

HOW TO UNDERSTAND AND USE SIRE SUMMARIES

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Sire summaries are produced and published twice a year by breed associations to provide up to date genetic evaluations on progeny of proven sires within their breeds. The sire summary formats may vary between breeds. However, they all are designed to use unbiased prediction procedures to produce expected progeny differences (EPDs) for all cattle in their breed that have legitimate performance records or progeny with legitimate performance records. An EPD is always the best estimate of an animal's genetic worth given the data for analysis. EPDs provide a genetic description of an animal for the traits included in the analysis.

Expected Progeny Differences (EPDs) provide a tool for genetic comparisons of cattle that can be used by both purebred and commercial producers. EPDs are expressions of the relative genetic merit of beef cattle for various traits. EPDs are used to compare the predicted progeny performance between two animals (bulls or females) within a breed, regardless of herd location or age. They cannot be used to compare two animals of different breeds.

EPDs are expressed in the actual units of measure for a given trait. EPDs for traits such as birth weight (BW), weaning weight (WW) and yearling weight (YW) are expressed in pounds. Since EPDs are used to compare two bulls (or females) within a breed, the difference in the EPDs for those animals compared would be the predicted differences in the average performance of those two animals progeny. For example, consider the EPDs for the bulls in Table 1.

Table 1. Birth Weight, Weaning Weight and Yearling Weight EPDs for two bulls.

EPD, lb.			
Bull	BW	WW	YW
A	+5	+22	+40
B	-1	+7	+30
Difference	6	15	10

These EPDs do not mean that bull A would increase a herd's birth weights by 5 pounds and add 22 pounds to the calves at weaning and 40 pounds to the calves as yearlings. They simply allow us to predict the difference between the average weights of the two bull's calves if they were mated to the same group of cows. When compared to bull B, we can expect calves from bull A to average 6 pounds more at birth, 15 pounds heavier at weaning and 10 pounds heavier as yearlings.

In addition to the numerical EPD (can be positive or negative), an accuracy value (0.00 to 1.00) for that EPD will also be calculated during the breeds genetic evaluation analysis. Accuracy (ACC) is a measure of confidence that the EPD reflects the true genetic merit of an animal. EPDs for an animal are calculated from its individual performance, performance of ancestors and siblings and progeny

performance. As the amount of information that goes into the calculation of an EPD increases, the accuracy of that EPD increases. EPDs with low levels of accuracy (.07 to .30) are likely calculated with no progeny information included and are thus more susceptible to change during the next evaluation when more data are included in the analysis. EPDs with high levels of accuracy (.80 to .99) already have included a large number of progeny and are less subject to dramatic changes.

CONTEMPORARY GROUPS

Proper contemporary grouping is the cornerstone of accurate genetic evaluation. A contemporary group is simply a group of cattle of the same sex raised in the same environment and weighed under the same conditions. When comparing the actual performance of cattle, it is important to only compare cattle from the same contemporary group. To compare across contemporary groups, more sophisticated evaluation procedures are required. Breed evaluation programs accomplish this by evaluating a large number of contemporary groups that have more than one sire represented and then crosslinking these groups by common sires. The increased use of artificial insemination has improved the ability to crosslink these various contemporary groups and has had a significant impact on improving the accuracy of genetic evaluations. It is important for producers to correctly form and identify contemporary groups in their within-herd performance programs to ensure accurate across-herd comparisons. The following guidelines should be utilized when forming contemporary groups: (1) animals of the same sex; (2) animals of similar age (not more than 90 day spread in birth dates); and (3) animals managed together and given equal opportunity to perform (same pasture time, same feed regime, same weigh dates, etc.).

TRAIT LISTINGS and DEFINITIONS

The main part of a sire summary is the listing of sires with their EPDs and accuracies. Since some breeds analyze different traits and present their EPDs in a different format, a sample listing of EPDs along with their explanations is usually presented at the beginning of the sire summary.

All cattle in the data set are analyzed and receive EPDs. However, it is common practice for breed associations to publish only current or active sires with minimum levels of accuracy in the sire summary. In addition to this "main" listing, many breeds also publish a supplemental listing of young sires that do not meet the accuracy requirements.

Bulls are listed in alphabetical order by registration name in most summaries. Included in the listing will be the birth date of the bull along with his sire and owner. A listing at the end of this paper presents the traits and their definition of a number of traits analyzed by various breed associations.

WHY EPDs CHANGE

It is important to realize that an EPD is a prediction of an animal's genetic transmitting ability for a specific trait. With any prediction there is a margin of error, or possible change, associated with an EPD. When the accuracy is low, the margin of error is high. As more information becomes available (progeny data), the margin of error becomes smaller. Many breed associations publish a table of possible change values for their breed in the front of their sire summaries similar to the example from the Angus sire summary shown in Table 2.

Table 2. Accuracy and Possible Change in Values (+ or -) for Angus EPDs

Accuracy	BW EPD	WW EPD	YRL EPD	MLK EPD
.10	2.55	11.9	15.0	10.6
.20	2.45	11.3	15.2	10.1
.30	2.35	10.7	14.5	9.5
.50	2.00	9.4	12.7	8.4
.90	1.20	5.3	7.3	4.9
(Spring, 1997 Angus Sire Summary)				

What this table tells us is that 67 percent of the sires are expected to have average actual progeny differences that fall within the range of the EPD plus or minus the possible change value and 95 percent are expected to be within the range of the EPD plus or minus twice the possible change value. For example, if an Angus bull has a weaning weight EPD estimate of + 30 pounds with an accuracy value of .50, we are 67 percent certain that his actual EPD is between 20.6 (30 -9.4) and 39.4 (30 + 9.4). One should not be surprised if in the next sire evaluation analysis, this bull's weaning EPD is as high as 39 or as low as 21. If he was +30 for weaning weight with a .90 accuracy, then we would be 67 percent certain that his actual EPD for weaning is between 24.7 (30 - 5.3) and 35.3 (30 + 5.3).

The possible change tables provide an excellent risk management tool. While you can never guarantee a certain minimum or maximum EPD for a given trait, you can reduce the risk that the EPD will shift outside of your acceptable range. For example if you were evaluating Angus bulls with .50 accuracy and wanted to be 95 percent certain that the milk EPD would not fall below 0.0, you would need to use bulls with a minimum milk EPD of + 16.8 (twice the possible change of 8.4).

GENETIC TREND

As the breeders within a breed emphasize various traits in order to build upon their breed's strengths or overcome a perceived weakness, a breed direction or genetic trend is established. Many breed associations show their genetic trend in the front of the sire summary by either giving the average EPDs by birth year or plotting these averages in a graph. EPDs are computed relative to a reference point or genetic base. Different breed associations use different years as their base point. The choice of the base is an arbitrary decision. However, the base point does affect the magnitude and sign of the EPD.

The genetic trends for various traits are obtained by computing the average EPD by year of birth. The genetic trend for the Simmental breed since 1981 is shown in Table 3. The genetic base for Simmental has been set so the average EPD for purebred Simmentals born in 1986 will equal to zero for each trait.

Table 3. Average EPDs for Purebred Simmental by Birth Year

Year	Calving Ease	BW	WW	YW	MLK
1981	-1.1	-0.5	-4.5	-7.3	0.0
1985	-0.2	-0.1	-0.9	-1.4	0.0
1986	0.0	0.0	0.0	0.0	0.0
1987	0.3	0.1	0.9	1.5	-0.1
1990	0.9	0.4	4.2	7.1	-0.3
1992	1.5	0.5	6.8	11.3	0.0
1994	2.2	0.5	8.6	14.3	0.3
1995	2.6	0.5	9.6	15.9	0.3
1996	3.2	0.3	10.8	18.1	0.2

(Simmental Spring 1997 Sire Summary)

BREED AVERAGE EPDs

Most breed associations publish the average EPDs of the sires of their breed at the front of their sire summary. It is important to realize that 0.0 EPD does not mean breed average. Differences in genetic trend and differences in the base point for calculating the EPDs have moved the average EPD for some traits in some breeds well away from zero.

For producers who are evaluating cattle in more than one breed, it is imperative to realize that the **EPDs are not comparable across breeds**. A high breed average EPD for a trait does not indicate breed superiority for that trait. It is more a reflection of the genetic trend and the base point of calculation for that breed.

In addition to the sire averages, several breed associations also publish the breed average EPDs for the last calf crop year or the nonparent cattle. This will allow a producer that is looking only at young, nonparent cattle to more readily determine how they compare to cattle of similar age. For instance, if a young Limousin bull with a milk EPD of 1.0 is compared to all Limousin sires (Average milk EPD = 1.0), he would appear to be breed average for milk. However, when the same bull is compared to the other nonparent Limousin cattle (average EPD = 3.4), he is somewhat below the average EPD of other bulls of his age that might be available.

PERCENTILE RANK AND DISTRIBUTION

Another tool that several breed associations include in their sire summary for producers to utilize in evaluating potential sires are tables (or graphs) of EPD distribution or percentile rank. These tables allow a producer to quickly evaluate where a bull ranks within the breed for a given trait (top 1 percent, top 25 percent, top 50 percent, etc.). The percentile rank table is also an excellent tool for use in multiple trait selection. For example, if a producer wants to place heavy emphasis on birth

weight and milk production while maintaining at least breed average growth, they could use the table to identify the EPDs necessary to rank in the top 5 percent of the breed for birth weight EPD and milk EPD and the top 50 percent of the breed for weaning and yearling EPDs.

The following table 4 is an abbreviated percentile breakdown for the Hereford Spring 1997 sire summary. It displays the percentile rankings for birth weight, weaning weight, yearling weight, milk and scrotal circumference EPDs. It also lists the averages and the highs and lows for those trait EPDs.

Table 4. Averages and Percentile Breakdown - 1995-96 Hereford Calves

Percentile Upper	BW	WW	YW	MLK	SC
1 %	-1.6	49	81	27	1.1
5 %	0.0	42	71	22	0.8
10 %	0.8	39	66	20	0.7
25 %	2.1	34	57	15	0.5
35 %	2.7	31	53	13	0.4
40 %	3.0	30	51	12	0.4
50 %	3.5	28	47	10	0.3
60 %	4.0	25	44	8	0.2
65 %	4.3	24	42	7	0.2
75 %	5.0	22	38	5	0.1
80 %	5.3	20	35	3	0.1
90 %	6.4	16	29	0	0.0
95 %	7.3	13	23	-3	-0.1
AVGS.	3.6	28	47	10	0.3
LOW	-6.4	-24	-24	-37	-1.3
HIGH	14.7	74	74	43	2.2
(American Hereford Assoc. - Spring 1997 Sire Summary)					

Sire summaries provide accurate and reliable information on which to base selection. These summaries provide producers an excellent tool for comparing the estimated genetic merit of progeny proven bulls and thus serve as an excellent aid in selecting AI sires. The sire summaries also provide valuable information for identifying genetic lines of cattle for producers that use natural service sires.

Both purebred and commercial producers can use the EPD listings and supporting statistical information to reduce the risk associated with sire selection decisions. Sire summaries can be obtained from each breed's national breed association office (Table 5). Sire summaries are, in a sense, similar to a parts catalog where goal oriented producers can go to find the cattle or lines of cattle with the genetic parts, or pieces, necessary to help them attain their goals.

Table 5. Breed Association Offices to Contact for Sire Summaries.

American Shorthorn Assn. 8288 Hascall St. Omaha, NE 68124	American Simmental Assn. 1 Simmental Way Bozeman, MT 59715
American Tarentaise Assn. P.O. Box 34705 Kansas City, MO 64116-1105	Beefmaster Breeders Universal 6800 Park Ten Blvd #290 W San Antonio, TX 78213-4211
Int'l Brangus Breeders Assn. P.O. Box 696020 San Antonio, TX 78269	North American Limousin Foundation Box 4467, 7383 S. Alton Way Englewood, CO 80155
Assn. American Salers Assn. 560 South Quebec Englewood, CO 80111	Santa Gertrudis Breeders Int'l P.O. Box 1257 Kingsville, TX 78364-1257
American Angus Assn. 3201 Frederick Blvd St. Joseph, MO 64501	American Brahman Breeders Assn. 1313 LaConcha Lane Houston, TX 77054
American Chianina Assn. P.O. Box 890 Platte City, MO 64079-0890	American Gelbvieh Assn. 10900 Dover St Westminster, CO 80021
American Hereford Assn. P.O. Box 014059 Kansas City, MO 64101	American Int'l Charolais Assn. P.O. Box 20247 Kansas City, MO 64195
North Amer. South Devon Box 68 Lynnville, IA 50153	Red Angus Assn. of America 42011-35 North Denton, TX 76201
Senepol Cattle Breeders Assn. P.O. Box 88 Louisa, VA 23093	

TRAIT LISTINGS USED IN VARIOUS SIRE SUMMARIES

Birth Weight: The expected difference in average birth weight of progeny. Large values usually indicate more calving difficulty.

Calving Ease: The ease which a bull's calves are born to first-calf heifers. EPDs are reported as deviations in the percent unassisted births. Larger EPDs indicate a higher percent of unassisted births. Some breeds report this trait as a ratio (100 being average). Higher ratio values correspond to less calving difficulty.

Weaning Weight: The expected difference in preweaning growth of progeny reported in pounds. Larger values indicate heavier weaning weights of progeny.

Gestation Length: The expected difference in gestation length of progeny by a sire. Positive values indicate longer gestation lengths.

Yearling Weight: Reflects differences in adjusted 365-day weights for progeny and is the best estimate of total growth. Larger values indicate heavier 365-day weights of progeny.

Maternal Milk: Reflects the milking ability of the sire's daughters expressed in pounds of calf weaned. The EPD value predicts the difference (due to milking ability) in average 205-day weight of a bull's daughters calves.

Maternal Calving Ease: The ease which a sire's daughters calve as first-calf heifers. EPDs are reported as deviations in the percent unassisted births. Larger EPDs indicate a higher percent of unassisted births.

Scrotal Circumference: Expressed in centimeters and is a predictor of the difference in transmitting ability for scrotal size.

Mature Daughter Weight: A prediction of mature size of daughters of a sire expressed in pounds.

Mature Daughter Height: A predictor of the difference in mature height of daughters of a sire expressed in inches.

Stayability: The expected difference in probability of daughters staying in the herd to at least the age of six years. Since cows are usually only culled for being open before the age of six, the EPD is primarily a measure of sustained fertility in female offspring.

Sources:

1. American Angus Association Spring 1997 Sire Evaluation Report.
2. American Gelbvieh Association 1997 Sire Summary.
3. American Hereford Association Spring 1997 Sire Summary.
4. American Simmental Association Spring 1997 Sire Summary.
5. Beef Improvement Federation Fact Sheet FS-3. 1992.
6. National Limousin Genetic Evaluation Manual Spring 1997.
7. Red Angus Association of America 1997 Sire Summary.

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