 lbs	168 days	1.52 lbs/day

As a group, these replacement heifers will reach their minimum pre-breeding target weight with a moderate level of nutrition that results in an average ADG of 1.52 lbs/day. Although heifer A has to gain only 1.07 lbs/day to reach her target weight, she would weigh 855 lbs. at the start of the breeding season if she gained 1.52 lbs/day. In contrast, heifer B has to be pushed much harder to gain 1.96 lbs/day to reach the same minimum target weight. If she gained 1.52 lbs/day, she would weigh only 705 lbs. by the beginning of the breeding season. As a result, heifer B will probably not reach puberty before the start of the breeding season so the odds of her getting bred during a 45-day breeding season are 50-50 at best and very late in the breeding season at best. Heifer B should not have been kept for a replacement heifer. It would take too much feed and money to push her to gain 1.96 lbs/day needed to reach her minimum target weight. In this particular herd, heifers weighing less than 500 lbs. at weaning probably should not be selected for replacements.

Again, a good heifer development program requires a little extra feed and management and cannot be short cut to save pennies. In a 1985 paper published in the Journal of Animal Science, Wiltbank and coworkers at Texas A&M University reported the results of a study which evaluated the economics of feeding heifers to reach a recommended minimum target weight versus a target weight below the recommended minimum to save a few dollars in feed. This study determined the reproductive performance in the first and then their second breeding seasons to evaluate the carryover effects of using target weights. The amount of feed to attain target weights, weaning weight of the first calf and calf losses in 221 Brahman crossbred heifers fed to weigh either 600 or 700 lbs. at the start of the breeding season was measured. They also studied the value of feeding heifers of differential weights separately.

Heifers were randomly assigned to either a 600 or 700 lb. target weight group. Each target weight group was subdivided into lightweight (below average) and heavyweight (above average) groups on the basis of initial weight. Heifers were fed in three lots - lightweight, heavyweight and one-half lightweight and one-half heavyweight - for 200 days until the start of the breeding season. All heifers were fed 2 lbs. of cottonseed meal/day and free-choice coastal bermudagrass hay. The amount of ground corn fed daily was varied so heifers would make the desired ADG to reach their target weight of 600 or 700 lbs. Following the first 20 days of the first breeding season, heifers were managed the same but only in two target weight groups through the second breeding season and weaning of their first calf in the fall when the experiment was terminated.

Brahman crossbred heifers with a 700 lb. target weight reached puberty 29 days earlier than heifers with a 600 lb. target weight. As a result, 63% of the 700 lb. target weight group had exhibited estrus in the first 20 days of the breeding season compared to only 33% of 600 lb. target group. By 40 days this difference had narrowed to 80% versus 56%. By 60 days the difference was 92% versus 71%. In other words, one-third more of 700 lb. target weight group heifers had been in heat with the potential of getting pregnant during the breeding season. The net effects were significantly higher pregnancy rates for 700 lb. target weight heifers than for 600 lb. target weight heifers - 39% vs 9% at 20 days, 57% vs 27% at 40 days and 74% vs 47% at 60 days, respectively. On average, the interval from start of breeding to pregnancy was 19 days less for 700 lb. target weight heifers than 600 lb. target weight heifers.

These same differences in reproductive efficiency were also found the second year after they calved as 1st-calf, 2-year-old heifers. Because heifers assigned to the 700 lb. target weight had a 16% higher pregnancy rate earlier in the first breeding season, they had a significantly earlier average calving date (17 days) and weaned 96 lbs. more calf per heifer exposed than heifers with a 600 lb. target weight. Little or no dystocia or calving difficulty was encountered in both groups of heifers.

In the Texas study, an average heifer in the 700 lb. group was fed 485 lbs or 8.7 bushels more corn and 220 lbs. more coastal hay than a heifer in the 600 lb. group. Assuming \$3.00 per bushel for corn and \$65.00 per ton for hay, it cost approximately \$33 more per Brahman crossbred heifer to get heifers to the recommended minimum target weight of 700 lbs. than 600 lbs. Using an average feeder calf price of \$85 per 100 lbs., the return on the \$33 per

heifer investment would be \$81.60 per heifer exposed from their first-calf. This is a net return on investment of \$48.60 or 147% per heifer exposed for breeding. A good heifer development program is an economic asset not a liability to a cow-calf operation.

Wiltbank and coworkers also found separating heifers into lightweight and heavyweight groups within a target weight had no advantages in reproductive performance over managing them as one group. This simplifies management of replacement heifers to reach a minimum target weight by start of the breeding season.

It is clearly evident from the Texas A&M study that a good replacement heifer development program is essential for a profitable cowcalf operation. This study emphasizes the economic and productive benefits of managing and feeding heifers to reach a minimum target weight by the start of the breeding season. Heifer development programs should also reduce labor requirements at first calving because larger heifers should have less calving trouble and should rebred earlier at a higher rate.

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