It's Real

The *American Angus Association will begin gathering real-time ultrasound data on a breed-wide basis. Processed through a centralized processing center, the data will be used to establish ultrasound-based carcass expected progeny differences, the first of which will be published in fall 1999.*

BY JOHN CROUCH

Research relative to the use of ultrasound to measure live cattle for ribeye area, rib fat, rump fat and percent intramuscular fat began in the 1950s with a young researcher named James Stouffer at Cornell University. The technology became somewhat stagnant until the Certified Angus Beef (CAB) Program focused national attention on the importance of quality in beef products. Presentations by Stouffer and Patsy Houghton at the 1988 Beef Improvement Federation (BIF) convention in Albuquerque,N.M., drew the industry's attention. Thus began the modern era of using ultrasound technology to measure carcass merit in live beef cattle.

As this technology developed, so did some application challenges. BIF programs certified many technicians; however, uniform hardware and software posed problems in image interpretation.

Realizing this lack of consistent protocol, the concept of centralized ultrasound processing was born.

Since one of the long-range goals of the American Angus Association is to "incorporate ultrasound data with carcass EPDs (expected progeny differences) within three years," a two-year research project with this objective was launched at Iowa State University (ISU) under the direction of Doyle Wilson, Gene Rouse and Scott Griener.

Basically, the research protocol called for:

1. The formation of a centralized ultrasound processing laboratory at ISU where ultrasound images could be uniformly interpreted.
2. Selection of specific hardware and software to be used in the project.
3. Development of a simple means for capturing images on diskette in the field.
4. Selection of qualified technicians to gather ultrasound data for research.

Thirty-nine ultrasound technicians attended a AAACUP training sessions in September. Many will be added to the AAACUP field technician list and will be able to collect and submit scans to the AAACUP lab. That list is available from John Crouch, American Angus Association.

Phase 1 complete

The first phase of the project has been completed as ultrasound data has been gathered on some 4,500 yearling bull progeny of 497 sires. The data were analyzed by Wilson in September 1998.

An excerpt from the Breed Improvement Committee minutes from the September 1998 American Angus Association Board of Directors meeting reads as follows:

"...Wilson reported that a first analysis of the ultrasound carcass data procured through the American Angus Association Centralized Ultrasound Processing (AAACUP) had been conducted, a copy of which is available. Correlations between ultrasound EPDs for sires using yearling bull data and carcass EPDs from steer data are excellent and positive. Ultrasound EPDs from steers were not significant due to insufficient numbers. Staff and advisors recommend:

"1. We continue the Centralized Ultrasound Processing Project focusing upon increasing the yearling bull, steer and heifer database.

"2. We significantly expand the AAACUP Program to include all interested Angus Herd Improvement Records (AHIR) herds.

"3. We publish the first ultrasound EPD with the Fall 1999 National Cattle Evaluation as supplemental information. The listing will include sires whose progeny were measured in 1999; however, AAACUP data gathered in 1998 will be included to increase accuracy and strengthen contemporary group ties."

AAACUP Basics

by Craig Hays, AAACUP Laboratory director

Where do we go from here?

Plans are in place to begin gathering ultrasound data on a breed-wide basis in 1999. A listing of participating technicians is available from the Association's AHIR department. Breeders wishing to participate should refer to the "Ultrasound Scanning Guidelines" section in this issue of the *Angus Journal* for details (see page 35). However, the basic protocol should be as follows:

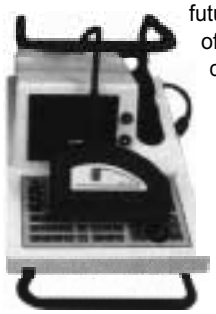
1. Breeder contacts technician and arranges for scan date.
2. Breeder contacts AHIR department and requests barn sheets. When the barn sheets are mailed, procedural guidelines and instructions will be included. Barn sheets should be requested at least three weeks prior to scan date.
3. Technician scans cattle and express-mails barn sheets and diskette containing images to the AAACUP Laboratory at ISU.
4. Images are then interpreted at the lab, and the data is transferred electronically to the Association.
5. The Association adjusts these measurements for age and provides breeders with summaries of data.

Plans are also in place for these ultrasound measurements to be analyzed by Wilson and his colleagues at ISU, and a separate set of EPDs from ultrasound will be calculated for ribeye area, rib fat thickness, rump fat thickness and percent intramuscular fat. These EPDs will be available to producers in fall 1999. They will be calculated only on sires whose progeny are scanned in 1999; however, the 1998 data will be used to strengthen contemporary group ties and improve accuracy.

As we prepare to enter the 21st century, we must be prepared to embrace change if change is needed. The inclusion of ultrasound technology in evaluating live animals for carcass merit is a change that is greatly needed. Not only will it enhance current technology, it will allow our industry to more quickly identify seedstock with the genetic ability to improve carcass characteristics. This technology also will provide the means to improve quality and consistency in beef products.

Background

The use of real-time ultrasound to accurately measure body composition traits in live beef cattle has been demonstrated and is being integrated into the recording and selection programs of an increasing number of Angus seedstock producers. This technology has the potential of significantly improving the characterization of more Angus cattle for carcass traits and in a more cost-effective and timely manner than existing progeny-testing programs for carcass merit.



However, for this to happen, a program must be developed to organize the collection and processing of the information, which will allow the highest standards of integrity and accuracy to be met. Even though considerable effort has been expended in developing a process to certify technicians, tremendous variation exists in technician proficiencies and in equipment and software technologies that are being used today in the industry.

The American Angus Association and its membership currently have the most comprehensive database for carcass traits ever assembled. This database continues to grow and support the genetic evaluation of more than 200 additional sires each year. This program must continue to be supported and expanded as the Association prepares to meet the future challenges of producing beef of the highest quality for consumers.

Within the near future, ultrasound data could be used to supplement the carcass database if organized to ensure credibility, timeliness and accuracy of the ultrasound information. This program has begun as a cooperative research and pilot program between the Association, Iowa State University (ISU) and selected real-time ultrasound technicians.

The American Angus Association Centralized Ultrasound Processing (AAACUP) Laboratory, located at ISU, began accepting images in January 1998. It was fully operational with a turnaround time of seven working days by Feb. 11. In the first six months of operation, the AAACUP lab processed images from more

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(Above) The AAACUP training program is designed to orient technicians to the process and guidelines involved with AAACUP and to evaluate their ability to submit images to the laboratory.

than 7,000 Angus cattle. Over a two-year period, the research program is planned to transition into an industry-owned and -operated program.

What is AAACUP?

AAACUP consists of the lab manager and a small group of trained interpreting technicians. It is a central location where trained and qualified field technicians can submit ultrasound images to be evaluated by the AAACUP staff. The staff evaluates each individual image for quality assurance and interprets the images for 12/13th-rib fat thickness, ribeye area, rump fat thickness and percent intramuscular fat (marbling). Our goal is to provide ultrasound data collected on yearling seedstock that will allow for the calculation and utilization of expected progeny differences (EPDs) for carcass traits from these ultrasound measurements.

How does AAACUP work?

An Angus breeder will need to contact John Crouch, American Angus Association director of performance programs to request barn sheets for the cattle to be tested. Crouch will ask pertinent information required and will send the breeder barn sheets along with the breeder guidelines. The Angus breeder must contact an AAACUP field technician (a list can be obtained from Crouch) to request they come to the ranch and ultrasound the breeder's cattle.

AAACUP technicians, field and interpreting technicians, are held to the highest standards for submitting and interpreting ultrasound images. There are guidelines (see page 35) that must be followed during each step of the process. These guidelines and the cross-checking process ensure the most accurate and standardized data possible to be used in genetic evaluation for Angus cattle.

After the images have been interpreted, the data is merged together with the barn-sheet information from the Association. The data is then submitted electronically to the Association where it is adjusted to age constants and contemporary group ratios are calculated. It is then submitted back to the breeder like all other Angus Herd Improvement Records (AHIR) data. This process should take no more than seven working days from the time the animals are scanned.

Tremendous variation exists in technician proficiencies and in equipment and software technologies that are being used today in the industry, says Craig Hays, AAACUP Laboratory director.

1998 update for AAACUP

AAACUP has processed more than 7,000 Angus during 1998 (yearling bulls, replacement heifers, steers and feedlot heifers). AAACUP worked with 14 field technicians using Aloka 500 hardware this past season. We believe we must expand this number of field technicians and also look to other hardware capable of being used in order to serve Angus breeders in the future.

AAACUP had its second annual training program in September with the hope of adding new technicians and hardware to the list. It was a great success and a great learning opportunity for those who attended. There were 39 attendees at the training program. Many of these technicians will be added to the AAACUP field technician list for 1999 (available from John Crouch). The attendees consisted of Aloka 500 and Classic Scanner 200 technicians. The training program is designed to orient technicians to the process and guidelines involved with AAACUP and to evaluate their ability to submit images to the laboratory.

Direction for AAACUP

The staff at ISU is intent on making this process work. They must continue to train and educate the technicians who are evaluating this data to meet the highest standards attainable and to provide the Association with the most accurate data. With the support of the American Angus Association Board of Directors we will continue to add to the ultrasound database and use this information to calculate and publish the first sire evaluation for ultrasound data in fall 1999.

Ultrasound Scanning Guidelines for Angus Breeders

PROCEDURES FOR BREEDER PARTICIPATION

- Contact John Crouch, American Angus Association director of performance programs, at (816) 383-5100 to obtain prescanning information at least three weeks prior to anticipated scanning date.
- Breeders must identify to the Association the animals they plan to scan so that scanning records forms (barn sheets) can be prepared and available at the breeders' farm or ranch on the day of scanning.
- Select a scanning technician. A list of qualified technicians can be obtained from Crouch. These technicians have participated in the annual training program at Iowa State University (ISU) and are qualified to submit images to the American Angus Association Centralized Ultrasound Processing (AAACUP) lab.
- It is incumbent on the breeder to ensure scanning is done early enough if the information is to be included in a sale catalog. Processing time will require an average of seven working days. In some instances, it could take more than seven days if errors are found. Plan ahead.

SCANNING COSTS

Scanning fees are set individually by ultrasound technicians. The fee structure is established by each individual technician and can vary depending on the number of head to be scanned and other circumstances. The technician will bill the breeder directly for the scanning fee.

WHAT THE BREEDER RECEIVES

1. Ultrasound images collected by the technician will be sent to the AAACUP Laboratory at ISU for interpretation. The interpretation will be done by highly skilled image interpreters. Images will be cross-checked by more than one image interpreter to ensure measurement accuracy.
2. After interpretation, the measurements are forwarded to the Association for processing. The processing will follow the same format used for weight traits within the Angus Herd Improvement Records (AHIR). Breeders will receive the ultrasound measurements as a part of the AHIR system.
3. Ultrasound measures will be adjusted to 365 days for yearling bulls. It is anticipated that end-point adjustments for developing heifers will be 420 days (approximately 14 months of age) and end-point adjustments for feedlot steers and heifers will be 420 days.
4. Ultrasound measures to be made on each animal include the following:
   - Rump fat thickness:
   - Fat thickness at the 12/13th rib;
   - Ribeye area; and
   - Percentage intramuscular fat (marbling)

GUIDELINES

Yearling bulls

Scans. Scan yearling bulls when they are 320-440 days of age. All bulls within a contemporary group are to be scanned on the same day or within no more than two consecutive days. Many breeders will scan their yearling bulls at the same time other yearling traits are being measured.

Weights. Record individual bull weights within seven (±7) days of when the bulls are scanned. Weights are to be taken in the morning prior to any feeding of the bulls. Bulls should not have access to feed overnight prior to weight collection. It's preferred, but not required, to hold the bulls off both feed and water overnight. This weight is to be used in the prediction of empty-body weight, so gut fill must be minimized. The weights are to be given to the ultrasound technician for submission to the AAACUP lab at ISU along with the ultrasound images.

Gain. The best measure of a bull's propensity for marbling and muscle expression will be when the bull is being fed to gain at least 3 pounds (lb.)/day. In addition, this propensity will best be expressed in the bull at or near the end of a postweaning gain test. Do not scan bulls after they have been taken off a gain test.

Contemporary group. Each bull contemporary group must have two sires represented. One of the sires must be a reference sire used in the Angus structured sire evaluation program for carcass merit. The number of bull progeny required to accurately evaluate a sire for carcass traits using ultrasound measures is a direct function of the heritability of the ultrasound-measured trait. Addressing the heritability issue is a research objective with this project. Contemporary group animals must be from the same weaning contemporary group.

Central-test scans. Central-test scans will not be accepted as a part of this program unless the bulls are maintained in their weaning contemporary group.

Feedlot steers and heifers

Identification. Each feedlot animal must be individually identified and produced by a registered Angus sire. The dam does not have to be a registered Angus cow. Birth dates are required for each feedlot animal.

Scans. Scan feedlot animals when the contemporary group averages 0.3-0.4 inches (in.) of external fat or just prior to slaughter if the animals will not be taken to a fat end point of 0.3 in. All animals within the contemporary group are to be scanned on the same day or within no more than two consecutive days.

Weights. Record individual animal weights within seven (±7) days of when the animals are scanned. Weights are to be taken in the morning prior to any feeding of the animals. The animals should not have access to feed overnight prior to weight collection. It's preferred, but not required, to hold the animals off both feed and water overnight. This weight is to be used in the prediction of empty-body weight, so gut fill must be minimized. The weights are to be given to the ultrasound technician for submission to the AAACUP lab at ISU along with the ultrasound images.

Contemporary group. Each feedlot contemporary group must have two sires represented. One of the sires must be a reference sire used in the Angus structured sire evaluation program for carcass merit. The number of progeny required to accurately evaluate a sire for carcass traits using ultrasound measures is a direct function of heritability of the ultrasound-measured trait. Addressing the heritability issue is a research objective with this project.

Developing heifers

Scans. Scan developing heifers when they are 320-440 days of age. All heifers within a contemporary group are to be scanned on the same day or within no more than two consecutive days. Many breeders will scan their yearling heifers at the same time other prebreeding examinations are being conducted.

Weights. Record individual heifer weights within seven (±7) days of when the animals are scanned. Weights are to be taken in the morning prior to any feeding of the heifers, The heifers should not have access to feed overnight prior to weight collection. It's preferred, but not required, to hold the heifers off both feed and water overnight. This weight is to be used in the prediction of empty-body weight, so gut fill must be minimized. The weights are to be given to the ultrasound technician for submission to the AAACUP lab at ISU along with the ultrasound images.

Contemporary group. Each heifer contemporary group must have two sires represented. One of the sires must be a reference sire used in the Angus structured sire evaluation program for carcass merit. The number of heifer progeny required to accurately evaluate a sire for carcass traits using ultrasound measures is a direct function of the heritability of the ultrasound-measured trait. Addressing the heritability issue is a research objective with this project. Contemporaries must be from the same weaning contemporary group.