

REPRO TRACKS

by Cliff Lamb, Texas A&M University

Selecting for Fertility in Heifers

Specific reproductive traits allow for producers to select for fertility.

Animal breeding/genetics and reproduction are closely related when enhancing productivity of beef cattle operations. The development and introduction of artificial insemination (AI) provided the opportunity to increase the influence of sires with superior genetics to improve production traits.

The addition of genetic technologies to this paradigm allows for improved methods of selecting sires and dams carrying the best genes for production and yield of edible products and resistance to diseases and parasites. However, decreasing the number of influential parents within a population also increases the risk of propagating a recessive gene that could negatively affect the species.

Therefore, the antagonistic genotypic relationships between production traits and fertility suggest care must be taken to ensure increasing the frequency of genes with a positive influence on production does not negatively affect the fertility of the replacement females entering the herd.

The use of genetic technologies to improve reproduction has been slow in beef cattle, mostly due to the relatively low heritability of these traits. Among reproductive traits, those with the greatest heritability

are associated with sexual maturity, probably because these traits depend on the animal attaining a certain age, body mass or body composition.

The relationship between growth and development genes and reproductive success suggests genetic technologies must be used with care to improve production efficiency without negatively affecting fertility and with a desire for genetic markers of fertility to develop selection indexes not focused solely on production traits.

There are multiple strategies (Table 1) that can be used to enhance fertility, such as which replacement heifers are selected, elimination of repeat breeder cows, measuring antral follicle count or selecting for age at first calving.

The natural tendency of producers is to choose the oldest and largest heifers to ensure a high proportion have initiated reproductive cycles at the start of their first breeding season. While selecting the heifers that are heaviest at weaning will increase the percentage

that are pubertal at a year of age, not all of the heaviest heifers will have initiated reproductive cycles. These heifers also usually have larger birth weights and produce heavier calves, so one can inadvertently increase cow size in the herd.

Conversely, care should be taken when selecting for young, light-weight heifers that have reached puberty, because decreasing the age at puberty too greatly can increase the risk of a very young heifer

Table 1: Heritability of traits associated with sexual maturity in beef cattle (adapted from Cushman and Perry, 2012)

Trait	Heritability	Reference
Age at puberty	0.14	(Snelling et al., 2012)
	0.24	(Morris et al., 2000)
Reproductive tract score	0.30	(Martin et al., 1992)
Yearling uterine horn diameter	0.20	(Johnston et al., 2009)
Antral follicle count	0.44	(Snelling et al., 2012)
Age at first calving	0.28	(Minick Bormann and Wilson, 2010)
Calving day	0.07	(Minick Bormann and Wilson, 2010)
Follicle diameter	0.16	(MacNeil et al., 2006)
Heifer pregnancy rate	0.11	(Snelling et al., 2012)
	0.21	(Doyle et al., 2000)
	0.28	(Thallman et al., 1999)
Pregnancy rate	0.07	(MacNeil et al., 2006)
Stayability	0.15	(Doyle et al., 2000)

attaining puberty and being mated by a co-pastured bull.

Having a veterinarian perform a reproductive tract score four to six weeks before the start of the breeding season can aid in selecting replacement heifers that are pubertal and of moderate age and size.

Cows that have failed to conceive in one or more breeding seasons can be considered to have an inherent fertility problem, because they should have had between three and six opportunities to conceive. An intensive characterization of the reproductive tracts of repeat breeder cows demonstrated they had fewer follicles on their ovaries compared to age-matched cows that had never failed to produce a calf.

Antral follicle count can be used as an indicator of fertility and reproductive age in cattle. Using

transrectal ultrasonography, a veterinarian can visualize the ovaries and count the number of fluid-filled follicles present.

In one experiment, crossbred beef heifers with fewer than 15 (low) follicles detected by ultrasonography had lower pregnancy rates at the end of a 60-day breeding season than heifers with more than 25 (high) follicles detectable by ultrasonography. This same classification also resulted in a difference in pregnancy rate and in the number of inseminations per pregnancy in dairy cows.

Therefore, antral follicle count seems to be an indicator of fertility and may even be an early indicator of how these cows will perform later in life.

Few producers know the pubertal status of their heifers before the

start of the breeding season, because observing behavioral estrus is labor-intensive. Palpating the reproductive tract to estimate development or using ultrasonography to determine antral follicle number is limited by the age and size of the heifer, as well as the numbers of heifers that can be processed in a day. In addition, an ideal time to sort replacement heifers would be at weaning when they are too small to be palpated.

On the other hand, most cow-calf producers know the birth date of the calves and can calculate an age at first calving for the heifers. Thus, age at first calving may be an indicator of heifer fertility that can be utilized by beef producers. **AJ**

Editor's note: Cliff Lamb is the animal science department head and a professor at Texas A&M University in College Station, Texas.



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