

In Committee

Industry leaders work in committee during the 2007 BIF meeting to shape the future of the beef industry from a genetic standpoint.

AB-EPD Table Release

The table of adjustment factors to be used to estimate across-breed expected progeny differences (AB-EPDs) for 16 breeds was presented June 7 at the Beef Improvement Federation (BIF) annual meeting in Fort Collins, Colo. (see Table 1).

Bulls of different breeds can be compared on the same EPD scale by adding the appropriate adjustment factor to the expected progeny differences (EPDs) produced in the most recent genetic evaluations for each of the 16 breeds.

As an example, suppose a Simmental bull has a weaning weight EPD of +25.0 lb. and a Gelbvieh bull has a weaning weight EPD of +45.0 lb. The across-breed adjustment factors for weaning weight are 24.4 lb. for Simmental and 7.0 lb. for Gelbvieh. The AB-EPD is 25.0 lb. + 32.9 lb. = 57.9 lb. for the Simmental bull and 45.0 lb. + 7.0 lb. = 52.0 lb. for the Gelbvieh bull. The expected weaning weight difference when both are

mated to cows of another breed (e.g., Angus) would be 57.9 lb. – 52.0 lb. = 5.9 lb., with the Simmental bull siring heavier calves on average.

The AB-EPDs are most useful to commercial producers purchasing bulls of more than one breed to use in crossbreeding programs. Uniformity from one generation to the next can be improved by selecting bulls with similar AB-EPDs. Selection for uniformity is especially important in rotational crossbreeding systems for traits such as birth weight to manage calving difficulty and for traits related to cow size and milk production to effectively manage feed requirements in cow herds.

In terminal crossbreeding systems, AB-EPDs for growth traits can be used to identify bulls across breeds whose progeny should have the highest growth potential.

Birth weight AB-EPDs are useful for selecting bulls for use on first-calf heifers to decrease the likelihood of dystocia.

Most breed associations publish EPDs on an annual basis. These EPDs predict differences expected in performance of future progeny of two or more bulls within

the same breed for birth weight, weaning weight, yearling weight and maternal milking ability (as reflected in progeny weaning weights). Normally, the EPDs of bulls from different breeds cannot be compared because most breed associations compute their EPDs in separate analyses, and each breed has a different base point (where the average EPD = 0).

The across-breed adjustment factors allow producers to compare the EPDs for animals from different breeds for these traits; these factors reflect both the current breed difference (for animals born in 2005) and differences in the breed base point.

The adjustment factors in the table were updated using EPDs from the most recent national cattle evaluations conducted by each of the 16 breed associations.

The breed differences used to calculate the factors are based on comparisons of progeny of sires from each of these breeds at the Roman L. Hruska U.S. Meat Animal Research Center (USMARC) in Clay Center, Neb. These analyses were conducted by USMARC geneticists Larry Kuehn and Mark Thallman with the assistance of Dale Van Vleck and Larry Cundiff.

For more information about this project, contact Kuehn at 402-762-4352 or larry.kuehn@ars.usda.gov or Thallman at 402-762-4261 or mark.thallman@ars.usda.gov.

Look for the PowerPoint and audio file for this presentation in the newsroom at www.bifconference.com, Angus Production Inc.'s online coverage site of the BIF annual meeting provided via the sponsorship of Biozyme Inc. Two proceedings papers are available on the "Symposium Papers" page.

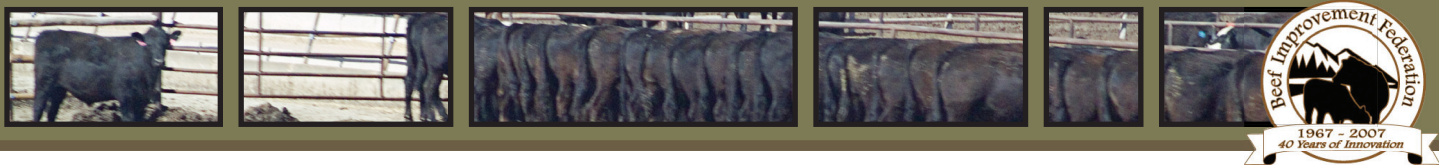
— News release provided by Roman L. Hruska U.S. Meat Animal Research Center

Table 1: Adjustment factors to add to EPDs of 16 different breeds to estimate across-breed EPDs

Breed	Birth wt.	Weaning wt.	Yearling wt.	Maternal milk
Angus	0.0	0.0	0.0	0.0
Hereford	2.7	-3.1	-12.7	-15.7
Red Angus	2.5	-4.7	-0.7	-5.1
Shorthorn	7.0	32.5	46.1	16.6
South Devon	5.8	23.1	41.7	8.0
Braunvieh	6.3	30.3	17.4	24.5
Charolais	9.6	40.9	48.7	3.5
Gelbvieh	4.4	7.0	-21.2	6.2
Limousin	4.0	-1.3	-24.0	-12.6
Maine-Anjou	7.1	-2.9	-31.9	-6.2
Salers	4.2	30.7	43.5	12.8
Simmental	5.7	24.4	17.0	13.7
Tarentaise	3.0	31.9	18.3	20.0
Beefmaster	9.0	42.2	43.7	-4.1
Brahman	12.1	38.5	2.6	26.7
Brangus	5.0	24.3	26.5	-3.1

Evaluating Udders

During the Live Animal, Carcass and End Product Committee meeting, Lauren Hyde presented proposed BIF Guidelines for teat and udder scoring in beef cattle.



Committee proposes teat and udder scoring guidelines.

Hyde is director of performance programs for the North American Limousin Foundation (NALF).

“Udder soundness was first thought to be a convenience trait,” Hyde said. Now some scientists and researchers are citing it as one of the most important functional traits in a beef cow.

Hyde continued by explaining that udder and teat size can directly affect calf performance and cow longevity.

“If a cow’s teats are too small, there will be reduced milk flow and the calf will not receive as much milk,” Hyde said. “If the teats are too big, the calf will be unable to nurse. Also, if a cow’s udder is too big, there is a larger chance that the cow will have injury or mastitis and a deterioration of quality to the udder over time.”

Seven of the eight major beef breeds in the United States and Canada that use some form of udder grading system have a two-score system in which they give both a score for teat size and shape and a score for udder suspension. The problem is that there are several scoring systems being used by different breed associations.

“In all the systems we’ve looked at, the lower scores are for big or bottle teats, and the higher scores are for the small teats,” Hyde said. For udder suspension, low scores indicate a pendulous udder, while high scores indicate a higher, tighter udder.

A study was conducted to compare the 10-point scales vs. the 50-point scales that were being used. It was determined that the 10-point scale was easier to distinguish and that producers were more likely to use it.

Hyde recommended to the committee that BIF accept separate teat size and udder suspension scores, the scores be on a 1-to-9 scale, and that scores must be established within 24 hours after calving.

The motion was seconded and passed in committee. It was presented before the BIF board later in the week. The board adopted the guidelines.

Look for the PowerPoint and audio file for this presentation in the newsroom at www.bifconference.com.

— by Mathew Elliott

A Carcass Standard

Not all expected progeny differences (EPDs) are created equal, but that may change where carcass traits are concerned.

Dan Moser, Kansas State University (K-State) geneticist, explained the different ways these end-product predictors are calculated. He spoke to BIF conference attendees during the June 7 Genetic Predictions Committee meeting.

Some organizations use carcass and ultrasound data separately to report two sets of EPDs, he explained. Others combine both groups of information, but publish EPDs either on a carcass scale or on an ultrasound scale. For example, a marbling EPD on a carcass basis would be reported in marbling scores vs. percent intramuscular fat (IMF) on the ultrasound scale.

Moser and Cundiff chaired the subcommittee that looked at options for standardizing the reporting of EPDs across breeds.

“It certainly would be a way to simplify selection by commercial producers and to increase the accuracy,” Moser said. It would also allow for across-breed evaluation of carcass traits, similar to what is already being done with growth traits. And it is a necessity for those breeds considering joining together in multi-breed evaluation.

Relative to carcass traits, prior to the subcommittee review, the *BIF Guidelines* stated:



PHOTO BY TROY SMITH

► K-State’s Dan Moser presented a suggested revision to the *BIF Guidelines* that would recommend standardization of the format for reporting of carcass EPDs.

“Carcass traits are presumed to be measured on an age-constant basis. Carcass measures could be from slaughter data, live animal data (ultrasound, etc.), or a combination of both data types.”

The subcommittee suggested that BIF make their recommendations more specific, and suggested changing the wording to read:

“Whenever possible, carcass data from harvested fed cattle and ultrasound measurements from yearling breeding bulls and heifers should be jointly analyzed with multiple-trait models. Such an evaluation would provide genetic predictions for both carcass and ultrasound measurements, but since the carcass measurements are the economically relevant traits, the carcass trait predictions and their associated accuracy values should be published for use in selection. Both carcass and ultrasound measurements should be evaluated on an age-constant basis.”

The guidelines revision was offered to the BIF board, which adopted the proposed revisions later in the week. Individual breed associations still have the option of whether to adhere to the new policy.

Look for the PowerPoint and audio file for this presentation in the newsroom at www.bifconference.com.

— by Miranda Reiman

Selection Decisions

BIF’s Selection Decisions Committee addresses feed efficiency, bull marketing and temperament.

The Selection Decisions Committee, chaired by Darrh Bullock of the University of Kentucky, met June 7 to discuss feed efficiency, bull marketing and temperament.

Feed efficiency. University of Nebraska geneticist Merlyn Nielsen reported on the December 2006 Feed Efficiency Symposium hosted by the National Beef Cattle Evaluation Consortium (NBCEC) in Kansas City, Mo. He summarized work done by U.S. scientists, as well as counterparts in Australia and Canada, to identify an accurate measurement for feed efficiency. Nielsen

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Merlyn Nielsen, University of Nebraska

said residual feed intake (RFI) is the favored trait to use in genetic evaluation for feed efficiency.

The ratio of feed intake to gain (feed conversion) has traditionally been used to evaluate feed efficiency in growing cattle. However, feed conversion is not suited for use in genetic selection since selection on that basis also results in selection for increased growth and mature size.

RFI represents the difference between an animal's actual feed intake and the amount required for maintenance and growth, Nielsen explained. Selection for RFI can be applied independently, without affecting growth rate and mature cow size. A negative

RFI value is indicative of efficient animals that consume less feed than expected, based on their size and growth rate.

Seeking RFI indicator. Gordon Carstens, associate professor at Texas A&M University, shared results of studying blood or serum levels of insulin-like growth factor 1 (IGF-1) as an indicator trait for RFI. A natural hormone, IGF-1 has been shown to be genetically correlated with RFI in *Bos taurus* cattle.

"Measuring feed intake [and thus, RFI] of individual animals is expensive," Carstens explained, "so it is preferable to find an indicator trait to predict RFI."

However, studies in the U.S. and Australia have shown that the relationship between RFI and IGF-1 is not always consistent across breed types. Results suggest that a significant amount of variation in RFI is unrelated to IGF-1. Consequently, Carstens reported, additional research is needed, and IGF-1 cannot yet be recommended as an indicator trait for RFI.

Bull marketing. Frank Padilla, NALF director of member services, presented results of a bull/female price study, based on registered and nonregistered Limousin cattle sold at public auction during 2005 and 2006. The results indicated commercial cattlemen were willing to pay substantially more money for registered seedstock. Purchase prices indicated buyers favored a full complement of EPDs and ultrasound data.

"The study showed that cattlemen want it all, and will pay more to get it," Padilla said.



Bob Weaber, University of Missouri

"But it also showed the need to encourage selection for balanced traits rather than extremes, and consider antagonisms such as growth relative to mature cow size and milk [production] related to reproductive performance."

Temperament. Bob Weaber, assistant professor of beef cattle genetics at the University of Missouri, discussed ongoing research related to animal temperament.

In Missouri, studies involving growing calves, electronic measurement of the speed with which animals leave a chute during regular processing (exit velocity) and subjective pen scores for disposition are applied. Results suggest higher scores, from each measurement, are associated with cattle that exhibited poorer rates of gain, but also had lower placement weights.

— by Troy Smith



Gordon Carstens, Texas A&M University

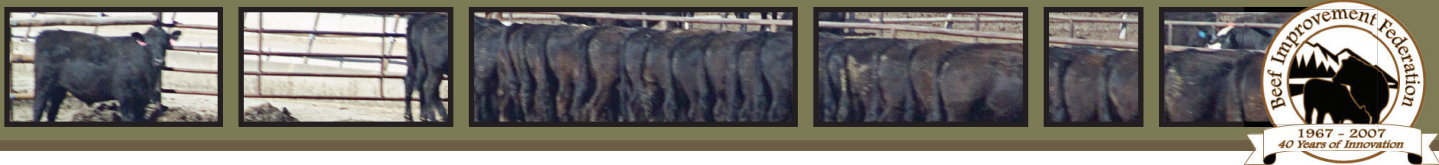


Frank Padilla, NALF

Cow Herd Efficiency

BIF's Cow Herd Efficiency & Adaptability Committee announced its intention to create guidelines for data collection associated with research attempting to measure feed efficiency on the basis of feed intake.

Denny Crews, national study leader for Agriculture and Agri-Foods Canada, explained the group's desire to identify and



Committee discusses cow efficiency and PAP heritability.

recruit sources of data, primarily through research projects and central bull tests. Crews said plans for the coming year include defining and refining criteria such as test length, diet specifications and applicable hardware and software.

Crews also addressed the need for a measurement of feed efficiency and maintenance energy in cows. To date, he said, the majority of research has addressed feed efficiency in bulls and feeder steers.

“We need a robust measurement of efficiency — one that could be applied across animal type,” stated Crews, adding that RFI is favored since it has been a good trait predictor of feed efficiency in the feedlot. “In my opinion, RFI stacks up well, due to its direct effect on cost and favorable heritability (ranging from 0.32 to 0.41). There is little genetic antagonism, and it can be measured early in life.”

Crews said another positive aspect is the considerable genetic variation that exists for RFI. Therefore, breeders should expect response to RFI-based selection for lower cow feed requirements. Based on previous RFI research, it is expected that selection can be made independently of other traits, avoiding antagonism with reproduction and cow longevity.

Crews offered no promise that RFI is the definitive answer to measuring cow efficiency, however. It is possible, he said, that RFI in cows is not the same trait as it is exhibited in steers.

Also on the agenda was Konni Shirley, Colorado State University, who presented an update on research related to cardiopulmonary edema. Also called high mountain disease or brisket disease, the malady affects cattle in high-elevation environments.

Pulmonary arterial pressure (PAP), or blood flow resistance, is a measure and reliable predictor of animal susceptibility.

According to Shirley, there is a heritable component of PAP, and studies suggest genetic heritability of 0.34.



Denny Crews, Agriculture and Agri-Foods Canada

Look for the PowerPoint and audio file for these presentations in the newsroom.

— by Troy Smith

Whole-Genome Approach

A new technology, called the “Illumina iSelect Infinium Custom Bead chip,” could potentially revolutionize the way cattle

producers identify economically important genes and allow them a “whole genome” approach to determining the genetic merit of cattle without dependence on phenotypic measurements.

The bead chip, developed with help from researchers at the University of Missouri, provides for “whole genome” investigations of the bovine genome. Expected to be commercially available this fall, the technology could accelerate the ability of researchers to cost-effectively unlock the genetic basis of dozens of traits, and allow the industry a greater breadth of understanding of the range of genes that affect specific traits, said Jerry Taylor, professor and Wurdack chair for animal genomics at the University of Missouri (MU).

Taylor introduced the concept to attendees of the Emerging Technologies Committee Meeting during the 2007 BIF annual conference.

“We’ve taken 5,000 DNA samples from bulls at Circle A Angus and 1,800 samples from AI bulls,” Taylor said. “We’ve genotyped 4,000 animals and identified 422 markers. From this research, we’ve found evidence for 59 individual marbling genes. If there are 59 genes in Angus that are responsible for the genetic differences in marbling and marbling scores, then we need to test for all 59 genes. If we’re going to do that, you need a test that encompasses the entire genome, not just parts of it.”

“The test could also help producers accurately predict the EPDs for all traits — without having to take measurements or weights,” he said. “It will also provide for parentage verification and traceability. There is an enormous range of applications.”

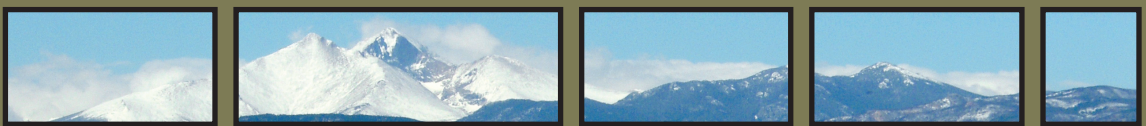
Cost of the test is currently at \$208 per sample, for research purposes. Taylor expects the cost to drop in the future to make it more economically feasible for producers and breed associations to use.

A potential downside of the technology is that each test is breed-specific. In other words, “the test we develop for Angus



► “If there are 59 genes in Angus that are responsible for the genetic differences in marbling and marbling scores, then we need to test for all 59 genes,” MU’s Jerry Taylor said.

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won't work for Salers," Taylor said. Each breed will have to make some investment to develop their own, breed-specific test in the future.

"If this proves to be effective, we will have to repeat the analysis for all breeds — and all the breeds that want to use it will have to pony up," he said.

Look for the PowerPoint and audio file for this presentation in the newsroom.

— by Eric Grant

Common Currency

Researcher advocates greater coordination when it comes to DNA and genetic evaluation.

While advancements in DNA technology are rapidly changing the beef production landscape, there are also monumental challenges in ensuring the technology complements existing genetic evaluations,

is useful by both producers and researchers, and can be validated through coordinated efforts of DNA companies, breed associations, researchers and government.

"Just like the European Union has tried to make business more efficient with a common currency, we need to make beef cattle selection more efficient by having a common currency," said Mike Tess of Montana State University. Tess made his comments during Friday's Emerging Technologies Committee meeting.

The industry's primary goal should be the development of DNA tools that can more efficiently produce genetic change, especially when coupled with genetic evaluations to produce EPDs, he continued. "We need to ask for DNA technologies that can achieve genetic change at a more rapid speed, lower cost, with more control and more choices," he said. "And somehow, this technology needs to be flexible enough to accommodate the future. It's possible that we could build a system with the info we have today that five years from now it could be unusable because the tech is changing so quickly."

Tess suggested the industry take a team approach toward "common currency" that includes a structured effort by genomic companies; breed associations; the U.S. Department of Agriculture (USDA); state experiment stations; and the NBCEC.

This system would need to catalog existing data that's already collected and to store this information in a centralized database. The system would also need capabilities to validate and assess information compiled by DNA research to ensure DNA markers actually have effects on production qualities. A third component would be educating the industry — from researchers to producers — about the use of DNA technology and the coupling of it with existing genetic evaluation technologies.

"This is not rocket science," Tess said, "but we need a single estimate of breeding value that's based on all the information we have available — DNA scores, pedigrees and phenotypic. And we need a single measure of accuracy that goes with it. That will give us higher accuracies for breeding values of animals much earlier in life."

Look for the PowerPoint and audio file for this presentation in the newsroom.

— by Eric Grant

Genetic Opportunities

Do opportunities exist to improve the healthfulness of beef through genetic selection?

That's a question scientists at Iowa State University (ISU) hope to answer. Preliminary results of their research demonstrate opportunities may exist for genetic selection to make beef a more healthful product, ISU's Richard "J.R." Tait told attendees of the Emerging Technologies Committee. Already, competitive meat and poultry industries are touting healthful aspects of their products. Chicken, for instance, sports packages that tout boosts in Vitamin E or Omega 3 and reduced levels of saturated fat.

While beef contains many healthful attributes, it also has relatively high levels of saturated fatty acids, which can be detrimental to the health of consumers, Tait said.

Between 2001 and 2004, ISU researchers evaluated more than 916 head of Angus-sired steers and bulls to determine the heritability of saturated fatty acids and beneficial fatty acids. They discovered that saturated fatty acids had a relatively high heritability: 0.49 for myristic acid (the most detrimental fatty acid



PHOTO BY SHAUNA ROSE HERMEL

► "We need a single estimate of breeding value that's based on all the information we have available — DNA scores, pedigrees and phenotypic," Montana State University's Mike Tess told the Emerging Technologies Committee.

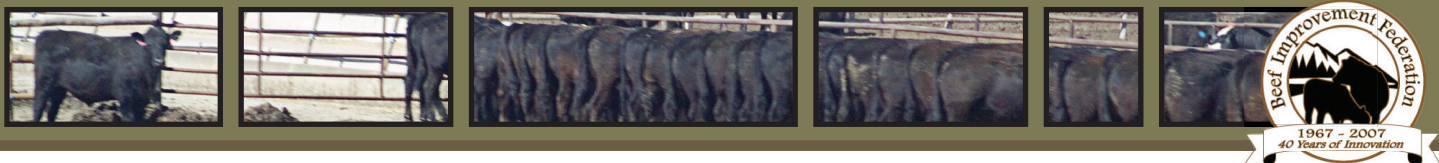


PHOTO BY SHAUNA ROSE HERMEL

► Cattlemen may be able to genetically select for a more healthful fatty acid profile in the beef they produce, said ISU's J.R. Tait.

Do opportunities exist to improve the healthfulness of beef through genetic selection?

to human health) and 0.43 for palmitic acid. At the same time, there were similar levels of heritability for desirable fatty acids, such as palmitoleic acid (0.49) and oleic acid (0.38).

This means that producers could potentially select for good fatty acids and against undesirable ones. But the industry will need to be cautious in determining if selection against detrimental fatty acids could reduce product acceptability, Tait said.

More research needs to be done to answer this and other questions. The industry should look at developing EPDs or identifying genetic markers for these traits as a way of determining breed decisions and producing healthier products in the future, but balance these developments with an understanding of how they affect product acceptance.

“What we don't have a very good handle on at this point is how this will impact the consumer acceptability of our product,” said Tait, who reiterated the need for more research on this matter in the future.

Look for the PowerPoint and audio file for this presentation in the newsroom.

— by Eric Grant

The Need for Verification

“What are Verification Programs and Why Do We Need Them?,” was the question Keith Belk presented to the Producer Applications Committee. The associate professor of animal science at Colorado State University broke verification down into three areas — depth, breadth and precision.

“The depth is how far your traceability goes,” Belk said. “The breadth is the amount of information that you have collected, and the precision is the degree of assurance with which a traceability system can pinpoint it. If we want to add consumer confidence to our product, we have to expand the system past the packing plant.”

But how are producers supposed to pay for this? According to Belk, consumers want this enough to pay more, but it can't be just traceability. Adding welfare information and safety information will equate to more money.

“Most of the opportunity for growth in this category will come from outside of the United States,” Belk said, adding that exports account for 95% of potential growth if trade agreements can be fostered.

Belk then used the Japanese identification (ID) system as an example of the level of ID expected by consumers there. In Japan, all calves are given two bar-coded ear tags at calving. This ID stays with the animal all the way through to the store. At the store, producers can scan the ID on a package of beef at a kiosk to see every owner that animal ever had, who fed it, their addresses, what the animal was fed, records of visits by a veterinarian, who harvested the animal, and all dates exchanged in between.

“Brazil has lots of land and cheap labor,” Belk said. “If we want to compete, we must differentiate.” The National Animal Identification System (NAIS) is one way that producers can differentiate, Belk said. The NAIS includes birth dates, animal ID and when and where the animal was moved. Branded beef is another option to set yourself apart.

Verification programs support consumer confidence.

In addition to ID, Belk advised producers to keep out or contain health issues using a combination of biosecurity and biocontainment.

“According to Cattle-Fax, in 2004 the United States lost \$165 to \$190 per head because of BSE (bovine spongiform encephalopathy),” Belk said. Whether they choose to use a specific verification program or just keep records, Belk advises producers to stay ahead of the curve for consumer preferences. “We need to meet consumer requests rather than consumer requirements.”

Look for the PowerPoint and audio file for this presentation in the newsroom.

— by Mathew Elliott

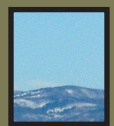
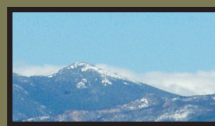
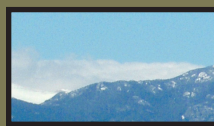
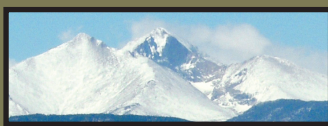
Advancing With Technology

The 2000s have brought new challenges and opportunities for the committee, and many new technologies to consider.

John Crouch, executive vice president of the American Angus Association, provided a historical overview of the Live Animal, Carcass and End Product Committee as well as the use of ultrasound for evaluating carcass merit during the committee's meeting June 7.

The committee began in 1969 as Technical Committee #3 Beef Carcass Evaluation. Since then, it has gone through several names to change with the times and its functions.

The underlying assumptions founding members used in formulating what they



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wanted to accomplish were profound, Crouch said. Those assumptions included:

- ▶ The beef product is the end point of all beef improvement.
- ▶ The quality of product and quantity of edible portion are basic measures of carcass merit.
- ▶ The relative value of quantity and quality are determined by consumer demand.

The committee advised carcass evaluation follow standards of the American Meat Science Institute and that USDA quality and yield grades be used as standards for comparison.

The carcass end point is important, Crouch commented, but the problem of the time was that when the carcass could be evaluated, the animal could no longer be used as a parent. Another problem the committee faced was people not following established programs. But the committee moved on. In the 1970s, USDA established

the Beef Carcass Data Service, which gave rise to a new name for the committee, the BIF Beef Carcass Data Committee.

According to Crouch, the 1970s were about heritable traits, and during that time everything was being measured. An ad hoc linear measurements committee was formed and called for standardization of methods for gathering data, but the BIF board rejected the committee's recommendation based on lack of information.

In the late 1970s, the name of the committee was changed to the Live Animal Evaluation Committee, Crouch reported.

The frame race blossomed and a subcommittee was formed to evaluate frame and make a frame score chart. It was first approved in 1984 and has since been revised several times to account for new findings.

Scrotal measurements and adjustment factors, udder scoring and disposition were also beginning to be looked at in the 1980s.

"The focus then shifted to ultrasound in

the '90s," Crouch said, noting a committee name change to the Live Animal and Carcass Evaluation Committee in 1988.

"Instrument grading, refinement, adaptation of standards for technician certification, and standards for evaluating body fat caused a few bumps in the road and a few sleepless nights, but are now very successful."

The 2000s have brought new challenges and opportunities for the committee, and many new technologies to consider, such as feed efficiency and DNA marker-assisted selection.

Crouch concluded by thanking former chairmen of the committee for the contributions they have given to the beef industry that have aided and given the industry the opportunity to move forward.

Look for the PowerPoint and audio file for this presentation in the newsroom.

— by Mathew Elliott

