

# Extra, Extra



## DNA, the costs and paybacks of technology, and consumer demand take center stage at the 2004 Beef Improvement Federation annual conference.

Story by *Crystal Albers, Shauna Rose Hermel, Angie Stump Denton & Troy Smith*

Photos by *Annie Jensen*

The latest theories and technologies in genetic improvement were evaluated at the 2004 Beef Improvement Federation (BIF) 36th Annual Meeting in Sioux Falls, S.D., May 25-28. An estimated 425 cattlemen, industry representatives and university experts gathered at the Sioux Falls Convention Center to discuss the future of genetic selection and to honor those who have advanced the effort of beef improvement.

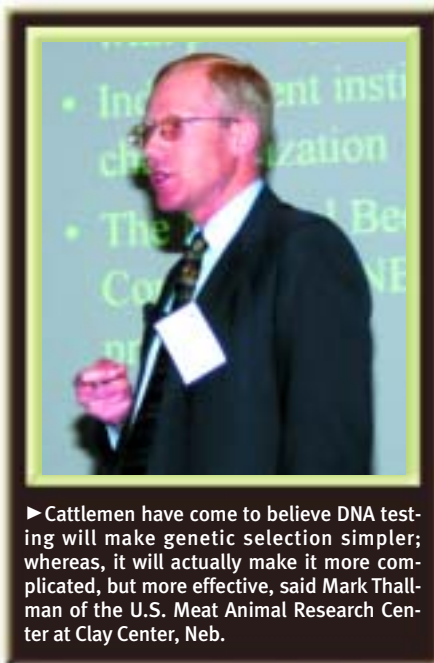
Tuesday evening's sessions explored applications of developing technologies in animal agriculture, while Wednesday morning sessions explored the costs and paybacks of incorporating new technologies. The sessions on Thursday morning focused on meeting consumer demand. Roundtables Wednesday and Thursday afternoons allowed more thorough presentations and interactive discussion.

Following are highlights of some of the presentations at the 2004 BIF meeting. Through the sponsorship of Boehringer Ingelheim Vetmedica, Inc., the Angus Productions Inc. (API) staff provided real-time coverage of the meeting online. You can listen to sessions, view PowerPoint® presentations and read proceedings at [www.bifconference.com](http://www.bifconference.com). The site also provides coverage of award winners, links to related stories, and an archive of 2002 and 2003 meetings.

### DNA testing — a tool for fine-tuning

The belief that DNA testing will completely replace expected progeny differences (EPDs) for making genetic selection is a myth, said Mark Thallman of the Roman L. Hruska U.S. Meat Animal Research Center (MARC), Clay Center, Neb., during the opening session of the 2004 BIF meeting. However, DNA technology does offer opportunity to add accuracy to current evaluation systems.

"DNA testing has been oversold for a long time," Thallman said. "I think we're getting



▶ Cattlemen have come to believe DNA testing will make genetic selection simpler; whereas, it will actually make it more complicated, but more effective, said Mark Thallman of the U.S. Meat Animal Research Center at Clay Center, Neb.

better about it now, but originally there was a lot of discussion that DNA testing was just going to replace the need for reporting of pedigrees and phenotypes."

The current system of genetic evaluation ties pedigree and phenotype, or performance, information on a number of animals together through the process of the National Cattle Evaluation (NCE) to provide EPDs. Thallman said incorporating DNA test results into that system to provide marker-adjusted EPDs will provide more accurate evaluation of genetic potential, especially for cattle at an early age.

Thallman noted that it will be difficult to include DNA test results into the NCE until sufficient data has been collected. Ironically, cattlemen tend not to collect a lot of data until it can go into the NCE.

He encouraged breed associations to develop procedures for direct acquisition of DNA test results into breed databases.

"Breed associations can play an important role in encouraging the flow of DNA testing information into NCE and reporting the resulting DNA-adjusted EPDs back to the

breeders," he said. "They will need to provide education on how to use this technology effectively and on how not to misuse it."

### Transferring cattle genes

Cattle traditionally haven't maintained a role in talks of human medicine, but that's quickly changing. Transgenic technology is allowing researchers to produce human proteins in cattle — just one of the possible agricultural applications of the technology, said Jim Robl, president and chief scientific officer (CSO) of Hematech LLC.

Significant advancements during the last couple decades have allowed scientists to advance from simply using a needle to extract and transfer DNA to using more complicated methods of genetic manipulation and embryo cloning.

Robl said two types of genetic manipulation that have allowed the cattle industry to greatly enhance its efficiency are gene targeting and microchromosome transfer. In gene targeting, researchers are able to block out or replace unfavorable genes in one breed of cattle with those from another, without diluting genetic makeup or causing harmful mutations. A similar function, microchromosome transfer involves the insertion of an entire sequence of DNA.

The technology, he explained, has two implications for the cattle industry — improved efficiency of food production and production of products such as pharmaceutical proteins for human medical needs.

Introducing transgenic beef into the marketplace carries a variety of considerations, he warned. First, regulatory agencies like the Food and Drug Administration (FDA) must deem the product safe for human consumption. Effect on the environment and animal welfare are other considerations, as well as poor cooperation among different sectors of the beef industry. Consumers and producers



► Jim Robl, president and CSO of Hematech LLC, describes the applications of transgenic technology to animal agriculture.

would need to accept the technology.

For the last five years, Hematech has been working on a collaborative effort to produce human antibodies in cattle that could be used to treat a wide variety of infections, help fight cancer cells, reduce organ transplant rejection and fight autoimmune diseases.

Researchers inactivate certain bovine chromosomes using gene-targeting technology and attach human chromosome fragments. The resulting calves produce a low level of human antibodies.

The technology holds future implications for the beef industry, Robl said. "We're now beyond transgenics and manipulating single genes. We're now in an era of chromosome engineering."

### Multi-trait selection in a single-gene world

As researchers sequence the bovine genome and develop genetic markers, cattle breeders will be able to use the genetic data to select for animal performance. However, the details of how to do that are yet to be determined, said David Notter, Virginia Tech animal scientist.

Genetic markers have the potential to improve the effectiveness of the NCE, Notter said. They are continually being discovered, and new information on genetic markers is quickly developing. This field of study will get a big boost with the completion of the bovine genome map, which is expected

## Advancements in reproductive technology

During the last 50 years, the evolution of bovine reproductive technology has added powerful tools for improving productivity. David Faber of Trans Ova Genetics said artificial insemination (AI) and embryo transfer (ET) stand out as significant components of the breeder's biotechnology toolbox. Now there are additional tools, such as in vitro fertilization (IVF), sexed semen and nuclear transfer (cloning).

Faber cited new techniques as reasons to expect even greater improvements to productivity during the next decade.

"The old tools won't go away, but the new tools will enhance their utilization," he explained. "Individually, these are powerful tools capable of providing significant improvements. However, the greatest gain will come from the application of combinations of these technologies."

IVF, where the "egg" is fertilized in the laboratory, has been used to complement an ET program, Faber said. It can be applied to females that fail to produce transferable embryos or possess reproductive abnormalities. IVF also may be applied to juvenile donors, as well as pregnant females.

"IVF also provides opportunities to use relatively low numbers of sperm to produce viable embryos," Faber said. "This allows for the utilization of high-value semen and may provide significant opportunities when coupled with gender-separated semen."

Faber said application of AI with separated, or sexed, semen has potential for revolutionizing breeding strategies by enabling breeders to preselect the gender of calves and target specific markets or needs. However, costs associated with separating semen may have inhibited widespread use for AI. Some challenges also exist for application to super-stimulated donors, making sexed semen less attractive for use in commercial ET programs.

Faber pointed out that coupling sexed semen with IVF may be the more logical commercial application at first. The inherent cost of separating sperm fits well into IVF schemes where small quantities of sperm are needed to achieve fertilization.

Presently, Faber said, cloning applications are limited to high-value biomedical or seedstock production. In the future, however, this technology could play a role in commercial beef production. Through cloning, the number of cows required to produce replacement females could be reduced. The same advantage could be captured through use of sexed semen or embryos.

Faber admitted that cloning is not ready for prime time, citing a need for improved efficiency. And while the creation of large numbers of identical individuals has the potential to significantly increase accuracy of genetic selection, the cloning of animals must overcome the scrutiny of society.

within a year. In time, expected EPDs will be calculated using not only performance data, but DNA information as well, he said.

"For most traits, genetic markers alone, as we have them today, are not going to account for enough genetic variation of the traits of interest to allow us to use genetic markers as the only selection trait," Notter noted. "Instead, we're going to have to have methods developed to combine information from genetic markers with information from performance reporting and simply use them as a way to improve and certainly not replace expected progeny differences."

With the new data, he said, come new opportunities and complexities.

According to Notter's proceeding paper, selective genotyping and reporting of marker information is one of the most significant challenges to effectively using gene markers in NCE. But, he maintains, breeders and breed associations can apply the following suggestions to utilize DNA data:

- identify an array of genes and markers



► David Notter, Virginia Tech animal scientist, explains different genetic markers and their possible ramifications for breeders and their selection strategies.

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of importance to the breed (since different genes will be important to different breeds);

- ▶ develop a DNA collection strategy;
- ▶ develop a genotyping strategy;
- ▶ develop validation strategies (be prepared to validate markers to understand their total effect since some markers having effects on traits like marbling or leanness may have effects on other genes, like fertility); and
- ▶ incorporate marker information into NCE.

“We have an opportunity to see a new, significant increase in the accuracy of the way we do business,” he said. “It’s going to be exciting. It’s going to be frustrating. There’s going to be winners and losers. There’s going to be mistakes made, and at the end of the day, I have absolute confidence that [breeders] are going to be in a better position 10-15 years from now than they are today. What track that will take, I don’t know; but, it’s going to be very fun to watch.”

### Panelists discuss effects of genetic selection

Geneticists have great expectations for use of DNA markers to aid genetic selection for desirable traits. Commercial tests for DNA sequence variants that influence marbling and tenderness currently are available to beef cattle breeders. A panel of experts addressing BIF participants predicted the discovery of additional gene markers that affect these and other important traits. However, the experts agreed that enthusiasm for the emerging technology is best tempered with caution.

Notter reminded the audience that individual gene markers often account for a small percentage of the genetic variation for specific traits. He suggested that markers will be most valuable to augment development of expected EPD values with improved accuracy.

“EPDs still are the definitive predictor of genetic worth,” Notter stated.

Dick Quaas, of Cornell University, warned that some people will succumb to single-trait selection by overemphasizing specific gene markers. The problem should diminish as more markers are identified and used.

American Hereford Association (AHA) executive Craig Huffines said breed

▶ Panel members Wednesday morning included (left to right) Dave Notter, Virginia Tech; Craig Huffines, AHA; Robert Williams, AICA; and Dick Quaas, Cornell University.



associations serve as the gatekeepers to incorporation of technology to the beef industry. Associations, he added, must develop business applications for practical application of DNA markers. Robert Williams, of the American International Charolais Association (AICA), agreed, stressing the importance of marker validation and development of methods for incorporating marker information into multi-trait selection.

### Technology: price tag and profit

Technology has become the fuel for a nation driven by cell phones, high-speed Internet access, personal data assistants (PDAs) and anything labeled wireless. But along the information superhighway, there are possible pitfalls, explained Barry Dunn, executive director of Texas A&M University’s King Ranch Institute for Ranch Management near Kingsville, Texas.

Traditionally, the beef industry — especially the cow-calf and stocker sectors — has been slower to adopt technology compared to other industries. When breeders do consider implementing new technology, however, Dunn said an extended cost analysis is necessary to determine whether it would be cost-effective.

Doing a partial budget is a common, relatively useful way to analyze economic merit of implementing new technologies. By calculating additional costs and revenues and reduced costs and revenues, a net change in profit can be determined using a partial budget format.

However, this simple analysis is limited, Dunn warned. Breeders must also consider marginality, possible implications and interactions, unexpected outcomes, risk, cash flow, quality of life, and other factors.

Dunn also suggested producers consider

fixed costs in addition to variable costs when conducting cost analysis on new technology and measure the impact of newly adopted technologies at the end of the production cycle.

What’s important, he said, is “how did it impact pounds sold, and what did it cost me in terms of pounds sold, not per head. . . . The correct feedback is absolutely critical.”

The concept of marginality is also critical when considering the implementation of technology. If you’re at a very high level of reproductive performance, and nutrition is good, you can still probably improve pregnancy rates by applying technology, but, he continued, “the next unit of change is going to be very expensive.”

Dunn said evaluating the effect of technology on a production system is complex. However, he suggested following a systems approach:

- ▶ describe the situation/problem;
- ▶ examine mental models;
- ▶ measure and define criteria to put things like marginality and future value in context;
- ▶ use some casual loop diagrams (see proceedings); and
- ▶ develop simulation models.

For a long time we’ve used the microscope to reduce something down, study it, know it, and be passionate about it,” he said. “And that’s a valuable, incredibly admirable thing to do, but so is looking at the landscape. . . . A systems approach isn’t buried on a hilltop with a pair of binoculars.”

### Working to increase demand

Industry profitability can be achieved by all points along the value chain — rancher,



feeder, packer and retailer/foodservice operator — if all segments work together with a common goal of satisfying the consumer, said John Huston, retired executive vice president of the National Cattlemen's Beef Association (NCBA).

"This opportunity for industry-wide profitability is absolutely dependent upon a clear-eyed, relentless focus on the consumer and what is required for her or him to persistently spend (more) money on beef," he said. "People who don't get that are a costly drag on the industry."

To improve profitability in the cattle industry, the industry must increase consumer demand for beef, he explained. "We must sell the same amount of beef at higher prices ... or we must sell more beef at the same price. Demand is a reflection of consumer attitudes about beef and the value they attach to it."

Huston said the consumer is the only genuine or new source of wealth for the beef industry. The industry can grow only if it competes successfully in the marketplace for the consumer dollar, which requires focused participation from all industry segments.

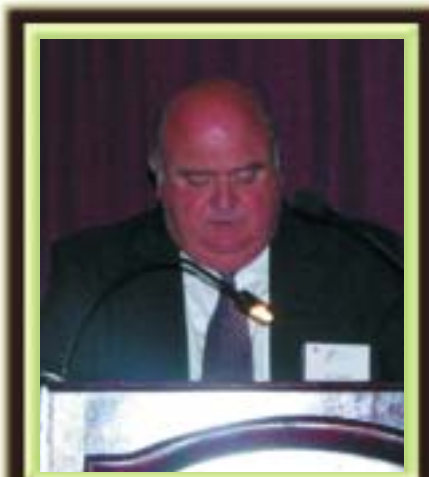
Huston reminded attendees that from 1980 to 1997 the beef industry saw a 50% decline in beef demand. Hitting a 20-year low in 1998, demand has continued to increase. In 2003 consumer expenditures for beef were up \$14 billion, and demand continued to grow, posting a 5.5% increase in the past year.

"What does it mean for beef producers?" he asked. "\$200 more per head for fed cattle."

Huston shared with attendees how NCBA has worked to increase beef demand by utilizing beef checkoff funds. Two of those projects, "Heat and Serve" products and "Mark of Quality" branded products, are exciting developments for the beef industry.

"*The Wall Street Journal* projects that the heat-and-serve red meats could easily generate \$1 billion in annual sales within the decade," Huston said. "That's impressive for a category that barely existed just five years ago. But, we must keep the heat-and-serve category in perspective — it is still a niche market."

Seventy-nine branded beef products have been granted the use of the Mark of Quality seal by the Brand-Like Commission — a panel of U.S. beef producers and NCBA culinary professionals who review beef products. The Mark of Quality assures consumers of superior taste and satisfaction.



► The consumer is the only genuine or new source of wealth for the beef industry, said John Huston, former executive vice president of NCBA.

In his final remarks, Huston quoted the late Max Brunk, a former marketing professor at Cornell University. "You have to work and scheme and sweat to produce livestock and meat products, but that does not give you a right to a market. To get that right you also have to work and scheme and sweat to create markets — to take markets away from someone else — to keep someone else from taking your markets."

Today, Huston added, "cattlemen now believe you have to work and scheme and sweat to innovate, add value to build consumer demand and to create new markets."



► John Lawrence, Iowa State University, encourages producers to be practical. If it cost \$10 to get a \$6 premium, is it really worth it?

### The cost of meeting consumer demand

During Thursday morning's session, Iowa State University (ISU) livestock economist John Lawrence heralded the fact that consumers are willing to pay more for beef. That trend, which began in 1998, continues. But as demand for beef is increasing, Lawrence added, so are the demands on beef.

"Consumers, retailers, processors and society in general are placing more demands on the food and people, companies and industries that produce it. These demands are expressing themselves in both more regulations and requirements on food producers and processors," Lawrence explained. "We have traditionally operated on a 'trust me' basis, but we are now entering a 'prove it' world."

When viewed as a commodity, all beef is beef. Only minimum standards must be met to qualify, and low-cost producers of that minimum standard are the winners. However, Lawrence added, the minimum standards for commodity beef are increasing, as is the cost of producing it.

From a product-oriented viewpoint, beef products are differentiated according to their attributes. Consumers have shown a willingness to pay premiums for detectable attributes, such as quality grade (marbling) or "guaranteed" tenderness, as well as credence attributes, including nutrient value or verification of how the beef was produced or processed. Some producers, Lawrence said, set their sights on claiming premiums, no matter what it takes.

"But what have you gained from a \$6 premium if it cost you \$10 to get it?" he asked, urging producers to be practical.

Increased competition and consolidation in the processing and retail sectors has been accompanied by the emergence of more branded products. Companies are staking their reputations and brand equities on these products. How long, Lawrence asked, before liability costs force companies to demand more assurances of specific attributes at the production level? Verification may become a condition of sale.

Lawrence said increasing numbers of companies are implementing quality management systems to provide buyer confidence in delivery of promised product attributes. They require levels of discipline

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and documentation that may represent added costs to producers.

Are there costs associated with not meeting consumer demands? The commodity market still exists, Lawrence stated, but the hurdles are being raised. As the industry adopts higher minimum standards, even low-cost producers will see increased costs.

A cost of not meeting consumer demands comes from missed opportunities when producers can't meet specifications for value-added markets. Markets may be lost to the competition, Lawrence added, whether that is pork and poultry or other beef producers who are committed to keeping up with consumer demands.

### Meeting consumer needs

Our customers and your customers are one in the same, so our goals should be the same, said Kevin Brost, Wendy's International director of supply chain management. Brost oversees the procurement for beef, pork, chicken and french fries.

Brost said that Wendy's supports the need for a sensibly constructed and implemented traceback system that can track the product it serves through the supply chain all the way to the originating ranch. Brost admits that



► Wendy's looks to the beef industry to help satisfy three consumer needs — good taste, a safe product and cost stability, said Kevin Brost, Wendy's International director of supply chain management.

such a process will not be cheap, and that Wendy's is willing to "pay up" part of the cost. "We look at it (the increased costs due to a traceback program) as paying for an insurance policy much like you do with car insurance," he explained.

Wendy's has a stringent beef shelf-life standard. Beef must be delivered to the retail stores within four days of processing and

must be served within eight days of processing. Brost said this is half of the time most retail stores allow.

"We've set that standard not so much because of food safety, but because of taste and smell," he explained. The company has found that there is a big difference between 8- and 10- to 12-day-old product.

There are five things customers demand that encourage them to return to Wendy's, Brost said. Consumers demand the products they want, good taste, product safety, affordability and consistency. Wendy's looks to the beef industry to achieve three of those needs — good taste, a safe product and cost stability.

Another concern of the company is animal welfare. Wendy's has taken an active role in trying to monitor the care of the animals once arriving at each of the company's suppliers. The company worked with livestock-handling specialist Temple Grandin to establish standards, and each plant is audited to track compliance.

Product cost is a concern for Wendy's and for consumers. Wendy's is able to contract the price of lettuce three years in advance. Brost said, in an ideal world, they'd like to be able to contract the price of beef products a year in advance. He stressed the need for the beef industry to stabilize costs and work toward the value of beef to rely more on beef cutout value.

## Roundtables Dig

### Committee roundtables offer more in-depth discussion and interaction during the BIF annual conference.

by *Crystal Albers, Shauna Rose Hermel & Troy Smith*

Six committee roundtable discussions offered a more in-depth look at beef genetic technologies during the 2004 Beef Improvement Federation (BIF) annual conference in Sioux Falls, S.D., May 25-27.

#### Producer Applications Committee

Topics addressed during Wednesday afternoon's Producer Applications Committee roundtable included perspectives on a national animal identification (ID) system and popular producer misconceptions regarding tools for seedstock selection.

**National ID system.** Opening the discussion of animal ID was Allen Bright, president of Nebraska Cattlemen and chairman of the National Cattlemen's Beef Association (NCBA) Animal Identification Commission. Bright said industry recommendations for the National Animal

Identification System (NAIS) have been submitted for consideration by the Animal Plant Health and Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA). He stressed that the goal of the proposed national program is disease surveillance.

The recommended plan calls for assignment of premises ID numbers to cattle operations, followed by individual animal ID numbers allowing tracking of animals through movement to different premises and changes of ownership. NAIS recommendations call for use of radio frequency identification (RFID) ear tags. Initiated on a voluntary basis, the system

## CMP: Meeting consumer demands through genetic selection

Results of the National Cattlemen's Beef Association (NCBA) Carcass Merit Project (CMP) hold promise for beef producers, Dan Moser, Kansas State University (K-State) animal scientist and member of the CMP team, told Beef Improvement Federation (BIF) attendees.

Moser gave a report on the results of the NCBA project, which was initiated in 1998 and completed just this year. The study was meant to collect data for calculating EPDs for tenderness and other carcass traits, as well as to validate previously identified genetic markers for such traits.

As Moser explained, 13 leading beef breed associations representing 14 breeds participated in the study, providing more than 8,500 progeny of sires chosen to represent the respective breeds. Each association coordinated sire selection, progeny testing, synchronization and breeding, collecting blood samples, selecting feedlots, setting the feedlot regimen, and designating harvest end points.

Cattle in the project were fed in commercial feedlots. DNA was sampled at first processing, and the animals were harvested in commercial packing facilities. After harvest, carcass data was collected and steaks were sent to the meat laboratory at K-State, where more than 7,000 progeny were tested for Warner-Bratzler shear force (WBS) values — 2,400 of which were also evaluated by a sensory panel.

"The project was designed to ... allow comparison of sires within each breed, but not sires across breeds," Moser cautioned. "The average shear force of each breed in this study is as much the result of management as it is genetics. ... We need to recognize that there shouldn't be any claims of superiority coming out of this study."

Carcass traits were representative of accepted industry standards; however, shear force values were somewhat surprising, he reported.

"What I did not expect was how high the shear force was. Before the study, a shear force over 10 pounds (lb.) was thought to be objectionable," he said. For the CMP, researchers used 11 lb. as the threshold for acceptability, corresponding to sensory panel results. Moser reported 26% exceeded the 11-lb. threshold, and 20% were rated less than slightly tender by the sensory panel.

"It's alarming that one-quarter of cattle were objectionable in this study for tenderness," he said. "And these are your best genetics, managed optimally."

Besides measuring shear force values, the study also evaluated

DNA markers, characterizing 11 quantitative trait loci (QTL) for carcass and meat quality traits in each breed — identifying markers that affect, or are believed to affect, traits like fat thickness, marbling, ribeye area and others. According to study results, several QTL were found to have significant effects on shear force values and tenderness.

Overall, Moser said the research project helped promote cooperation among breed associations; raise awareness and visibility of marker-assisted selection; and develop a large, multi-breed database of DNA (genotypes) and phenotypes.

The greatest benefit of the CMP, he said, is the creation of a legacy that will benefit the industry, helping it meet consumer demands for many years to come.

The final results of the project, which was funded by participating breed associations and the \$1-per-head beef checkoff, are now available online at [www.beef.org](http://www.beef.org).



► Dan Moser, K-State animal scientist, gives a report on the final results from the NCBA Carcass Merit Project. Moser, a member of the CMP team, said the project has produced a large, multi-breed database of phenotypic information and DNA samples — an important resource in the genetic improvement of carcass merit in beef cattle.

# a Little Deeper



► **Left:** Cattle feeder John Haverhals says marketing advantages may be achieved through source and process verification facilitated by individual animal ID.

► **Right:** South Dakota cow-calf producer Marshall Edleman said some auction market operators are organizing special sales featuring feeder cattle tagged with electronic ID devices. They are approaching individual animal ID as an opportunity rather than a challenge, he added.



across the country. Many are wondering who will have ownership of data, and who will or will not have access to it. Perhaps the most common question concerns who will pay for implementation of the system.

would be phased in, moving toward required industry-wide participation.

South Dakota cow-calf producer Marshall Edleman said secondary benefits of a national system could include opportunities to add

value to cattle through source, age and process verification of individually identified animals.

Ronnie Silcox, University of Georgia Extension educator, said his colleagues hear many ID-related questions from producers

While APHIS must have access to information related to disease surveillance, Bright said confidentiality and security of producer information must be maintained

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by keeping database control in the hands of private industry rather than government. With regard to the cost of a national program, he said there is little doubt that producers will foot the bill.

**Seedstock selection.** Discussing tips for seedstock selection, geneticist Bob Weaber said expected progeny difference (EPD) values are the most quantitative selection tools. Recently associated with Cornell University and soon to join the staff of the University of Missouri (MU), Weaber warned producers to abandon popular myths related to genetic selection.

Weaber said DNA marker tests are not viable substitutes for EPDs. Nor should actual ultrasound records be used instead of interim EPDs based on adjusted ultrasound information. And, in spite of the carcass data hype, commercial producers should not apply selection pressure for end-product traits at the cost of more economically important traits such as reproduction and performance.

“Make sure cattle work at the cow-calf level first,” Weaber advised.

### Genetic Prediction Committee

**Across-breed EPDs unveiled.** This year there were relatively few changes to the across-breed EPDs (AB-EPDs), reported Dale Van Vleck, University of Nebraska, Lincoln (UNL) in the Genetic Prediction Committee roundtable. The animal geneticist reported the 2004 adjustment factors for calculating AB-EPDs established through the Germplasm Evaluation (GPE) project at the Roman L. Hruska U.S. Meat Animal Research Center (MARC), Clay Center, Neb.

Van Vleck presented factors to adjust the EPDs of 17 breeds to a common birth year of 2002 for birth, weaning and yearling weight and EPDs of 15 breeds for the milk component of maternal weaning weight (see Table 1).

**Table 1: Across-breed EPDs**

	Birth wt.	Wean wt.	Yrlg. wt.	Milk
Hereford	3.4	-2.0	-13.7	-17.8
Angus	0.0	0.0	0.0	0.0
Shorthorn	7.8	31.4	44.5	12.1
South Devon	6.7	21.7	40.8	3.5
Brahman	13.0	34.8	-4.4	24.6
Simmental	6.4	22.4	21.9	10.0
Limousin	4.5	1.8	-19.9	-15.9
Charolais	10.5	38.4	53.4	2.6
Maine Anjou	6.7	17.6	5.5	7.6
Gelbvieh	5.4	7.1	-21.1	1.7
Pinzgauer	7.7	28.3	25.5	6.1
Tarentaise	3.6	30.1	13.4	17.8
Salers	4.9	30.7	46.1	9.0
Red Angus	3.6	-1.4	0.7	-7.8
Braunvieh	6.5	30.0	13.9	22.2
Brangus	5.7	20.0	20.4	—
Beefmaster	9.7	39.0	37.9	—

“Bulls of different breeds can be compared on a common EPD scale by adding the appropriate table factor to EPDs produced in the most recent genetic evaluations for each of the 17 breeds,” Van Vleck said.

**Cycle 7 insights.** Cycle 7 of the GPE project reveals how much more rapidly improvement can be made when EPDs are available to help guide selection decisions, Larry Cundiff told the Genetic Prediction Committee.

“What we refer to as a cycle is like a separate experiment that involves a set of sire breeds, usually six or seven different sire breeds mated to cows of two or more breeds,” Cundiff explained while providing an overview of the project. Cycle 7 was designed to re-evaluate what had become the seven most prominent beef breeds in North America, as determined by annual registrations. Included were Angus, Hereford, Charolais, Limousin, Simmental, Red Angus and Gelbvieh.

“The differences today among the seven breeds are not as great as they were 30 years ago for weaning weight and most of the traits we evaluate,” Cundiff said, noting that the British breeds have closed the gap on the

Continental breeds in terms of growth.

Conversely, for traits that have not been widely evaluated for long, little change in breed differences has occurred. He pointed out that differences in carcass traits such as marbling and tenderness are about the same magnitude today as they were 30 years ago.

Revealing a few highlights of the study, Cundiff said that while Simmental had relatively high birth weights, calving ease scores for the breed were comparable to the British breeds. He also noted growth curve changes, using Angus as an example. Progeny sired by the light-birth-weight Angus cattle are going to have smaller mature weights, he said.

Cundiff said it's too early to evaluate differences in reproduction traits, since the cows are just 2 years old. “We've never found significant reproduction differences in these breeds,” Cundiff reported, “probably because they are all managed to meet their nutrient requirements.”

Other noted differences for the Cycle 7 evaluation include the use of legacy sires in addition to young sires representative of the breeds, the mating of F<sub>1</sub> cows to F<sub>1</sub> bulls, multi-sire pasture-breeding using DNA parentage verification, and using Charolais- and Simmental-cross cows. Blood samples have been collected to provide DNA on all the calves produced in cycles 5, 6, 7 and 8.

These will require changing the model used to evaluate the data, Cundiff said. “We're wanting to establish a design where we can do a multi-breed evaluation, estimate the breeding effects, estimate the heterosis effects, and at the same time estimate the quantitative trait loci (QTL) effects in an experiment where you can estimate one independent of the other.”

### Live Animal, Carcass and End Point Committee

Industry specialists discussed live animal, carcass and end point traits and their effects on end product value during the Live Animal, Carcass and End Point Committee roundtable at BIF.

Duane Wulf, an animal scientist from South Dakota State University (SDSU), discussed the effect of

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► **Left:** Cycle 7 of the GPE project was designed to re-evaluate the seven most prominent beef breeds in North America, as determined by annual registrations, said Larry Cundiff. Included were Angus, Hereford, Charolais, Limousin, Simmental, Red Angus and Gelbvieh.

► **Right:** “As a data processor or EPD service provider, we have an obligation to ensure the EPDs are as reliable as possible given the pedigree and performance information that we have available,” said CSU’s Dorian Garrick in expressing the importance of validation to the Genetic Prediction Committee.



muscling on beef carcass value. Wulf reviewed size, quality and cutability and their effects on carcass value. Yield grades and their relationship to fat thickness and ribeye area were also discussed. Citing SDSU research, Wulf said a 13.8-square-inch (sq. in.) ribeye — at a 775-pound (lb.) carcass weight — is optimum for the retail market.

During his presentation, he also discussed the implications of the increasing trend of injecting meat with additives for flavor. “Marinated meat, enhanced meat, injected meat — it all removes a lot of variability in quality and substantially improves it,” Wulf said. “There are things on the horizon that will improve it even greater than this. It’s just in its infant stages.”

John Pollak of Cornell University discussed feed efficiency projects and their implications for cattle breeders. Pollak explained the importance of indicator traits and their correlations to economically relevant traits (ERTs) and residual feed intake (RFI).

Denny Crews Jr., a research scientist at Agriculture and Agri-Food Canada, discussed the challenges and opportunities of collecting and utilizing RFI data. Crews said there are many challenges associated with collecting and measuring individual feed intake. The process requires an extended period of time; evaluation of a large number of sires; and expensive hardware, software and other technology. However, as more data is collected, the overall goal of such efforts remains the same — to decrease cattle producers’ input costs while maintaining efficiency.

### Cow Herd Efficiency Committee

Attendees of the Cow Herd Efficiency Committee roundtable focused on indexes developed by several breed associations to assist in multi-trait selection.

Lowell Gould presented producer reaction to the mature cow maintenance energy requirement (ME) EPD adopted by the Red Angus Association of America (RAAA). Gould said in a survey of 10 members, 80% said they had used the EPD to rank bulls. All considered it a useful tool for cow herd efficiency when combined



► **Left:** SDSU animal scientist Duane Wulf reviewed size, quality and cutability and their effects on carcass value.



► **Right:** Denny Crews Jr., a research scientist at Agriculture and Agri-Food Canada, said there are many challenges associated with collecting and measuring individual feed intake.

with other traits, and 50% said their customers had asked about the EPD. All those surveyed thought the EPD could be used to meet customer needs, but they cautioned that it would take time.

The American Gelbvieh Association (AGA) unveiled the beef industry’s first index in 2001. The “old” Grid Merit index was modified to divide out Feedlot Merit and Grid Merit indexes, said Dennis Fennewald, AGA director of marketing.

Robert Williams, director of breed improvement and foreign marketing for the American-International Charolais Association (AICA), presented the AICA Terminal Sire Profitability Index. Described as a decision-support tool for commercial cattlemen, the index serves the purposes of simplifying genetic selection; improving the ability for bull customers to locate bulls within a geographic area; improving the visibility of AICA-registered Charolais bulls through the Internet; and leveling the playing field between small- and large-scale seedstock producers. More information on this selection index is available at [www.charolaisusa.com](http://www.charolaisusa.com).

Sally Northcutt, director of genetic research for the American Angus Association, explained the first of the Association’s suite of bio-economic indexes. Last fall the Association released three \$Value Indexes — feedlot value (\$F), grid value (\$G) and beef value (\$B) — in answer to requests from commercial cattlemen for a

way to simplify multi-trait selection. The multi-trait indexes express expected differences in dollars per head.

Northcutt said the Association is finalizing a weaned calf index (\$W) that it intends to release within the year. For more information, visit [www.angus.org](http://www.angus.org).

Just because it’s hard, doesn’t mean we shouldn’t do it, said Mike MacNeil, USDA-ARS, in regard to establishing selection indexes tied to economic parameters. And while mistakes will be made, they won’t cost producers that much because they’re not just chasing one trait.

### Emerging Technology Committee

On Thursday afternoon, the BIF Emerging Technology Committee conducted a discussion of the potential incorporation of DNA testing into practical cattle evaluation and genetic selection. Speaker Dick Quaas, Cornell University, stressed the need for validation of tests marketed commercially by genomic companies.

Quaas is a member of the BIF Molecular Technology Guidelines Committee charged with creating guidelines for standardized technology nomenclature, data collection and database entry, and incorporation of test information into breed improvement programs.

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► **Left:** Robert Williams, director of breed improvement and foreign marketing, presented the AICA Terminal Sire Profitability Index.



► **Right:** Last fall the American Angus Association released three \$Value Indexes — feedlot value (\$F), grid value (\$G) and beef value (\$B), explained Sally Northcutt, director of genetic research.



Quaas also serves on the National Beef Cattle Evaluation Consortium's "project team" addressing commercialization of DNA testing technology.

"The Consortium team has a more narrow focus — development of a protocol for validation of gene marker tests. And the team will actually conduct the validation process," Quaas explained. "Certainly, it is important to test the claims of marketing companies with independent data."

Also on the agenda was Mark Thallman, of MARC, discussing results of the NCBA Carcass Merit Project (CMP) and 13 breed associations. The beef checkoff-funded CMP's objectives included development of procedures for collecting information necessary to develop EPD values for carcass merit traits. Another objective was validation of DNA markers to be used in marker-assisted selection for improvement of carcass traits. Of particular interest is the development of selection tools for improving tenderness.

Thallman said the CMP validated previously discovered QTL, or points in the DNA sequence, which are associated with carcass traits. The research sought to characterize 11 QTL to see which traits are affected by each QTL.

"Most QTL showed significant effects for more than one trait, but we are particularly excited about four of them," said Thallman, referring to QTLs associated with traits such as shear force, flavor, juiciness and overall tenderness, as well as marbling and ribeye area.

The experts agreed that this project brings the industry a step closer to potential DNA tests to help advance genes affecting carcass traits and, particularly, those that are hard to measure. However, they also agreed that it is too early to use



► **Left:** Burke Teichert discusses selection decisions and the strict culling regimen he employs as general manager of Rex Ranch. "We cull most cows based on fertility and function of adaptability to the environment," he said.



► **Right:** John Pollak, Cornell University, discusses cow longevity and adaptability and how such traits change with different environments.

the information as a seedstock marketing tool.

The most significant result of the CMP, said the experts, is the sizable database of phenotypic information and DNA samples collected from a wide cross section of U.S. beef germplasm. The data and samples represent an unbiased resource population for use in validation of gene tests prior to marketing to cattle producers.

### Selection Decisions Committee

A variety of factors can determine how producers select for their herds. Although a plethora of available tools can assist in herd selection, Oklahoma State University (OSU) researcher John Evans said producers often just select for the popular trait at the time; practice independent culling or ad hoc selection; and select to maximize production, regardless of shrinking net profit.

"Producers oftentimes comment to me that they don't even know where to begin. There's just a tremendous number of tools out there to use. ... They do get that overwhelming feeling sometimes because of all the information," Evans told the crowd gathered at the Selection Decisions Committee roundtable discussion.

In an effort to simplify the selection process, selection index technology was introduced in 1943 to simultaneously apply selection pressure to multiple traits, also assigning economic value.

"Theoretically, the indexes should maximize genetic progress, with emphasis on profitability, and simplify net merit," Evans noted.

After reviewing some of the selection indexes available from leading breed associations, he described the benefits of such tools. However, Evans addressed the diversity of the beef industry and the dangers of a one-size-fits-all philosophy, saying the concept of selection indexes "does not replace the exercise of establishing goals of the breeding program and breeding objectives."

Also during the roundtable discussion, Dorian Garrick of Colorado State University (CSU) explained indicator traits and their effect on ERTs — traits that directly influence profit. By understanding ERTs, Garrick said, producers can select appropriate EPDs to make better selection decisions. For example, birth weight is an indicator trait that helps predict calving ease. If wanting to reduce calving difficulty, Garrick explained, selecting for calving ease EPD rather than birth weight EPD would allow producers to reduce calving difficulty in less time with fewer consequences on weaning weight.

Burke Teichert, general manager of Rex Ranch, also discussed an ear-notching system that uses fertility, disposition, preg-test weights and more to cull his low-maintenance cow herd, while Pollak explained how such practices could affect herd longevity and adaptability.



► **Left:** Dick Quaas, Cornell University, stressed the need for validation of tests marketed commercially by genomic companies.

► **Right:** Mark Thallman, USDA MARC, discussed results of the NCBA Carcass Merit Project.

