



# Application of Ultrasound Technology in Beef Cattle Carcass Research and Management: Frequently Asked Questions

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Hawai'i's beef industry has experienced significant changes over the past decade due to consumer demands on the market and food safety regulations. Providing the consumer with a leaner product in less than 20 months is increasingly the focus for all segments of the industry. Cattle ranchers are now implementing new management procedures to upgrade genetic programs with intensive use of artificial insemination and emphasizing selection by expected progeny differences (EPDs), embryo transplanting of superior animals, DNA mapping of key growth genes, and ultrasound technology (UT).

The use of ultrasound for predicting fat and muscle content in live cattle has been around since the early 1950s (Wild 1950). Today, UT is routinely used by the beef industry for

- evaluating seed stock (Wilson 1992)
- identifying dates to slaughter cattle (Houghton and Turlington 1992)
- predicting quality, palatability, and cut-ability in carcasses (Hamlin et al. 1995)
- sorting feeder cattle into uniform groups for specialty markets (Williams and Trenkle 1997).

UT measurement of carcass traits in live cattle, when combined with good production records, can serve as a powerful tool in beef cattle breeding programs. The purpose of this publication is to answer some frequently asked questions about ultrasound technology.

## **What is ultrasound technology?**

Ultrasound is the use of high-frequency sound waves, on the order of 20 kilohertz (Khz), or above what is perceived by the human ear. These sound waves produce vibration-reflection images of tissues such as muscle, fat, and internal organs in live animals using specialized, "piezoelectric" crystals housed in an ultrasound transducer or wand. The reflected images are then converted to electrical current and appear as gray-shadowed pictures on a viewing screen (monitor).

## **Is UT the same technology used for human pregnancy?**

Yes, in fact all live-animal ultrasound technology used by veterinarians was adapted from human medicine.

## **Is UT safe?**

Yes. For over a decade, UT has been accepted by cattle breed associations as being of diagnostic value. UT is a safe, humane, non-invasive, non-destructive, painless technique that can be readily used on live animals.

## **How much does an ultrasound machine cost?**

Because most ultrasound use is in human medicine, the machines could be prohibitively expensive for small-scale livestock producers. A typical machine with software can cost from \$15,000 to \$35,000.

### How can a small-scale producer afford a UT machine with it being so expensive?

Small-scale producers usually do not purchase a machine. A certified, trained technician usually purchases a machine and starts up a for-hire service within a district. A scanning session usually costs between \$10 and \$25 per animal, depending on the number of animals scanned and the distance traveled by the technician.

### What part of the animal is scanned for carcass data?

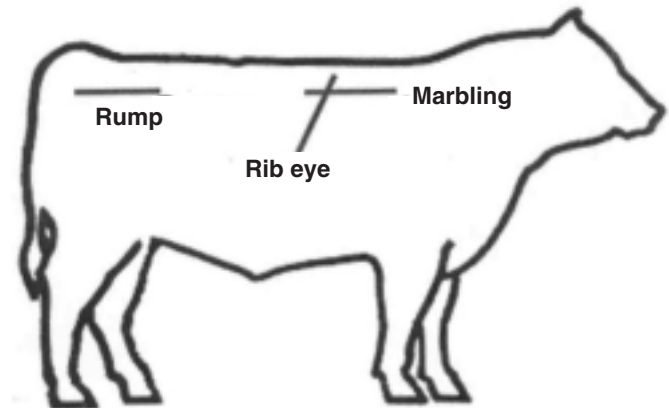
Animals are scanned in three different areas on the right side of the body. Ultrasound images are taken of the rib eye area (REA), the 12<sup>th</sup> to 13<sup>th</sup> rib-fat thickness and intramuscular (marbling) fat (IMF) area, and the rump fat (RF) area (see illustration). The technician routinely takes two scans for REA, four scans for IMF, and two scans for RF, and submits the images to a centralized ultrasound processing laboratory (CUP) for interpretation. Pictures received from the field must be of superior quality, complete with accurate animal identification, and include contemporary grouping records. Failure to abide by these guidelines results in rejected images, and thus the data will not be used in calibrating genetic expected progeny differences.

### How accurate is UT?

UT is very accurate. Certified technicians have been trained to measure and interpret within 0.6–0.7 square inches of actual rib eye area, 0.04–0.05 inches of actual rump fat area, and 0.8–0.9% of intramuscular fat area.

### How do technicians become certified?

To become a certified UT technician, one needs to attend a basic, sanctioned ultrasound training session. Once completed, the technician then needs to become comfortable with the equipment (usually scanning 300 animals from at least six to ten different herds). The technician then enrolls in an intensive four-day certification program to demonstrate proficiency using UT in both scanning and interpretation. All applicants must pass each section according to the Ultrasound Guidelines Council (UGC) standards. Standards are rigorous, and only 60 percent of participants become certified. Technician certification is usually renewed every other year.



Scan positions for ultrasound images

### What is UGC?

The Ultrasound Guidelines Council is an organization that was formed by the U.S. Beef Breeds Council to be responsible for developing, maintaining, and governing testing protocols and standards for beef cattle ultrasound technician certification. Committee members are usually breed organization representatives, university personnel involved with UT research, and representatives of industry companies and technician organizations that support the beef cattle industry through ultrasound service programs.

### What is a CUP?

A Centralized Ultrasound Processing (CUP) Laboratory is an independent business that processes images sent by certified technicians. To prevent biases on pictures sent, certified technicians do not interpret their own images. CUP requirements assimilate UGC standard protocols for all image collection, assure accuracy in the interpretation of ultrasound scanned pictures sent, and provide cross-checks on problem images submitted. Data collected by the CUP is then used by breed associations to develop genetic EPD calculations.

### At what age would I have my animals scanned with UT?

The recommended use of UT is on yearling bulls and replacement heifers. Depending on your breed association, the proper animal scanning age range should fall between 320 to 440 days, and yearling weights are adjusted to 365 days of age.

**Are there any special animal preparations needed prior to scanning animals?**

Collection of individual animal weights should be done within seven days prior to or after scanning. Animals should not have access to overnight feed or water prior to being weighed in. Once a herd has enrolled, all animals in a contemporary group must be scanned with ultrasound within a three-day period.

**Is there any special equipment I will need so that animals can be UT-scanned?**

The basic necessities are a weight scale and a covered squeeze chute to protect animals, equipment, and the technician from rainy conditions while scanning. Electrical power maybe needed for the ultrasound equipment and also a pair of hair shears for clipping animals with long, dirty, or matted coats.

**Are there any specific records I will need to get started using UT?**

Any kind of recordkeeping on the animals is helpful. Birth weights and yearling weights are useful in determining growth rate and for comparing it with UT carcass data.

**What are the advantages of UT over traditional beef quality grading?**

UT has the ability to quickly amass large amounts of data on live yearling offspring for use in carcass trait genetic evaluations. With UT, producers are now able

to evaluate a sire's carcass merit transmitting ability without waiting two to three years for the results from slaughtering offspring, which could be quite expensive. This information can be used as a management tool in selection and replacement of breeding stock for the improvement of the genetics of the herd. Producers also can sort live cattle into different management categories, leading to uniformity of product destined for specialized markets.

**Literature cited**

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