ROCK **SOLID**

Current Hereford research builds upon intentionally sturdy foundation.

by ***Wes Ishmael***

"It is often believed today that successful breeders have some mysterious method of which others are ignorant. Instead, the principles of the successful breeder have been exceedingly simple. The difficulty lies not so much in knowing the principles as in applying them," according to Sewell Wright, a livestock geneticist in 1920.

Tom Field, the Paul Engler Chair of Agribusiness Entrepreneurship at the University of Nebraska-Lincoln, shared Wright's quote and the context for it during the opening session of the American Hereford Association (AHA) Educational Forum, held in conjunction with the 19th World Hereford Conference in Kansas City, Mo. Field set the stage for sharing current AHA research results, advancements in genetic prediction and more.

AHA members have always valued objective, collaborative research as essential requirements for breed improvement. Insights shared during the Forum helped participants connect current and previous Hereford research and how each step in the deliberate journey paved the way to current possibilities.

For instance, Mark Enns, the John E. Rouse Chair in animal breeding at Colorado State University (CSU) shared details about the school's collaborative research project with AgNext and the AHA. It's designed to estimate in-breed heritabilities and evaluate genetic and phenotypic correlations among three environmental sustainability traits — dry matter intake, methane emission rate and blood urea nitrogen — and growth and carcass traits.

Based on results so far, Enns explains, "There are genetic differences within the AHA population for both methane emissions and blood urea nitrogen concentration. If selection pressure is applied, we will see genetic change in those traits."

Shane Bedwell, AHA chief operations officer and director of breed improvement, also shared plans for ongoing research aimed at better understanding bovine congestive heart failure (BCHF) in late-day feedlot cattle and how Hereford genetics reduce the risk.

All of this represents the leading edge of exploring necessary new frontiers, but Bedwell reminded the Educational Forum that it is possible because of the thoughtful, deliberate way AHA leadership has addressed the need for the continuous collection of accurate phenotypic data over time, as well as genotypic data these days.

The AHA was an early adopter of whole-herd reporting, for example. It remains one of only two breeds in the U.S. which requires whole-herd reporting for data to be included in the breed's genetic evaluation.

Hereford is the only breed in the U.S. with a genetic proving program — the National Reference Sire Program (NRSP) — designed to compare the genetic merit of young Hereford sires in real-world, commercial beef cattle production. The mainstay NRSP test herd at Olsen Ranches, Harrisburg, Neb., is the reason the breed has such an enviable amount of individual animal dry matter feed intake and carcass data to use in its genetic evaluation for the benefit of all users of Hereford genetics. Incidentally, this is how and where data is also collected for methane emissions, nitrogen excretion and individual animal water intake.

Mark Enns, CSU, described current AHA research efforts to evaluate they heritability of sustainability traits and their genetic correlations to growth and carcass traits.

The Olsen herd also provides an extraordinary amount of BCHF data.

More than 400 Hereford sires have been tested through the NRSP since its inception in 1999. Those sires influence 7% of the more than 2 million AHA performance pedigrees.

"The National Reference Sire Program is simply unrivaled in the data collected and the resource it provides as a major breed improvement tool," Bedwell says. HW

CONTINUOUS **GAIN**

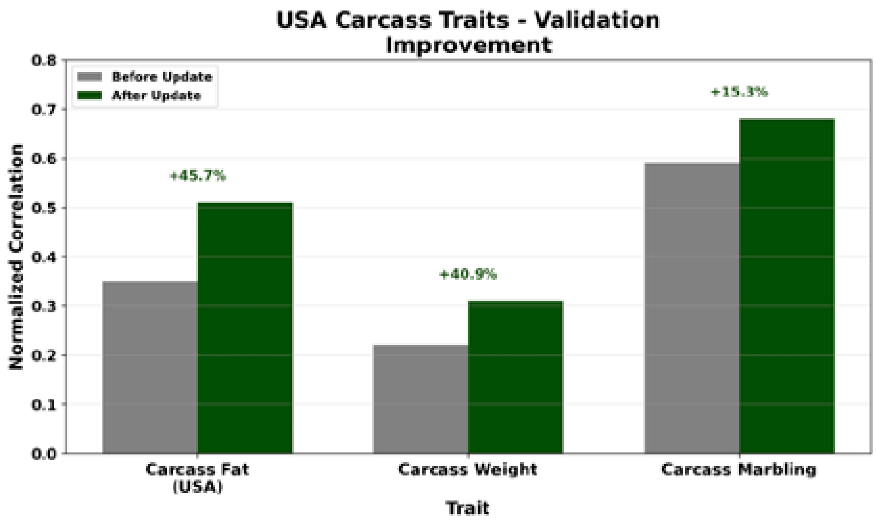
Innovation fuels gains in selection accuracy.

by ***Wes Ishmael***

If you were born after 1985 or so, it might be difficult to fathom a beef cattle seedstock industry without expected progeny difference (EPDs) to inform selection decisions. Even if you were alive during genetic evaluation's nascent U.S. history in the late 1960s and early 1970s it can be easy to take for granted how far and fast the journey has been.

Dorian Garrick, Theta Solutions LLC co-founder and The Helical Co. Ltd. consultant, provided an insightful history lesson that set the stage for research presented at the American Hereford Association (AHA) Educational Forum.

With an extravagantly short stroke of the brush, Dorian explained the evolution of selective livestock breeding from its roots commonly attributed to Robert Bakewell in 1725 to the current day, from the role of breed organizations to maintain animal pedigrees and record performance data, to the calculation of estimated breeding values and modern-day EPDs enhanced by genomic information.



Source: Theta Solutions

Exponential improvement

Dan Garrick (Dorian's son), Theta Solutions LLC managing partner and The Helical Co. Ltd. co-founder, described how all of that led to the accuracy and selection power of the Pan American Cattle Evaluation (PACE), which provides genetic evaluation for the AHA.

Broadly speaking, prediction accuracy increases when more valid data contributes to the calculation. Along with the U.S., PACE includes Argentina, Canada and Uruguay. As of October 2025, PACE included 4 million pedigrees and 253,000 genotypes. Of those, U.S. data accounts for 2.8 million pedigrees and just more than 227,000 genotypes. This added data has provided U.S. producers with increasingly accurate genetic predictions since PACE relaunched in 2019.

Incidentally, Australia and New Zealand are thinking about joining PACE. If they do, the number of pedigree records increases by 49.2% and the number of genotypes by 33.4%.

Increased prediction accuracy over time also comes with improvements to the single-step marker effects model utilizing Biometric Open Language Tools (BOLT), according to Shane Bedwell, AHA chief operations officer and director of breed improvement. Recent model updates were incorporated into the genetic evaluation, beginning in the fall of 2025.

"What we're trying to do anytime we introduce these updates is really around improving that prediction accuracy," Dan says. "We want to make sure that we are validating what we're doing so that we can say with confidence that the EPDs we are going to produce after these updates are more accurate than the ones prior to that."

Rank correlation between current and proposed models is key. Correlation measures alignment between old and new predictions. Values closer to 1.0 indicate strong agreement. Rank correlations between the previous and new model range from 0.93 to 0.99 with most above 0.95.

Improvement in carcass trait predictions were notably higher with model improvements that were able to account for more phenotypic and genomic data (see Table).

"These are more reliable EPDs with improved production accuracy across the traits; there's reduced uncertainty," Dan says. "These are a tool in your toolbox, and what's important to you is that you have a breeding objective. It's about how you can make use of this information if you choose to generate breeding decisions that are right for you." **H**W

MATERNAL HETEROSIS HANDS DOWN

Ongoing research underscores the Hereford advantage.

by ***Wes Ishmael***

Crossbreeding and Hereford cattle have gone together ever since the breed first came to the U.S. in 1817 to improve the nation's native cattle herd.

Specific benefits from direct and maternal heterosis are well documented, too, with much of the seminal research conducted at the Meat Animal Research Center (MARC) in the 1960s.

What continues to evolve, however, is quantifying the magnitude of advantages associated with utilizing Hereford genetics in strategic, complementary crossbreeding. That's the goal of the American Hereford Association's (AHA) ongoing multi-year collaborative research with the University of Illinois Urbana-Champaign (UIUC).

More specifically, Dan Shike, interim head of the UIUC department of animal sciences explains, "The objective is to characterize the performance of Hereford genetics in a commercial Angus operation that retains replacements and finishes out all steer progeny."

Dan Shike shared results from the multi-year research project at the University of Illinois, which describes the benefits of heterosis and Hereford's value in crossbreeding systems.

Results from the project thus far serve as a literal textbook example of the production and economic power yielded by maternal heterosis. Hereford-sired females, compared to those bred to Angus bulls, were more moderate in size, consumed less feed, weaned more calves, bred back more efficiently and had increased longevity.

For context, the study began with 600 commercial Angus cows. Half were bred to six different Hereford bulls; the other half to Angus bulls.

> "I'm not looking for the cow that wins in one year. I'm looking for the cow that wins over her lifetime and stays in the herd, stays in production, because she has some built-in fertility, some resilience, which leads to longevity."
>
> — Dan Shike

All bulls used represented the top 15% of each breed for it maternal and terminal indexes. This is a fall-calving herd.

Although the results are expected, the differences (Table 1) underscore the significant advantages enabled by Hereford genetics and maternal heterosis.

Shane Bedwell, AHA chief operations officer and director of breed improvement, pointed out during the Forum that Hereford provide additional heterosis due to the fact they are the least related of the Bos Taurus breeds, as documented by MARC.

Table 1: Implications of Longevity

	Angus-sired (%)	Hereford-sired (%)
Pregnant heifers	55	60
2-year-olds calving	49	57
Pregnant 2-year-olds	41	56
3-year-olds calving	38	50
Pregnant 3-year-olds	37	48
In herd as 4-year-olds	67	80

Source: University of Illinois

Winning for the long haul

"I'm not looking for the cow that wins in one year. I'm looking for the cow that wins over her lifetime and stays in the herd, stays in production, because she has some built-in fertility, some resilience, which leads to longevity," Shike says.

Table 2: 2-year-old Females

	Angus-sired	Hereford-sired
Feb. body weight (lbs.)	1,014	963
Feb. BCS	4.8	4.6
Feb calf body weight (lbs.)	243	252
Milk	8.3	9.7
DMI	31.1	27.8
April calf weaning weight (lbs.)	387	373
First-calf weaning rate	76%	90%
Rebreed (AI)	60%	68%
Rebreed pregnant	75%	93%

Source: University of Illinois

Although the advantages of maternal heterosis are noteworthy each year of reproduction, Shike notes how brightly they shine for the 2-year-olds with a heifer at side (Table 2), which breed back on time for the next calf. As cattle producers have long-known, that's when so many expensive replacement females are lost, unable to breed back with their second calf at one of the most stressful developmental periods of their lives.

Considering the 14% advantage in first-calf weaning rate of the Hereford-sired females at 2 years of age, Shike explains, "In a 100-head cow herd, that's 14 more calves. If you put a $2,000 price tag on each weaned calf, that's $28,000. That's $280 more per cow. That's a lot of dollars."

That's before considering that Hereford-sired females needed fewer groceries. Pricing hay at $150 per ton, the advantage equates to about $90 less feed cost per cow per year, according to the data.

Shike added context by pointing out, "Seventy percent of the feed resources in the beef industry go to the cow herd, and 70% of that feed that goes to the cow herd goes to her maintenance. Multiply those two numbers. It's 0.49. I'm going to round that to 50%. Half of the feed in the beef industry goes to just maintaining the cow, and I haven't produced anything."

Bottom line, Shike explained, "They wean more calves, and more of them breed back. That's Hereford genetics, that's maternal heterosis."

Perhaps unsurprising, given the Angus breed's relentless pursuit of pounds and marbling, the Angus-sired steers in the project resulted in heavier carcasses and graded higher on average. For instance, based on a subset, the Hereford-sired hot carcass weight was 876 pounds, compared to 901 pounds for Angus-sired steers. Marbling score for Hereford-sired steers averaged 479 versus 557 for the Angus-sired steers. Ribeye area was the same for both groups at 14.1 square inches.

Bedwell cautions the data is also influenced by the unique management system employed at the university of Illinois. Calves are weaned at about 90 days of age and moved to a backgrounding facility.

Think about the reproductive efficiency in the Hereford-sired heifers and cows versus heavier weights in the Angus-sired ones. Greg Thoma, AgNext director for agricultural modeling and lifecycle assessment, used the data to conduct a lifecycle assessment for a 1,000-head operation over 10 years. Generally speaking, the model considered a 1,000-cow commercial Angus herd using Hereford bulls and retaining its own replacement heifers or using Angus bulls and retaining its own replacement heifers.

More weaned calves over time yielded 45,728 more pounds of steers and open heifers to sell in the herd utilizing Hereford bulls.

"The feedlot side of the business pays the bills, but the female side keeps us in the business," Shike says.

Based on preliminary AgNext results, carbon intensity was also 8% less in the modeled herd employing Hereford bulls.

"Achieving the performance metrics documented for the Hereford breed in this trial by any means – genetic or management — shows clear benefits," Thoma says. HW

Shane Bedwell (left), AHA chief operations officer and director of breed improvement, provided background on previous AHA research characterizing Hereford and maternal heterosis advantages, which paved the way to current research.