Ultrasound Guidelines Council Update: Field and Lab Certification Review

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The Ultrasound Guidelines Council (UGC) serves as the seedstock industry standard for establishing proficiency testing guidelines for collecting, interpreting, and submitting carcass data records via live animal ultrasound to participating beef breed associations in the United States. Since 2003, these standards have been reviewed, upheld, or even strengthened as the technology has progressed. Field technicians must "certify" that they are proficient at scanning cattle by collected good quality images that are easy to interpret in the lab. These technicians must certify ***in person*** at least twice before they are eligible for ***in absentia*** certification, a process that reviews image quality on the body of work submitted by the technician over the previous two years. Lab technicians, or those that interpret images submitted from the field, must also certify every two years with no eligibility for ***in absentia***. Lab certifications are tied to a specific technology, or type of ultrasound machine.

The Certification Process (Proficiency Testing)

To become UGC Field Certified, ultrasound technicians must pass proficiency testing (often referred to as UGC Field Certification). Proficiency testing includes a written exam, and the collection of ultrasound images of the rump, rib, and intramuscular fat. Twenty animals, varying in age, gender, and condition are scanned representing breeding cattle as well as harvest cattle. Each technician collects images on every animal twice (i.e., in two sessions). Animals are renumbered between sessions. Technicians should be prepared to spend no more than three minutes collecting images from a single animal. All animals will be clipped in advance by the host institution.

UGC Reference Field Technicians collect images on the same animals. The images collected are interpreted by UGC Reference Lab Technicians to yield estimates of ribeye area, rib fat, rump fat, and intramuscular fat. The Reference Lab Technicians also score every image for image quality. Measurements from images collected by the Reference Field Technicians are used as the standards for each trait. Technicians are evaluated based on several statistics including image quality, correlation, bias, standard error of prediction, repeatability, and standard error of repeatability. The UGC website contains study materials and explanations of the statistics used to evaluate technician proficiency.

Statistics for all technicians are evaluated by members of the UGC Board of Directors which makes all pass/fail decisions. Technicians are notified of the results within about six weeks of the certification program.

Standards for *in person* UGC certification of field technicians

An ***in person*** demonstration of proficiency will consist of an official UGC proctored event at which 20 animals will be scanned twice by the individual seeking certification. The animals used at this event will be of a weight representative of well managed yearling age purebred beef cattle of breeds that are commonly used in commercial beef production.

These same cattle will be scanned immediately prior to the certification event by three UGC certified technicians (reference technicians) who have previously met the criteria for in absentia certification in the immediately preceding two certification cycles (i.e., four years). Subject to quality control, the data produced by the reference technicians, when averaged, will serve as the standard for the certification event.

Images collected during the certification event will be analyzed independently by a minimum of two experienced and UGC certified image interpretation technicians. Average results of these analyses (again subject to quality control) will be the data used to assess the proficiency of each individual.

Any individual seeking in person certification of their proficiency in ultrasonic imaging of phenotypes that are indicative of carcass merit in beef cattle must successfully meet all of the following criteria.

1. Achieve a score of 70% or greater on a 25 question open book examination of the individual's general knowledge of UGC, use of ultrasound by the beef industry, and applicable ultrasound technologies.
2. Produce a minimum of 15 pairs of images that can be interpreted for depth of fat at the 12th-13th rib interface FAT, depth of fat over the rump (RMP), area or the longissimus dorsi muscle at the 12th-13th rib interface (REA), and intramuscular fat within the longissimus dorsi (IMF). Failure to produce 16 pairs of interpretable images for any of the anatomical locations shall result in the individual not being certified by UGC.

3. Achieve minimum average image quality scores of 0.70, 0.65, and 0.88 for RMP, RIB, and IMF, respectively.
4. For those animals with repeated measures of each trait, achieve correlations among those measures of 0.90, 0.80, 0.80, and 0.80 for RIB, REA, RMP, and IMF.
5. The standard deviations of differences between the repeated measures of RIB, REA, RMP, and IMF shall not exceed 0.06, 0.05, 1.10, and 0.75, respectively.
6. Achieve product-moment correlations for RMP, RIB, REA, and IMF between reference and candidate technician produced values greater than 0.90, 0.90, 0.85, and 0.85, respectively.
7. The standard deviation of the differences between reference and candidate predictions of RMP, RIB, REA, and IMF shall not exceed 0.05, 0.05, 1.00, and 0.70, respectively.
8. The Student's t-test for the paired differences between reference and candidate generated values will not be highly significant ($P < 0.01$) for any of the measured traits.

Standards for *in absentia* UGC certification of field technicians

A field technician seeking ***in absentia*** certification of their proficiency in ultrasonic imaging of phenotypes that are indicative of carcass merit in beef cattle must successfully meet all of the following criteria. Failure to meet any of these 6 criteria will result in the field technician being required to demonstrate their proficiency in person.

1. Have successfully demonstrated their proficiency ***in person*** at least once, and have not failed a more recent in person evaluation of their proficiency.
2. Have image quality scores for a minimum of 3000 head scanned.
3. Have image quality scores for a minimum of 250 head scanned annually in the preceding two years.
4. For RIB images: Have no more than 0.6% of images submitted scored as "reject"; and at least 93.4% of all RIB images scored as "acceptable" over the preceding two years.
5. For IMF images: Have no more than 0.5% of images submitted scored as "reject"; and at least 94.5% of all IMF images scored as "acceptable" over the preceding two years.
6. For RUMP images: Have no more than 0.1% of images submitted scored as "reject"; and at least 98.9% of all RUMP images scored as "acceptable" over the preceding two years.

Lab Certification Policies

Beginning in 2003, Lab certifications included 40 images per technology (Examples: Aloka, Classic, etc.). Since each technology portrays the image differently (i.e. brightness, contrast, grayscale, etc.) and uses different scaling or magnification, lab technicians must be proficient on each ultrasound technology, and thus are tested accordingly. As you might imagine, several lab technicians are certified on multiple technologies.

UGC administers lab certifications with all tracing images linked to carcass data, and with both tracing and image quality images set up to measure technician repeatability. UGC also can conduct lab certifications for technicians in other countries by using a paid independent third-party proctor.

A 3-point scale (1=Acceptable, 2=Marginal, 3=Rejected) for Image Quality replaced the 7-point scale used in field and lab certifications in 2012.

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