

Genetic Selection Skills Need Sharpening?

A nuts-and-bolts review of available tools may help.

by

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Statistics are only as good as the understanding of the person using them. And for seedstock or commercial producers working with expected progeny differences (EPDs) and dollar value indexes (\$Values), being reminded once in awhile about what all the numbers mean and how they can be used in the Angus genetic selection process doesn't hurt.

"The production scenario is the framework for evaluating the importance of various selection tools in a producer's

breeding program. The old adage, 'you must know where you are in order to know which direction to move,' speaks a great deal to producers having planned breeding system objectives," says Sally Northcutt, American Angus Association genetic research director. "Every producer needs to align their planned breeding program with the direction they want their future calf crops to move genetically. Then, EPDs (expected progeny differences) and selection indexes can be used as tools to reach those production goals."

Northcutt advises producers to start by

reviewing individual production scenarios, including cow herd needs, existing bull batteries, environmental factors and feed resources. Once accomplished, producers can better prioritize which selection tools to use.

For example, for producers mating bulls to first-calf heifers, calving ease EPDs become a high priority. "This would be the economically relevant trait beyond just reviewing the classic birth weight EPDs," Northcutt says. "If cows are being bred after their first calf, then these EPDs are not typically an emphasis point."

For producers whose emphasis is the preweaning phase, where calves are sold at weaning, the weaning weight EPD can be used as a tool to target calf growth. If replacement heifers are retained, the selection strategy should include choosing the appropriate milk EPD level and mature size. The optimal milk module found at www.angus.org/tools/optmilk/index.html can help.

"Some producers are interested in retained ownership and carcass merit," she adds. "For these cases, postweaning gain — as reflected in yearling weight EPD

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Fig. 1: Example of the EPD and \$Value statistics published on individual sires in the American Angus Association Sire Evaluation Report

Each bull listed in the report is comparable to every other bull in the database. The analysis takes into account only the differences expressed in each herd in which the bulls were used. For example, if Bull A has a weaning weight (WW) EPD of +30, Bull B has a WW EPD of +20 and you ran-

domly mated these bulls in your herd, you could expect Bull A's calves to weigh, on average, 10 lb. more at weaning than Bull B's progeny (30 - 20 = 10).

SIRE STATISTICS	EXPECTED PROGENY DIFFERENCES AND \$VALUES																					
	PRODUCTION					MATERNAL					CARCASS					SVALUES						
	CEM ACC	BW ACC	WW ACC	YW ACC	YH ACC	SC ACC	CEM ACC	Milk ACC	MKH MKD	MW ACC	MH ACC	SEN	CW ACC	Marb ACC	RE ACC	Fat ACC	CGrp CProg	UGrp UProg	\$W	\$F \$G	\$Q \$G	\$B
A A R NEW TREND #9958634 04-05-81 SIRE: V D A R SHOSHONE 548	+3 .88	+5.8 .97	+32 .96	+59 .95	+5 .89	+1.94 .88	+6 .91	+27 .95	1314 3466	+23 .89	+2 .89	+4.12	+5 .82	+18 .84	+19 .82	+0.05 .82	19 197	303 515	+16.18	+6.56 +19.59	+12.90 +6.69	+30.13

Source: American Angus Association Spring 2009 Sire Evaluation Report, "How to Read the Report," page 2.

Fig. 2: Spring 2009 breed average EPD and \$Values

	Production					Maternal					Carcass				\$Values				
	CEM	BW	WW	YW	YH	SC	CEM	Milk	MW	MH	SEN	CW	Marb	RE	Fat	\$W	\$F	\$G	\$B
Current Sires ¹	+5	+2.2	+42	+78	+3	+34	+6	+20	+32	+5	+4.49	+10	+26	+10	+0.08	+23.53	+21.14	+19.40	+36.16
Main Sires	+5	+2.1	+45	+83	+3	+37	+6	+20	+33	+5	+3.36	+10	+26	+11	+0.08	+24.61	+25.00	+18.97	+36.39
Supplemental Sires	+6	+2.0	+47	+86	+3	+48	+7	+22			+3.38	+13	+30	+15	+0.14	+25.08	+26.78	+20.05	+40.30
Current Dams ¹	+4	+2.4	+38	+69	+3	+22	+6	+18	+32	+5	+8.68	+6	+21	+0.4	+0.05	+22.03	+14.32	+17.58	+30.40
Non-Parent Bulls	+5	+2.2	+44	+80	+3	+38	+6	+21			+2.89	+10	+30	+1.4	+0.11	+24.30	+23.00	+20.86	+38.70
Non-Parent Cows	+5	+2.2	+43	+80	+3		+6	+20			+3.21	+11	+32	+1.5	+0.11	+24.19	+22.50	+21.16	+39.02

¹At least one calf recorded in herd book within the past two years.

Source: American Angus Association Spring 2009 Sire Evaluation Report, "Spring 2009 Breed Average EPD and \$Values," page 8.

EPD primer

Expected progeny difference (EPD) is the prediction of how future progeny of an animal are expected to perform relative to progeny of other animals in the American Angus Association database. EPDs are expressed in units of measure for the trait, such as pounds, plus or minus. Interim EPDs, signified with an "I," are used for young animals before their performance is incorporated into National Cattle Evaluation (NCE) procedures.

Accuracy (ACC) is the reliability placed on an EPD. ACC is affected by the number of progeny and ancestral records. An ACC close to 1.0 signifies higher reliability.

EPDs are defined below in three categories: production, maternal and carcass traits.

Production EPDs

Calving ease direct (CED) is expressed as a difference in percentage of unassisted births. CED predicts the average difference in ease with which a sire's calves will be born when he is bred to first-calf heifers. A higher value indicates greater calving ease.

Birth weight (BW), expressed in pounds, is a predictor of a sire's ability to transmit birth weight to his progeny compared to that of other sires.

Weaning weight (WW), expressed in pounds, is a predictor of a sire's ability to transmit weaning growth to his progeny compared to that of other sires.

Yearling weight (YW), expressed in pounds, is a predictor of a sire's ability to transmit yearling growth to his progeny compared to that of other sires.

Yearling height (YH), expressed in inches, is a predictor of a sire's ability to transmit yearling height compared to that of other sires.

Scrotal circumference (SC), expressed in centimeters, is a predictor of the difference in transmitting ability for scrotal size compared to that of other sires.

Maternal EPDs

Calving ease maternal (CEM) is expressed as a difference in percentage of unassisted births and the average ease with which a sire's daughters will calve as first-calf heifers when compared to other sire's daughters. A higher value indicates greater calving ease.

Maternal milk (Milk) is a predictor of a sire's genetic merit for milk and mothering ability as expressed in daughters compared to daughters of other sires. Milk is that part of a calf's weaning weight attributed to milk and mothering ability.

Herds (MkH) indicate the number of herds from which daughters are reported.

Daughters (MkD) reflect the number of daughters that have progeny weaning weight records included in the analysis.

Mature weight (MW), expressed in pounds, is a predictor of the difference in mature weight of daughters of a sire compared to daughters of other sires.

Mature height (MH), expressed in inches, is a predictor of the difference in mature height of a sire's daughters compared to daughters of other sires.

Carcass trait EPDs

Carcass weight (CW), expressed in pounds, is a predictor of the differences in hot carcass weight of a sire's progeny compared to progeny of other sires.

Marbling (Marb) is expressed as a fraction of the difference in USDA's marbling score of a sire's progeny compared to progeny of other sires.

Ribeye area (RE), expressed in square inches, is a predictor of the difference in ribeye area of a sire's progeny compared to progeny of other sires.

Fat thickness (Fat), expressed in inches, is a predictor of the differences in external fat thickness at the 12th rib of a sire's progeny compared to progeny of other sires.

Group/progeny (Carc Grp/Pg and Usnd Grp/Pg) reflect the number of contemporary groups and the number of carcass and ultrasound progeny included in the analysis.

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and carcass trait EPDs — becomes more important. It's always good to remember that very rarely is an effective breeding program based solely on single-trait selection. Chasing just the marbling EPD will not be the perfect solution. Instead, a balanced approach with consideration for interrelated traits that affect successful retained ownership and carcass merit should be a priority."

\$Values

Northcutt notes that \$Values are designed more with commercial bull buyers in mind, and can be used in conjunction with EPD data.

"The purpose of the \$Values is to simplify EPDs into business-minded values reported in dollars and cents," she explains. "As a tool, producers can emphasize more maternal traits by using weaned calf value

(\$W) as a maternal influence selection index. In contrast, if a commercial producer is focused on selecting terminal-trait sires, where all calves go to market for postweaning and carcass value, beef value (\$B) can be a selection tool of interest."

Northcutt says the Angus industry continues to evaluate other selection tools and indexes that might bring additional value to the planned breeding system process.

"New EPDs under consideration are reported as research, such as heifer pregnancy and docility. Genetic tools for cattle intake and efficiency are also on the horizon," she says. "Another stepping-stone within our reach is enhanced, or marker-assisted, EPDs that seamlessly incorporate DNA marker test results into genetic evaluation procedures."



Expert team

Every producer should have a team of experts to call upon in deriving and implementing breeding and production programs, advises Sally Northcutt, American Angus Association genetic research director. For more information, she recommends the following sources:

- American Angus Association web site, www.angus.org
- Seedstock supplier
- Extension service
- Veterinarians
- Personnel within your operation's integrated resource management team

\$Value Primer

Dollar value indexes (\$Values) are multi-trait selection indexes expressed in dollars per head that can simplify genetic selection decisions. The \$Value is an estimate of how a sire's future progeny will perform, on average, compared to progeny of other sires if the sires were randomly mated to cows, and calves were exposed to the same environment.

Weaned calf value (\$W) is an index value expressed in dollars per head, and is the expected average difference in future progeny performance for preweaning merit. \$W includes both revenue and cost adjustments associated with differences in birth weight, weaning direct growth, maternal milk and mature cow size.

Feedlot value (\$F), expressed in dollars per head, is the expected average difference in future progeny performance for postweaning merit compared to progeny of other sires.

Grid value (\$G), expressed in dollars per head, is the expected average difference in future progeny performance for carcass grid merit compared to others.

Quality grade (\$QG) represents

the quality grade segment of the economic advantage found in \$G. \$QG is intended for specialized users wanting to place more emphasis on improving quality grade. The carcass marbling (Marb) EPD contributes to \$QG.

Yield grade (\$YG) represents the yield grade segment of the economic advantage found in \$G. \$YG is intended for specialized users wanting more emphasis on red meat yield. \$YG encompasses ribeye, fat thickness and weight in an economic value for yield.

Beef value (\$B), in dollars per head, is the expected average difference in future progeny performance for postweaning and carcass value compared to progeny of other sires.

Cow energy value (\$EN), in dollar savings per cow per year, assesses differences in cow energy requirements as an expected dollar savings difference in daughters of sires. A larger value is more favorable. Components for computing \$EN savings include lactation energy requirements and energy costs associated with differences in mature cow size.