

*Consortium proposes*

# Multi-Breed Analysis



Many breeds conduct genetic evaluation separately, leaving many producers involved in crossbreeding calling for across-breed EPDs.  
[PHOTOS BY SHAUNA ROSE HERMEL]

***Some breed associations, including Angus, say, “Not yet,” to single analysis that would create across-breed EPDs.***

*Story by*  
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Expected progeny difference (EPD) values have been around for a long time. They have been heralded as the most valuable tools available for use in genetic selection. After years of using EPDs, it would be hard to go back to in-herd records and a keen eye as the primary criteria for selecting seedstock.

“I couldn’t go back to the old way of picking bulls. Having EPDs spoils you,” one producer said. “It’s like kissing your girlfriend. Once you’ve tried it, you won’t be satisfied with just holding hands.”

But even as EPDs became important selection tools, addressing growing numbers of heritable traits, a dilemma remained for cow-calf producers whose breeding programs involve more than one breed of cattle. You can’t directly compare the

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numbers for an animal of one breed with those of an animal of another breed. Each breed’s genetic evaluation is conducted separately, and the resulting EPDs for various traits are computed separately, with different base points. That has left producers involved in crossbreeding or production of composite-breed cattle calling for across-breed EPDs.

The nearest thing to a remedy came in the form of EPD

adjustment factors. In 1997, research geneticists at the Roman L. Hruska U.S. Meat Animal Research Center (MARC) in Clay Center, Neb., developed a table of EPD adjustment factors whereby animals of different breeds could be compared on the same EPD scale after adding the appropriate adjustment factor to the EPDs produced in the most recent genetic evaluations for many of the breeds (see Table 1, page 16).

However, the accuracy of the system has been questioned, since it was developed using a relatively small cattle population at a single location. Wouldn’t it be better, the critics asked, if all of the data from all breeds were submitted to a central entity for calculation of true across-breed EPDs?

That is the ambitious goal of the National Beef Cattle Evaluation Consortium (NBCEC). The consortium is a

collaborative effort involving geneticists from land-grant universities responsible for researching and developing trait analyses for various breed associations. Doesn’t it make sense for these expert “chefs” to throw all of the ingredients into one pot and cook up the across-breed EPDs that many beef cattle producers hunger for? The idea is appealing, but some breed associations fear the recipe lacks seasoning, and the results won’t suit their tastes.

## **A big undertaking**

E.J. “John” Pollak, a geneticist at Cornell University and director of the consortium, admits that building a centralized multi-breed analysis is a huge undertaking, but he believes it is a natural step toward a more coordinated effort to advance genetic evaluation of beef cattle. Coordination of that effort is why the consortium was created (see sidebar, page 16).

Pollak says Cornell has already worked with the American Simmental Association (ASA) to create a multi-breed evaluation of animals from several breeds — mainly those that are used with Simmentals to create composites. The University of Georgia has also been involved in a separate analysis project involving more than one breed.

“But the consortium’s goal is to bring more breeds into a system; to conduct a genetic evaluation for all breeds,” Pollak explains. “We’re starting with a prototype evaluation of growth traits only — just birth weight, weaning weight and yearling weight. We’ll build a national pedigree file that will be finished, we hope, by fall.”

Invitations to participate were extended to all breed associations, sparking interest among a dozen or so. But some breeds have declined. Notable among those are the American Hereford Association (AHA) and the American Angus Association.

“There seems to be a lot of mixed emotion. Some breeds have invested a lot of energy and money in their own evaluation programs,” Pollak says. “Questions have been raised about whether the volume of data will be prohibitive to a multi-breed analysis and whether we’ll be able to work through the logistics of getting a system up and running. The prototype run should help answer those questions and show us



how to proceed with evaluation of additional traits.”

The University of Kentucky’s Darrh Bullock is chairman of the consortium’s advisory council, representing the Beef Improvement Federation (BIF) and the Extension service. Since the consortium has been successful in consolidating resources and reducing duplication in previous research, Bullock views multi-breed analysis as the next logical step.

“It makes sense to me. Why not submit all the data and run one evaluation, instead of separate runs for each breed? The real advantage comes when producers have truly comparable EPDs for all breeds,” Bullock offers.

“I think we have to commend the breed associations that are stepping up and supporting this,” he adds. “I’m sure the breeds choosing not to participate have their reasons. They might think it takes away some independence and the freedom to pursue the traits they choose. But they don’t have to abandon their own within-breed evaluation just because they offer their data to the multi-breed prototype.”

Wade Shafer, ASA director of performance programs, agrees that the obvious benefit of multi-breed analysis would be the commercial producer’s ability to make across-breed comparisons of genotypes. The more data, Shafer says, the better it will be for improving prediction accuracy.

The ASA genetic evaluation program was developed to include foundation animals that were not purebred. With this involvement of other breed influences, it evolved into a tool for evaluation of composite cattle, he explains, adding that breed associations can’t ignore how more and more seedstock producers are raising and marketing composites.

Shafer says ASA leaders deliberated long and hard before deciding to accept the consortium’s invitation to participate. Feeling they had the most comprehensive across-breed database and model in the country, they wondered if they might be giving away more than they would be gaining. To an extent, he adds, the ASA already was doing what the consortium was proposing, but the ASA board wanted to cooperate in a united effort.

“If the consortium takes hold and gets traction, it will help the industry make better seedstock,” Shafer adds. “Our policy is to do whatever we can to make better seedstock.”

### **Complications recognized**

Similar reasoning prompted the North American Limousin Foundation (NALF) to support the project. The decision was partly made in the spirit of cooperation. NALF Executive Officer Kent Andersen says his board of directors thought it was important to be part of what will be the largest multi-breed database ever assembled.

“You can’t deny that it creates some exciting possibilities,” Andersen adds. “Neither can you deny the advantages that heterosis creates in a commercial crossbreeding program. We believe in

the goal of more accurate across-breed comparisons and more accurate predictions for hybrid seedstock.”

Andersen admits that it has been a divisive issue due to legitimate concerns. The logistics of combining multiple herd books twice a year will be complicated. Entering into a project with multiple entities means there is a risk of losing

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**Consortium** (from page 15)

control over how the genetic evaluation is run. Andersen believes the consortium will try to use the best science available, but some decisions may be based more on art than science. That's where participating breed associations may have to accept certain compromises.

"But this is just a prototype involving only growth traits. If it is expanded, we will eventually have to decide if we want to maintain involvement, continue our own evaluation or do both," Andersen states. "Our job is to serve our members and their customers.

They will want comprehensive predictors, so we will want a complete EPD profile. We may have interest in certain traits that other breeds do not. There may always be a need for our own customized evaluation."

Iowa seedstock breeder Dave Nichols also serves on the consortium's advisory council. He merchandises both Angus and Simmental cattle, but 50% of the bulls Nichols sells are composites. He believes the time has come for development of accurate across-breed EPDs.

"They need to be made available to producers using crossbreds or

composites," Nichols states. "We need to remember that heterosis is not heritable. An F<sub>1</sub> cross performs better than the average of its parents. That hybrid vigor is not heritable, but it is transferable. We need to be able to compare animal genotypes while removing the influence of heterosis. It is really complicated, but really important."

Of course, Nichols adds, across-breed EPDs offer no advantages to purebred breeding programs. But a purebred breeder's customers may have use for across-breed EPDs when selecting crossbred replacement heifers. Nichols says many commercial producers using more than one breed are building pedigrees on their cattle. There may come a day when these producers would be willing to pay an entity, such as a breed association, to produce EPDs for those cattle.

"The breed associations that don't want to participate now may change their minds in the future," Nichols says. "I'd advise them not to burn any bridges."

**Not now**

AHA Executive Vice President Craig Huffhines says the concept of multi-breed analysis is good. At some point down the road, AHA may be interested in joining the effort — but not now.

**The American  
Angus, Hereford  
and Shorthorn  
associations opted  
not to participate.**

"We have declined the invitation because of several different concerns. We think the consortium still lacks the computer capability and models needed to accomplish its goal," Huffhines explains, "but some of our reasons might be unique to Herefords."

There is concern over linkage of

Hereford genetics to other breeds. Rather, it is the lack of linkage, since there is little evidence of pedigree ties. In AHA's opinion, the Hereford database may be weak for purposes of direct comparison.

Allocation of association resources presents another dilemma. Should AHA support and participate

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

Breed	Birth wt.	Weaning wt.	Yearling wt.	Milk
Angus	0.0	0.0	0.0	0.0
Hereford	3.4	-2.0	-13.7	-17.8
Red Angus	3.6	-1.4	0.7	-7.8
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
Limousin	4.5	1.8	-19.9	-15.9
Simmental	6.4	22.4	21.9	10.0
Charolais	10.5	38.4	53.4	2.6
Gelbvieh	5.4	7.1	-21.1	1.7
Maine Anjou	6.7	17.6	5.5	7.6
Salers	4.9	30.7	46.1	9.0
Pinzgauer	7.7	28.3	25.5	6.1
Tarentaise	3.6	30.1	13.4	17.8
Braunvieh	6.5	30.0	13.9	22.2
Brangus	5.7	20.0	20.4	—
Beefmaster	9.7	39.0	37.9	—

The table of adjustment factors to estimate across-breed expected progeny differences (AB-EPDs) for 17 breeds was presented to the Genetic Prediction Committee at the Beef Improvement Federation (BIF) Annual Meeting in Sioux Falls, S.D., May 26. Animals of different breeds can be compared on the same EPD scale after adding the appropriate adjustment factor to within-breed EPDs produced in the most recent genetic evaluations for each of the 17 breeds. For example, suppose the EPD for birth weight for a Charolais bull is +2.0 within the Charolais genetic evaluation, for an Angus bull is 2.8 within the Angus genetic evaluation, and for a Hereford bull is +4.0 within the Hereford genetic evaluation. The AB-EPD adjustment factors (see table) are 10.5 for Charolais, 0.0 for Angus, and 3.4 for Herefords. The AB-EPD for the Charolais bull is 12.5 (10.5 + 2.0), for the Angus bull is 2.8 (2.8 + 0.0), and for the Hereford bull is 7.4 (3.4 + 4.0).

**Source:** Adapted from Larry Cundiff and Dale Van Vleck, Roman L. Hruska U.S. Meat Animal Research Center.

## History of the National Beef Cattle Evaluation Consortium

Most of the genetic evaluation of beef cattle for the U.S. beef industry has been conducted by four land-grant universities in partnership with various breed associations. Taking the lead in this area of genetic research have been Cornell University, Colorado State University (CSU), Iowa State University (ISU) and the University of Georgia. Generally, a breed association would contract with one of the universities for research and development of genetic trait analysis and calculation of expected progeny difference (EPD) values.

These arrangements have worked, but the system has drawn criticism. Breed associations have been accused of engaging in games of one-upmanship, with each trying to outdo the others in pursuit of EPDs for more and different traits. The critics also feared beef industry resources were not being used efficiently. The four universities depended upon funding from breed associations, and were trying, separately, to accomplish the same or similar goals.

Fueling the discontent was envy for the dairy industry's centralized genetic evaluation program. It received direct federal funding that the beef industry's segmented efforts did not. And, some U.S. breed associations were taking advantage of Australia's genetic evaluation system, which also receives generous government support.

Cornell University geneticist E.J. "John" Pollak says the National Cattlemen's Beef Association (NCBA) urged the universities to come together for a more coordinated effort. Along with sharing information used in genetic evaluation and avoiding duplication of specific research, a united entity could apply for funding from the U.S. Department of Agriculture (USDA).

The National Beef Cattle Evaluation Consortium (NBCEC) was formed. Researchers from each university make up the consortium's board, with Pollak as director. Also established to help set priorities was a 10-member advisory council with representation from industry groups such as the NCBA, the Beef Improvement Federation (BIF) and the U.S. Beef Breeds Council.

Pollak says the consortium recently achieved its third year of federal grant funding. Projects toward which the consortium has applied its combined resources include development of an EPD for heifer pregnancy. Pollak says the evaluation is available to the industry and already has been adopted by the Red Angus Association of America (RAAA).

The consortium also developed and now applies procedures for validating DNA tests for specific traits, as well as strategies for using gene markers as trait predictors. Now in its third year, the consortium's Commercial Ranch Project is looking at ways to apply genetic evaluation to commercial cattle through progeny testing. Other projects are seeking ways to incorporate early-weaned calves in weaning weight evaluation and investigating the genetic components of feed efficiency, as well as cow maintenance and stayability.

Pollak states NCBA again acted as a catalyst for development of multi-breed analysis and creation of across-breed EPDs. Hence, the push to involve as many breeds as possible in the first step — a prototype evaluation of growth traits. The question of whether the consortium is ready for this challenge has brought mixed responses.



The American Angus, Hereford and Shorthorn associations have opted not to participate in the prototype multi-breed analysis.

model also contains a considerable amount of proprietary information that the Association feels it cannot share. Additionally, Angus leaders are wary of a situation where they have little or no influence over how the analysis of multi-breed animals is related to Angus cattle.

The Association's policy statement also notes how incorporation of its entire database into a consortium multi-breed

analysis would equalize all breeds relative to publication and distribution of EPDs. Crouch adds that many Angus breeders believe the real or perceived marketing advantages they enjoy could be neutralized.

"There is no question that multi-breed analysis would be a good thing for many commercial producers, providing them with more accurate tools for selecting

seedstock for crossbreeding programs. I hope this prototype project results in effective methodology for accomplishing that. I'm afraid that, right now, the consortium's methodology is insufficient," Crouch says. "Our Board has chosen not to participate. Not yet, anyway."



in the consortium's multi-breed analysis when it is already committed to a long-term and international evaluation of Hereford genetics? Huffhines says AHA doesn't want to give up cooperative effort among the United States, Canada, Australia and New Zealand. Trying to do both does not seem practical at this time.

AHA fears a logistical complication exists in that, unlike breed associations that have chosen to participate in multi-breed analysis, AHA does not use one of the consortium-member universities to crunch its data and crank out EPDs. That is done by the University of New England in Armidale, New South Wales, Australia. (The same is true for the American Shorthorn Association, which also has decided against participation in multi-breed analysis.)

"And we're not ready to give up the ability to set genetic parameters of evaluating our own population," Huffhines adds. "The consortium would have to dictate the parameters and treat all breeds the same. We aren't ready to go along with that. Not yet."

### Angus perspective

American Angus Association Executive Vice President John Crouch says the Association's Breed Improvement Committee voted unanimously against participation in the proposed multi-breed evaluation prototype research. The Angus leaders' reasoning parallels that of their Hereford counterparts.

Genetic evaluation for Angus cattle is no longer linked to the consortium by a member university. Angus analysis is not conducted abroad, but considerable investment has been made toward bringing all genetic evaluation capabilities within the Association.

"We've been working on that for five or six years, and it is coming to fruition. We don't want to jeopardize that now," Crouch says.

There is concern that the proposed multi-breed analysis will not employ genetic evaluation enhancements that have been added to the Angus model. Among those are new 205-day adjustments and inclusion of performance data of embryo transfer (ET) cattle. Crouch says the in-house