

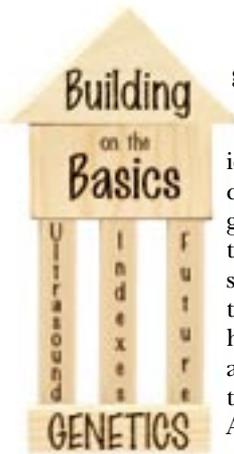


Here, Dan Moser explains the basics of expected progeny differences (EPDs) and the importance of genetic evaluation. Then, in three related articles, we look at the ultrasound process, producers' utilization of the \$Profit Indexes and the future of genetic evaluation.

The use of EPDs is one tool to help breeders produce the genetics they want in their herds.

by **Corinne Patterson**

For a purebred breeder, there's perhaps not a more exciting time of the year than calving season. It's a busy time that may even make strangers out of a close family who share the same house. The spring and fall debut the future of the Hereford breed, and the study of the next



generation's genetics begins to take shape.

Genetic evaluation is the idea of making across-herd comparisons of an animal's genetic merit. Long before today's genetic evaluation system, producers were taking weights on their herds for weaning, yearling and birth, says Dan Moser, the American Hereford Association's (AHA) genetic

advisor and associate professor at Kansas State University.

Then breeders used ratios to compare animals based on these weights — a process that worked well within a herd to determine top sires and dams. But problems arose when someone tried to compare actual weights or ratios across herds because of differences in environment, nutrition and climate came into play. And thus, the modern

The basis of sound breeding

Historically members of the ag community are some of the most trustworthy, honest workers. It's not that rural values have changed that much over the years. But today many claims about worthy seedstock are backed up with a reliable tool. As breeders have produced top Hereford genetics, the tools available for genetic evaluation have become more accurate in determining which genetic traits are superior through the evaluation of expected progeny differences (EPDs) and indexes.

"I can remember as a junior Hereford member 20 years ago trying to pick out an AI (artificial insemination) sire for my junior show heifer. The only data you really had to go by in the magazines were the average weights that sometimes were presented," recalls Dan Moser, the American Hereford Association's genetic advisor and associate professor at Kansas State University. "The ratios were presented and then just some commentary about each bull. Of course, the commentary was always favorable; every bull was a great choice for heifers. You didn't really have an objective measure."

With EPDs, "we are much more likely to get what we want," Moser says. "Producers can set whatever goals that they want, and with an EPD system, they'll likely get it. So if you want more milk, you'll get more milk. If you want more growth, you'll get more growth. If you want more calving ease, you'll get it. The EPDs allow you to accurately know which bulls will get you what you want, and which won't."

The following list describes each EPD and the \$Profit Indexes available to Hereford breeders and their customers:

- **Calving ease (CE)** — The CE EPD indicates the influence of a sire on calving ease in 2-year-old females. CE is based on birth weight and calving ease scores. The higher the number the more favorable calving ease.
- **Birth weight (BW)** — The BW EPD predicts the difference in average birth weight of an animal's calves compared to calves of all other animals evaluated. BW is reported in pounds, and a lower BW EPD usually indicates less calving difficulty.
- **Weaning weight (WW)** — The WW EPD reflects pre-weaning growth. WW EPD predicts the difference in average 205-day adjusted weight of an animal's calves compared to calves of all other animals evaluated. WW is reported in pounds.
- **Yearling weight (YW)** — The YW EPD reflects the differences in 365-day adjusted weights of progeny. YW is reported in pounds.
- **Maternal milk (MM)** — The MM EPD reflects the milking ability of a bull's daughters. The MM EPD predicts the difference (due to milking ability) in average 205-day weight of a bull's daughters' calves compared to the calves from daughters of all other bulls evaluated. MM is reported in pounds.

expected progeny difference (EPD) system was developed.

“An EPD at the core is the difference in performance that you expect from the progeny of one animal compared to either the progeny of another animal or to a breed average,” Moser says. An EPD eliminates the environmental and management factors that vary from operation to operation across the country.

The future of a potential sire or dam is at stake. Will it be the next great one? Will this animal’s genetics be worthy of carrying throughout the Hereford breed? Many factors will determine this outcome, especially time. The animal’s EPDs offer many clues.

But the absolute value by itself, he warns, doesn’t really tell you anything about the animal. It’s all about comparisons. For example, if you compare Sire A’s weaning weight EPD of 60 and Sire B’s weaning weight EPD of 40, you can expect there to be a 20 lb. difference or advantage to the calves born to Sire A if they are born to similar cows raised in similar environments.

The AHA’s genetic evaluation currently consists of 11 traits and four \$Profit Indexes. For a description of each, see the sidebar “The basis of sound breeding.” These EPDs and indexes are derived from the performance data that breeders submit on their cattle.

Taking into account

Understanding the accuracy value, which is always included with an EPD, is very important. An EPD is calculated based on production information submitted on a bull’s or female’s ancestors, his or her own production, and the production of progeny. The accuracy increases as each generation’s information is added, and it’s expressed in the range from 0-1. A breeder should be more confident in an EPD accompanying accuracy value of .80 than one with an EPD accuracy of .10.

“We have a newborn calf, and before we weigh that calf, we have some idea of what his birth EPD



ought to be. It’s the average of the sire and the dam,” Moser says. “That’s not a perfect estimate, but over a large group, that’s actually a fairly accurate estimate. As more data accumulates on that calf, the accuracy goes up.”

While a value closer to 1 means more information has been submitted on the production of the animal or its progeny, Moser says even EPDs with “low accuracies” are still useful in genetic selection.

“I’ve heard commercial and seedstock producers say, ‘That EPD’s accuracy is so low, it does me no good,’” Moser says. “And nothing could be further from the truth. It’s not as good as if that bull had 500 progeny measured — no doubt about it. But that EPD is still better than anything else you could use.”

Another error Moser says he sees producers make is bypassing the low birth weight EPD bull because of a low accuracy

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- **Milk and growth (M&G)** — The M&G EPD reflects both the milking ability of a bull’s daughters and the growth potential of their calves. M&G is reported in pounds.
- **Maternal calving ease (MCE)** — The MCE EPD indicates how easily a sire’s daughter will calve at 2 years. Higher values indicate more unassisted births.
- **Scrotal circumference (SC)** — The SC EPD is the best estimate of fertility. It is related to a bull’s semen quantity and quality and is also associated with age at puberty of sons and daughters. Larger SC suggests younger age of puberty. SC is measured in cm and adjusted to 365 days.
- **Rib fat (Fat)** — The Fat EPD reflects differences in adjusted 365-day, 12-rib fat thickness. A lower fat EPD would indicate leaner cattle. Fat is reported in inches.
- **Ribeye area (REA)** — The REA EPD measures the amount of muscle in a carcass. The EPD reflects the difference in adjusted 365-day ribeye area measurements. The higher number indicates more REA. REA is measured in square inches.
- **Intramuscular fat (IMF)** — The IMF EPD predicts the percentage of intramuscular fat in the ribeye, which is directly related to U.S. Department of Agriculture (USDA) marbling scores. This is adjusted to 365 days. A higher IMF indicates more intramuscular fat and, therefore, a higher marbling score.
- **Baldy Maternal Index (BMI\$)** — This is an index to maximize profit for commercial cow-calf producers who use Hereford bulls in rotational crossbreeding programs on Angus-based cows and heifers. Retained ownership of calves through the feedlot phase of production is assumed with fed cattle marketed on a Certified Hereford Beef (CHB) LLC pricing grid.
- **Brahman Influence Index (BII\$)** — This index is similar to BMI\$ — with one difference — Hereford bulls are used in rotational crossing with Brahman rather than Angus. This index places greater emphasis on traits deficient in Brahman-cross cattle, such as fertility and age at puberty, and less on traits that are more acceptable in those cattle, such as growth and calving ease.
- **Certified Hereford Beef Index (CHB\$)** — This is a terminal sire index, where Hereford bulls are mated to British-cross cows and all offspring are sold as fed cattle on a CHB LLC pricing grid.
- **Calving EZ Index (CEZ\$)** — This index is similar to BMI\$ except that Hereford bulls are mated only to yearling heifers. This index has increased emphasis on direct and maternal calving ease compared with the other indexes. **HW**

associated with it and, instead, to select the low actual birth weight bull.

“What they don’t understand is that actual birth weight is already in the EPD calculation. They are using less information if they use the actual weight. They are throwing away some good information on the pedigree of the calf,” he adds.

Moser says he could calculate an accuracy for the actual weight, and it’s always going to be lower than the accuracy of the birth weight EPD.

“A low accuracy EPD is always better than anything else you could get on that animal at that time,” he says. “When they say that this EPD’s accuracy is low, I’d say compared to what? It is high compared to anything else you can get on this calf. It’s just not as high as an older, highly proven animal.

“Human nature is to hedge and say I want a birth weight EPD of 4 or below, but I am also going to want an actual weight at a certain level or below,” Moser says. “If you do that, then you’ve made a mistake.”

The birth weight EPD reflects the calf’s actual weight, but it is also adjusted for things like age of dam. A calf born to a heifer might be 8 lb. lighter than a calf born to that same female as a mature cow simply because as a heifer, she grew her calf in a smaller uterus

and pelvic area and she was still growing herself.

Another factor known to affect birth weight and the other production traits is the environment.

“We know that the same calf born in the northern U.S. might be 10-20 lb. heavier than the same exact calf born in the southern U.S.,” Moser points out. “If you put a screen on actual birth weight, you are going to select maybe more calves born in the south than calves born in the north, but genetically they are exactly the same, and what they will do in your herd is exactly the same. Those are environmental things that they don’t pass on to their progeny.

“The EPD equation figures how much of the emphasis should be placed on the calf’s own weight, how much on the pedigree information, and then once he gets progeny, how much we put on that. If you try to outthink it, you’ll make a mistake. You should use the EPDs. You should ignore the actual weights.”

Proper selection

EPDs aid sire selection in many different ways. Producers have the opportunity to select combinations of traits that they think best fit their needs, but there are some wrong ways to approach the challenge.

Moser says some producers ask him, “What EPD will get me a 650-lb. calf at weaning?” That’s a question that EPDs alone cannot answer because the actual weaning

weight of a calf depends on more than just genetics, Moser says. What’s your supplementation program for your cows? Do you put out creep feed or not? Do you calve in the spring or fall? In what part of the U.S. are you located? What’s the stocking rate of your pastures? All of these factors come into play and influence weaning weight.

EPDs also don’t predict variability. Moser says he talks to producers who are convinced that one bull is more predictable and has more uniform calves than another.

If you listen at the coffee shop, you’ll hear one producer testify that a bull he used on his cows returned 15 calves that are all peas in a pod. Another bull he used produced 15 calves that are all over the range, both big and small.

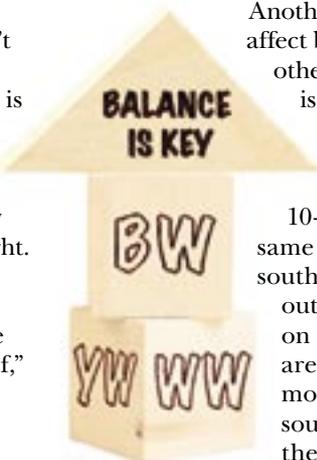
“In reality, if you went to a different coffee shop somebody else will have used those same two bulls and had just the opposite result,” Moser says, pointing out over time the offspring average out. “There’s really no way to make an animal produce more consistent offspring except inbreeding, which could create other issues.”

Another concern producers have asked Moser about is the selection of low birth weight EPDs, which indirectly reduce pelvic area creating smaller cows that are harder to calve.

“If they look at direct calving ease plus maternal calving ease, that’s not a worry,” he says. “A high direct calving ease number says the calves will be small and easily born. If you have a favorable high maternal calving ease number, that means the cows will have relatively large pelvic areas, and they themselves will calve relatively easy. The calving system covers both the direct side as well as the maternal side.”

Service to the customer

Glenn Oleen and his brother, Chuck, began their partnership in Oleen Cattle Co. near Falun, Kan., in 1977. Before that time, their father and granddad raised purebred Herefords on the same ranch since 1936. The Oleen family’s long history in the breed has allowed the brothers to use



Benchmarking your performance

Genetic evaluation allows a breeder to compare his or her herd’s genetics to other herds. Breed average is an important benchmark for breeders to compare their programs.

“I don’t think anybody sets out to be average,” says Dan Moser, the American Hereford Association’s genetic advisor and associate professor at Kansas State University. “Everybody wants to be better than average for the traits that they think are most important and that their customers think are most important. It does give you a benchmark of where you stand.”

The current active sire benchmarks for each trait are:

CE	-0.2	YW	68	MCE	0.5	REA	0.14	CEZ\$	13.99
BW	3.7	MM	16	SC	0.6	IMF	0.00	BI1\$	14.11
WW	41	M&G	36	FAT	0.003	BMI\$	14.90	CHB\$	17.38

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genetic evaluation to improve their herd.

Glenn says they have been keeping performance records since before EPDs became a widely used tool. He knows what parameters benefit his herd and the commercial customers he serves, so he enters his criteria on the Internet-based sire sort provided by the AHA.

“I run sire sorts. I have even since before the Internet when they still had their big mainframe computer, and you had to send into Kansas City some parameters, some minimums and maximums,” Glenn says.

The Oleens are looking for proven sires and select based on specific ranges for birth weight, yearling weight, milk, scrotal circumference, ribeye area and marbling.

“I don’t like real tiny calves. I don’t like to crimp birth weight too small because I think you will crimp performance, and you will probably downsize pelvic area. There are a lot of traits that kind of go hand in hand,” Glenn says. “We’re trying to stay middle ground on birth weight. It’s a battle to pick cattle that please your eye and grow like you want and still hold birth weight down.”

The Oleen ranch can carry about 200 pairs through the summer. While they are located only 10 miles from the rich Smoky Hill River bottoms, their land is mainly pasture and continuous dryland wheat.

Maternal traits, including good milk and udders, are extremely important to their program because they also market heifers and young pairs each year, including some black baldies from their commercial herd.

Glenn selects a maximum for birth weight of 4.5 and selects yearling weight at a minimum of breed average. He looks for accuracy on the milk EPD of about .40 or .50, figuring that this number is generated by about 10 or more daughters in production with data recorded.

His sort criteria aren’t necessarily the average of what he selects for use in his herd. It’s used

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— Dan Moser

more as a guide to direct him to bloodlines he may choose. The average of the bulls he sold this year was 2.8 for birth weight, 23 for milk and 74 for yearling.

“I usually don’t put maximums or minimums on rib fat, but the last several years, I’ve put ribeye and marbling at just plain 0 for both of them with an accuracy of at least .40,” Glenn says. “What that does is mean somebody has to scan 10 or 20 head at least out of that sire.”

Glenn knows his search for high-accuracy sires means his list of potential sires doesn’t change much.

“It’s just one tool,” he says of EPDs. “The pedigree is important, and I think the actual performance of the cattle within their contemporary group is somewhat important.”

Environment demands respect

Joe Van Newkirk’s family has been using Hereford genetics in the North Platte Valley of the Nebraska Sandhills since the 1890s. Hereford bulls were bred to Longhorn cows when Van Newkirk’s granddad started the operation. The family business went to only purebred Herefords in 1944.

This rugged country requires livestock to travel and tolerate rough winters. A pair is stocked per 16 acres in the dry climate. Soundness and fleshing ability, Van Newkirk says, are vital for winter survival.

“EPDs are a tool for us rather than the *Bible*,” he says. “There’s no measure for soundness, structural correctness or fleshing ability.”

Using EPDs as a tool, Van Newkirk has been able to breed calves that are born lighter but are still able to grow. Keeping birth

weight in check, he says, is a top requirement of his bull buyers. Ninety-nine percent of the 80-100 bulls they market each year are sold to commercial producers.

Higher accuracy EPDs are also taken into consideration when selecting matings. Their goal has been to increase milk during the last 15-20 years, which Van Newkirk says they have accomplished. His herd averages about 20 for milk, a number with which he says he’s comfortable.

“If you use proven sires or genetics, you’re going to avoid genetics that doesn’t have maternal milking abilities,” Van Newkirk says. “To make genetic improvement you need to use EPDs. But I still have to qualify every animal as far as soundness of these cows. We are in a harsh climate so they need hair coat, pigment and darker udders. There are a lot of qualities we try to balance.”

Balance is key, and genetic evaluation has allowed seedstock producers to make genetic progress. EPDs will continue to receive more and more emphasis; something Moser says can be attributed to the demand from commercial producers who are making them the base of their buying decisions.

“A Hereford breeder works hard to earn a bull customer, so they want to make sure that they are meeting their needs and providing them the best bull they can,” Moser says. “That’s really the whole goal of genetic evaluation program: To help seedstock breeders identify genetics for their programs and use those values in merchandising so commercial producers find the herd bulls that best meet the needs of their operations.” **HW**