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Preparation for Ultrasound Body Composition Scanning

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Ultrasound scanning for carcass traits is a useful tool for obtaining valuable carcass information from a live animal. Ultrasound technology uses sound waves to develop images of body composition. Body composition traits that can be measured include 12th to 13th rib fat thickness, rump fat thickness, ribeye area, and intramuscular fat percentage (marbling). Each of these traits is at least moderately heritable and is significant in the determination of red meat quality and yield for individual animals.

Body Composition Traits

Rib Fat

Rib fat is an external fat measurement taken between the 12th and 13th ribs. It is measured in inches. Rib fat (also called fat thickness or backfat) is used in the USDA Yield Grade calculations and is the most important determinant of retail yield. Higher amounts of rib fat decrease cutability and produce less desirable Yield Grades.

Ribeye Area

Ribeye area is the area of the *longissimus dorsi* (ribeye) muscle that is measured in square inches at the 12th rib interface on the beef forequarter. Ribeye area is expressed in square inches. Retail product yield increases and Yield Grade decreases as ribeye area increases.

Rump Fat

Rump fat refers to the depth of fat at the juncture of the *gluteus medius* and superficial *gluteus medius* muscles. This measurement is expressed in inches. It is taken from an image collected between the hooks (hips) and pins of the animal. The rump fat measurement, together with the rib fat measurement, is used to determine more accurately the overall external body fat. This improves the accuracy of predicting percent retail product. In most cases, an animal will exhibit more fat over the rump than the rib, so more variation is often displayed in rump fat measurements than rib fat measurements.

Intramuscular Fat

Intramuscular fat percentage (%IMF) is the percentage of fat in the ribeye muscle. It is often called marbling and is observed as flecks of fat in lean tissue. Degree of marbling is related to intramuscular fat percentage and is the primary factor determining quality grade. Higher levels of intramuscular fat improve quality grade. This measurement should be collected when cattle are maintaining a high level of nutrition.

Acceptable Scanning Ages

Yearling bulls and heifers can be scanned at approximately 365 days of age to provide a good indication of how sibling steer and heifer mates will perform on the rail. Each breed association has established a window for age at scanning that must be complied with in order for the data to be used in the national cattle evaluation. Consult with the respective breed association for current scanning age guidelines.

Acceptable age windows for ultrasound body composition scanning by beef cattle breed

Breed	Acceptable Ultrasound Body Composition Scanning Age, Days ¹		
	Yearling Bulls	Developing Heifers	Feedlots Steers and Heifers
Angus	320 - 440	320 - 460	320 - 480
Beefmaster	320 - 410	320 - 410	320 - 410
BIF Guidelines	320 - 410	320 - 410	320 - 410
Braford	320 - 410	320 - 410	320 - 410
Brahman	320 - 410	320 - 410	320 - 410
Brangus	310 - 430	310 - 430	310 - 430
Braunvieh	320 - 410	320 - 410	320 - 410
Charolais	320 - 430	320 - 430	320 - 430
Chianina	320 - 440	320 - 460	320 - 460
Gelbvieh	320 - 410	320 - 410	320 - 410
Hereford	301 - 530	301 - 530	301 - 530
Limousin	300 - 450	300 - 450	300 - 450
Maine-Anjou	330 - 440	330 - 440	330 - 430
Murray Grey	320 - 410	320 - 410	320 - 410
Red Angus	320 - 440	320 - 460	320 - 460
Salers	330 - 450	330 - 450	330 - 450
Santa Gertrudis	320 - 410	320 - 410	320 - 410
Shorthorn	320 - 440	320 - 460	320 - 460
Simmental	300 - 440	300 - 440	300 - 440
South Devon	320 - 440	320 - 440	320 - 440

¹ Refer to the specific breed association for updates.

Barnsheets

A barnsheet is a form that includes information such as herd ID, tattoo, sex, birth date, and registration number of each calf to be ultrasound scanned. Breed associations require that barnsheets be submitted with ultrasound scan images, so every animal scanned for breed association data submission must be on a barnsheet. For breeds that utilize ultrasound body composition data in expected progeny difference (EPD) calculations, barnsheet reporting is critical to ensure that scan results are properly reported to breed associations for EPD updates. For cattle not listed on preprinted

barnsheets, the breeder must provide the necessary animal information to the ultrasound field technician for inclusion on the barnsheet at the time of scanning. This may be necessary if there are delays in data submission or processing such as registration paperwork or weaning performance data paperwork delays.

Obtaining barnsheets prior to scanning is the responsibility of the cattle breeder, not the ultrasound field technician. To obtain a barnsheet from a breed association, a minimum amount of data for the cattle to be scanned must be on file with the association. Cattle must be registered with the association, and some breed associations require weaning weights before barnsheets will be created. Preprinted barnsheets are often distributed to breeders along with weaning performance reports. Barnsheets may also be accessed and printed by breed association members through breed association websites as part of their online accounts.

Review barnsheets in advance of scanning to make sure all data needed to complete the sheets can be readily supplied at scanning. Barnsheets require the breeder to specify the contemporary grouping, management, and diet of the animals. A contemporary group describes cattle of similar age and sex that were managed the same and had performance data collected as a group. Improper contemporary group reporting will cause performance results to be incorrect. Note that a minimum contemporary group size is often required by breed associations for ultrasound body composition scan data to be utilized in EPD calculations or for yearling adjustments or performance ratios to be computed.

Specific management or test type codes (abbreviations or numbers designating animal management such as ranch test, central test, developing heifers, and feedlot) and diet codes (abbreviations or numbers describing how the animals were fed such as specific thresholds for concentrate feeds levels) are provided by each breed association. Look on the barnsheets or breed association websites for keys to these codes and code descriptions or contact the breed association directly for this information.

Arranging for Ultrasound Scanning Services

An Ultrasound Guidelines Council (UGC) certified technician can perform ultrasound body composition scanning services for a fee. The U.S. Beef Breeds Council charged the UGC with responsibility for developing, maintaining and governing proficiency-testing protocol and standards for beef cattle ultrasound technician certification. Arranging for a UGC certified technician to scan cattle often needs to be scheduled well in advance of the desired scanning date. Breed associations may have additional breed specific ultrasound guidelines and publish a list of technicians that are certified for the particular breed.

It may be advantageous for several producers in an area interested in having their bulls scanned to arrange for a technician to service multiple farms in one area in one trip. The Mississippi Beef Cattle Improvement Association facilitates ultrasound body composition scanning of registered Mississippi cattle by accommodating ultrasound

scanning sessions at centralized locations for multiple breeders at one time. This may help lower the cost of scanning for an individual farm by spreading the travel costs of the technician out across several farms.

Preparing for Scanning

A grounded 110-volt electrical outlet must be provided for the field technician to use with the scanning equipment. Because cattle must be dry in the scanning regions, covered cattle holding and handling facilities may be needed in the event of precipitation. Severe weather may dictate that the scanning session be postponed until conditions become acceptable for scanning. Be prepared to provide supplemental heat for scanning equipment and oil if the outside temperature is too cold. Covered or shaded cattle handling facilities are needed to keep animal out of direct or bright sunlight during scanning. This allows the field technician to view the images on the monitor.

Cattle should be restrained in a squeeze chute with side panel doors during scanning to ensure image quality and ease of scanning. Cattle must be adequately clipped (within $\frac{1}{2}$ inch hair length) and cleaned in the region of scanning. Check with the field technician in advance to decide if the breeder needs to provide clippers, electrical extension cords, vegetable oil, paper towels, or other supplies at scanning. It may be useful to keep an extra set of clippers and clipper blades on hand in the event that there is a problem with the original clippers used.

Scanning and Image Processing

Individual animal weights must be recorded within seven days of when the cattle are scanned. Record these weights on the barnsheets for the technician to submit to the authorized image interpretation lab along with the ultrasound images. Ideally, weights are collected at the time of scanning to reduce the number of times cattle must be handled. Some breeders choose to collect all yearling performance data (weights, scrotal circumference measurements, hip heights, temperament scores) at the same time cattle are ultrasound scanned for carcass composition. If the scan weight is to be used as a yearling weight, the breeder must submit the weight as a yearling weight to the breed association. This weight will not automatically be used as a yearling weight.

The ultrasound field technician should submit collected images and associated completed barnsheets to an authorized lab for interpretation. Breeders must be sure to leave barnsheets with scanning technicians instead of submitting them to the breed association. The field technician should be familiar with breed association requirements regarding acceptable image interpretation labs.

Image processing fees are typically charged for image interpretation services. The ultrasound field technician may pay these fees directly and then include the charge in an invoice to the breeder or may request that the breeder send payment directly to the authorized lab. After scan data interpretation is completed, scan results are then sent to the respective breed association(s) for adjustments and EPD calculations. Summaries

of scanning results and related performance information are then provided by breed associations to breeders.

Ask the field technician how long it generally takes for image processing to be completed and results reported to the breed association and/or breeder. Breeders will typically be notified by scanning technicians if errors are found during image processing or by breed associations during report processing. Potential errors can include bad or missing images, incomplete barnsheets, unpaid scanning or image processing fees, missing weaning weights, or animals not found in breed association databases. If an unreasonable amount of time passes after scanning with no feedback on results, then contact the scanning technician and/or breed association to track down and help resolve any potential problems. Results may be reported by e-mail, mail, or obtained on member-specific screens on breed association websites.

Conclusions

Ultrasound scanning technology is a useful tool for collecting body composition data on live animals. The resulting data are less expensive and time consuming to collect compared with actual harvest data from beef carcasses. This technology allows seedstock producers to collect body composition data on prospective breeding animals for use in genetic improvement efforts. Ultrasound scanning results help breeders select cattle that best fit market specifications. This information provides breeders with powerful information for seedstock marketing as well. For more information on ultrasound scanning for body composition traits, contact an office of the Mississippi State University Extension Service.