

REPRO TRACKS



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Stress and reproduction

Efficiency of reproduction is likely the single most important trait to a beef cattle producer. Producers who have greater pregnancy rates, with an increased percentage of females calving early in the calving season, tend to also wean a greater percentage of their calf crop and have greater weaning weights.

To ensure that beef cows and heifers have the greatest opportunity to become pregnant and calve early in the calving season, producers should be cognizant of the impacts of stress on reproduction. Various stressors, whether environmental, nutritional, shipping, handling or individual (i.e., excitable temperament), may all directly impact reproduction.

Stress from a change in diet or grazing skills and dietary habits are learned early in life and allow animals to increase their consumption of feed or forage. These skills that cattle learn, especially between weaning and breeding, have been known to carry over from one season to another.

As cattle age, they become less willing to try novel feeds they may encounter. It is especially important for producers to understand that when they offer new or novel feeds to their cattle, they need to introduce those feeds or forages in increasing amounts over time.

For example, when females are introduced to a new pasture with novel forage, they may spend more

time and energy foraging, but less time ingesting feed. Research has shown that heifers grazing forage from weaning to breeding rather than being placed in drylots appeared to retain better grazing skills and increased average daily gains into the subsequent summer.

In one study (Perry et al., 2013), heifers that were developed from weaning until the next spring on range with supplementation showed no weight loss the following spring, whereas heifers that were developed in a drylot lost weight when turned out for grazing the following season. In addition, heifers that were kept in a drylot until artificial insemination (AI) had decreased pregnancy rates compared to heifers that had previous grazing experience (see Fig. 1). Therefore, post-insemination nutritional stress and dietary modifications may have had an influence on embryonic survival due to the stress associated with such changes.

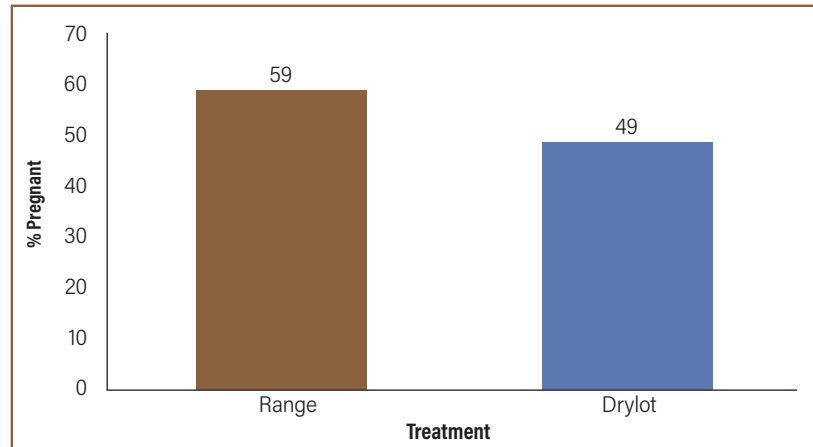
A question I am frequently asked is, 'When is the best time to ship cattle after artificial insemination?' With our knowledge of the critical time

points in embryonic development, it is possible to understand how stress from shipping could also result in increased embryonic mortality in cattle.

When animals are loaded on a trailer and hauled to a new location, they become stressed and release hormones related to stress. These hormones lead to a release of different hormones that change the uterine environment in which the embryo is developing. During blastocyst formation, hatching, maternal recognition of pregnancy, and attachment to the uterus, the embryo is vulnerable to these changes. Therefore, the period of time at which an embryo is most likely to be affected by a stressful event ranges from Day 5 to Day 42.

Before the embryo is 5 days old, it usually is in the oviduct and is not exposed to the uterine environment. In addition, the embryo has not "hatched" by Day 5 either. Therefore, handling or shipping stress will have a lesser impact on the embryo within the first five days after insemination.

Fig. 1: Pregnancy rates to artificial insemination for heifers that were either developed on range or in a drylot. All heifers were moved to grass after AI.



Source: Adapted from Perry et al, 2013.

Temperament effects

Individual animal temperament also has an influence on fertility in cattle. We know that cattle with excitable temperament have decreased feed intake and partition their nutrients differently to sustain their stress responses. This decreases nutrient availability to support normal body functions, such as reproduction, indicating excitable temperaments may indirectly impair reproduction by decreasing nutritional balance.

In addition, hormones produced during a stress response, particularly cortisol, directly disrupt the physiological mechanisms that

regulate reproduction in beef females, such as ovulation, conception and establishment of pregnancy. Calm cattle have reduced cortisol and greater blood concentrations of luteinizing hormone, the hormone required for puberty establishment and ovulation, compared to temperamental cattle.

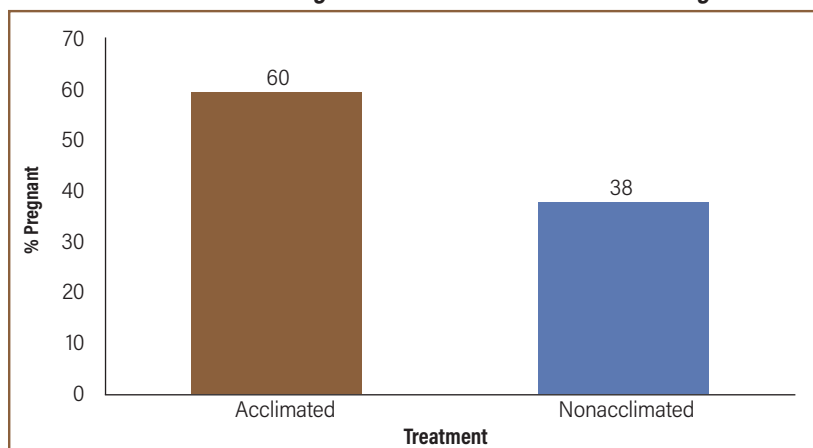
One method to improve temperament and increase fertility in cattle is to adapt cattle to humans and handling. This has been shown to decrease stress-induced hormones and increase favorable reproductive hormones.

In addition, replacement heifers exposed to an acclimation process to human handling for four weeks

after weaning had improved temperament, reduced cortisol, and reached puberty and became pregnant earlier compared to nonacclimated cohorts (see Fig. 2). Therefore, adapting beef females to human interaction and handling may improve their temperament and consequently hasten their reproductive development.

Exposure of beef females to any stressful situations during and after breeding has detrimental effects on their reproductive performance. Therefore, producers should adopt management strategies to prevent such stressors to optimize reproductive efficiency in beef operations. ^[A]

Fig. 2: Percentage of heifers attaining puberty by 12 months of age after acclimation to human handling or no acclimation to human handling



Source: Adapted from Cooke et al, 2012.