

Practical Uses for Ultrasound in Managing Beef Cow Reproduction¹

G. Cliff Lamb and John Arthington²

Ultrasound has been utilized as a tool in beef and dairy research systems for many years, and in more recent years has become available to commercial livestock agriculture. An ultrasound is an electronic instrument that sends out ultrasonic sound waves from an attached device called a transducer. The waves pass freely through fluid and are reflected back to the probe once they contact a soft tissue like muscle or a dense structure like bone, resulting in an image which can be identified as the placenta, fetus, or other organs. Although ultrasound technology may be used for various functions, this article will focus only on the reproductive aspect of ultrasound.

Ultrasound can be used to determine pregnancy status, age of fetus, and sex of fetus. Additionally, ultrasound can accurately determine the presence of a viable embryo as early as 30 days after mating. The accuracy of detecting fetal viability may approach 100%, because the user can visually identify the viable embryo by the presence of a beating heart. A technician with a trained eye has the capability of accurately assessing the age of the fetus based on fetal size (Figure 1). At 60 to 85 days of age the trained user can even determine fetal sex by the

absence and/or presence of the fetal genitalia with over 95% accuracy (Figure 2). These two features alone provide many options for the use of ultrasound in reproductive management practices.

When choosing bulls, Most producers are faced with difficult decisions regarding the contributions of both maternal and carcass traits. Not only do the attributes of multiple breeds vary, but variation within breed is also substantial. By combining ultrasound and artificial insemination (AI), a producer can develop a breeding program that optimizes both maternal and carcass traits. Prior to the start of a normal breeding season (or during the first 21 to 30 days of the breeding season) bulls possessing high maternal traits may be selected and used in an AI system. After this time, natural service bulls, selected for carcass merit, can be used for the remainder of the breeding season. Using ultrasound, the producer may now determine which females are pregnant with AI-sired heifer calves based on the age and sex of the fetus. These females can be managed separately with the knowledge that they are pregnant with heifer calves possessing quality maternal traits that have the potential to be replacement heifers.

1. This document is AN113, one of a series of the Animal Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Published November 2001. Revised September 2008. Please visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.

2. G. Cliff Lamb, associate professor, Department of Animal Science, North Florida Research and Education Center (REC)-Marianna; John Arthington, associate professor, Range Cattle REC-Ona; Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

Further, because these heifer calves were conceived early in the breeding season, they will be older and larger and have the possibility of being more productive replacements when bred as yearlings in the upcoming breeding season. Calves from all other females will either be male siblings to the replacement heifers or progeny of the terminal cross (carcass trait) bulls.

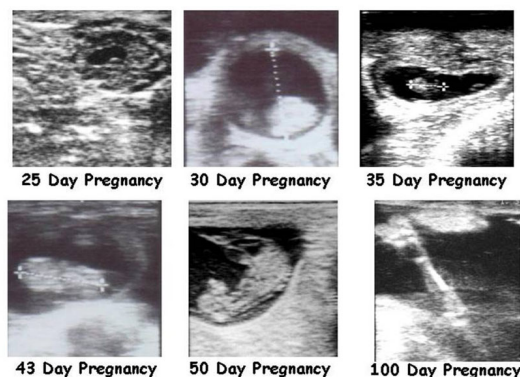


Figure 1. Ultrasound images of the bovine fetus at various stages of development (Lamb, 2001).

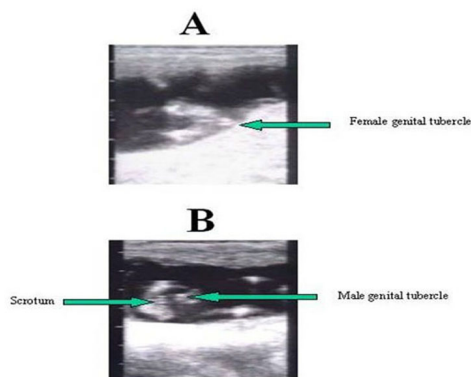


Figure 2. Ultrasound image of a female bovine fetus (65 days of gestation; Panel A) and a sagittal view of a male fetus (65 days of gestation; Panel B). Images were taken using a 5.0 Mhz transducer.

Many producers may wish to use a common bull type but manage individual pregnancies depending on the sex of the calf. An example of this management strategy is found in purebred operations wishing to separate cows giving birth to bull calves from those giving birth to heifers. At approximately 60 to 85 days after breeding, ultrasound may be used to determine fetal sex. Cows that did not conceive will also be identified. Producers can now divide the herd and

manage each of the births in a manner that best fits their production system for heifer and bull calves.

In a typical commercial cow-calf production environment a controlled breeding season can range from 60 to 120 days. Therefore, on a common weaning day, calves from these cows vary substantially in both age and weight. By using ultrasound as early as 30 days after the conclusion of the breeding season, producers can divide their herd into three groups: 1) cows that became pregnant early in the breeding season, 2) cows that became pregnant late in the breeding season, and 3) open cows. Each of these groups may now be managed to best complement its pregnancy status. For instance, late-pregnant cows may be maintained on pastures that will optimize calf growth, alleviating differences in calf weaning weight between older siblings. Producers may wish to utilize creep feeding for calves born to cows in the late-pregnant group, or supplement these cows in a manner that might lessen the following postpartum interval. Finally, producers may wish to wean these groups on different dates, optimizing calf uniformity and market price.

Specifically in Florida there are additional common practical uses of reproductive ultrasound technology:

1. To examine yearling heifers 30 days after the end of the breeding season to accurately determine pregnancy status (with 95-100% accuracy) compared to rectal palpation between 50 and 60 days to gain the same accuracy. Thus, producers are able to make immediate culling decisions about heifers and do not need to keep them on grass or feed them for another 20 to 30 days, which cuts down the feed cost significantly.
2. For large groups of yearling heifers, ultrasonography may assist in culling heifers based on fetal size. Only the heifers that become pregnant in the first 60 days of a 90 day breeding season will be retained. The remaining late pregnant heifers will be sold and not kept in the cow herd. This allows producers to sell pregnant heifers that are worth more than open heifers.

3. For commercial producers that use AI programs, ultrasound may be used 50 to 60 days after AI to identify which cows are pregnant from the AI in comparison with natural service. Identifying cows pregnant via AI (by notching ear tags or inserting an additional ear tag) allows producers to sort cows into calving groups the following spring based on whether they were pregnant from AI or not.

There are other potential uses for ultrasound in cow-calf production systems. A limitation in Florida is the availability of trained technicians and the high cost associated with its use. In addition, the expansive nature of the Florida beef production systems generally does not afford cattlemen access to the cows when ultrasound may be most effective. As with any emerging technology, these hurdles will be overcome as producers find ways to incorporate ultrasound into reproductive management practices. Contact your local county IFAS agriculture agent for the availability of a trained ultrasound technician in your area.

References

Lamb GC. 2001. Reproductive Real-Time Ultrasound Technology: An Application for Improving Calf Crop in Cattle Operations. *In: Factors Affecting Calf Crop: Biotechnology of Reproduction*. Ed. M.J. Fields. pp 231-153. CRC Press LLC. Boca Raton. FL.