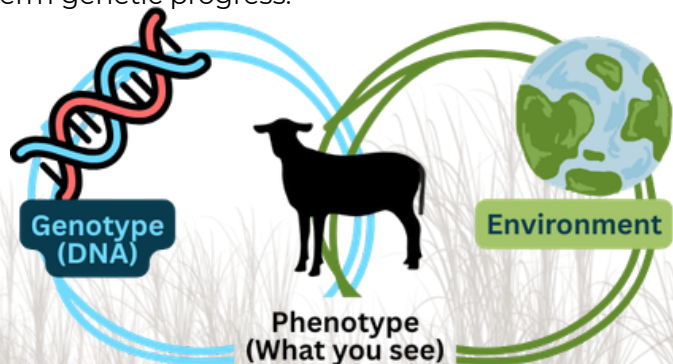


MAKING SENSE OF ESTIMATED BREEDING VALUES (EBVs): A PRACTICAL GUIDE FOR SHEEP PRODUCERS

What Are Estimated Breeding Values (EBVs)?

Estimated Breeding Values (EBVs) are predictions of an individual sheep's genetic potential to pass specific traits to its offspring. These values are available for a range of economically important traits and are designed to be used in conjunction with visual selection. When utilizing EBVs in your breeding program, you are choosing the genes, not the environment they were raised in. The appearance and performance of an animal is a combination of its genes and the environment in which it is raised (e.g. the amount and quality of feed, whether it was born a single or twin). EBVs help breeders compare animals more accurately by separating genetic merit from environmental influences such as feed, weather, or management.

EBVs help sheep producers make informed, strategic selection decisions when choosing rams or replacement ewes. By consistently selecting animals with EBVs that align with flock goals—such as improved growth, maternal ability, carcass quality, or parasite resistance—producers can make steady, long-term genetic progress.



Example EBV: Weaning Weight



Estimated Breeding Values (EBVs) predict how a sheep and its offspring are expected to perform compared with other sheep raised under the same management and environmental conditions.

For example, if a ram has a +3.0 Weaning Weight EBV, he has the genetic potential to be 3 kilograms (approximately 6.6 pounds) heavier at weaning compared to a ram with an EBV of 0. Because each parent passes on half of its genetics to its offspring, his lambs are expected to average 1.5 kilograms (approximately 3.3 pounds) heavier at weaning than the progeny of a ram with an EBV of 0.

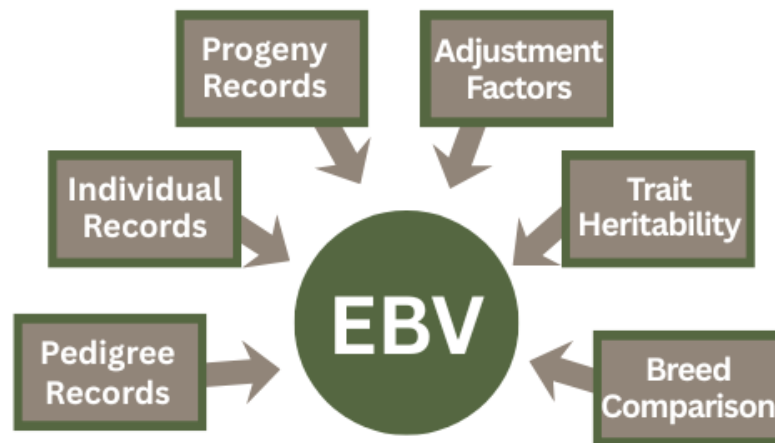
While a few pounds may seem small in an individual lamb, these differences add up across an entire flock. A 3-pound advantage in weaning weight across many lambs can significantly increase total pounds marketed, resulting in greater overall productivity and profitability over time.

What Data Are Included in an EBV?

EBVs are calculated using several sources of information, including pedigree records and performance data from the individual animal, as well as its relatives, and especially progeny. The calculation process also accounts for adjustment factors and the heritability of each trait.

EBVs are not calculated in the same way as adjusted weights. EBVs are derived using advanced statistical models that separate genetic influence from environmental effects.

Because of this approach, EBVs can help describe and predict traits that are difficult or expensive to measure directly, such as carcass characteristics and maternal performance.



What Does Accuracy Value Mean?

Accuracy is scored from 0 to 1 (0%-100%) and shows how close an EBV is to an animal's true breeding value. The more data that is available, the higher the accuracy.

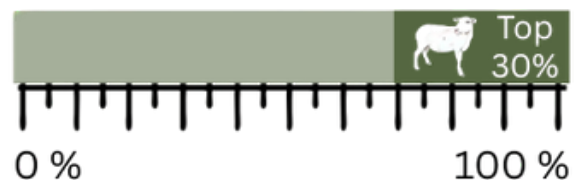
- A high accuracy means that an EBV is less likely to change as more data are available, so there is greater confidence an animal will pass those traits to its lambs. Proven sheep with high numbers of progeny and/or DNA data was gathered will have higher accuracy values.
- Low accuracy values are common for younger animals, where progeny performance data are unavailable. These EBVs have a greater likelihood of changing over time.

Accuracy values can differ for each trait for the same animals, because not all traits are measured equally. For example, growth traits usually have higher accuracy because they are measured directly on all animals. Maternal traits, however, are measured only in females and are not evaluated until later in life.

How to Interpret Percentile Rank for EBVs?

Percentile rank shows where an animal's EBV ranks compared to animals within that breed and is expressed as a percentage. A higher percentile means an animal ranks higher. For example, an animal with a percentile rank of 70% for weaning weight (WWT) means they are in the top 30% of that breed for weaning weight EBV and that their lambs are expected to wean heavier than the remaining 70% of the breed.

These rankings translate raw EBVs into an easy-to-understand scale that can quickly be used to compare animals within the breed.



What Are Selection Indexes?

Many sheep genetic evaluations provide selection indexes in addition to individual EBVs. Indexes combine important production traits into a single value and are a useful way to rank animals quickly and easily for a particular production system. They are usually designed for maternal systems (focused on reproduction and raising lambs) or terminal systems (focused on growth and meat traits).

Selection indexes help producers rank and compare sheep using the same criteria for every animal. Since indexes are specific to each breed, they should not be compared across breeds unless the evaluation includes data from multiple breeds.

Knowing which indexes match your flock's goals can help you make better breeding decisions, improve genetic progress, and increase overall flock profitability.

Overview of Common EBVs

EBV	Definition	Unit	Description
BWT	Birth Weight	Kilograms (kg.)	Estimates genetic effects on weight at birth. A positive BWT is anticipated to increase birth weight and be positively correlated with early lamb survival. A negative BWT is anticipated to reduce birth weight and lambing difficulty associated with oversized lambs.
MWWT	Maternal Weaning Weight	Kilograms (kg.)	Estimates the genetic effects of the dam on the weaning weight of her lambs. It is a measure of the ewe's mothering ability. This EBV mainly reflects genetic differences in ewe milk production, but other aspects of maternal behavior may also be involved.
WWT	Weaning Weight	Kilograms (kg.)	Provides an estimate of preweaning growth potential and will likely receive emphasis in most flocks.
PWWT	Post Weaning Weight	Kilograms (kg.)	Combines preweaning and postweaning growth to estimate genetic effects on the postweaning weight at 120 days. This EBV is expected to favor rapid growth to typical market ages.
YWT	Yearling Weight	Kilograms (kg.)	Estimates growth potential to 12 months of age. Animals with a high YWT exhibit sustained postweaning growth but are anticipated to have heavier adult body weights and greater maintenance requirements.
FAT	Fat Depth	Millimeters (mm)	Indicates genetic differences in carcass fat cover. It is derived from ultrasonic measurements of fat depth in live animals. Animals with a negative FAT are expected to produce leaner progeny.
EMD	Eye Muscle Depth	Millimeters (mm)	Is an indicator of genetic differences in muscling. It is derived from ultrasonic measurements of loin muscle depth in live animals. Animals with a positive EMD are expected to produce offspring with larger loin eyes.
WFEC	Weaning Fecal Egg Count	Percent (%)	Evaluates genetic merit for parasite resistance based on the worm egg count recorded at weaning. Animals with a low WFEC are expected to have greater parasite resistance at a younger age.
PFEC	Post Weaning Fecal Egg Count	Percent (%)	Evaluates genetic merit for parasite resistance based on the worm egg count recorded at postweaning. Animals with a low PFEC are expected to have greater parasite resistance.
NLB	Number of Lambs Born	Percent (%)	Evaluates genetic potential for prolificacy. This EBV is expressed as number of lambs born per ewe lambing. Ewes with an EBV of +0.10 are expected to have an average of 0.10 more lambs at each lambing.
NLW	Number of Lambs Weaned	Percent (%)	Is expressed as the number of lambs surviving until weaning per ewe lambing. Ewes with an EBV of +0.10 are expected to wean an average of 0.10 more lambs at each lambing.

Overview of Common EBVs

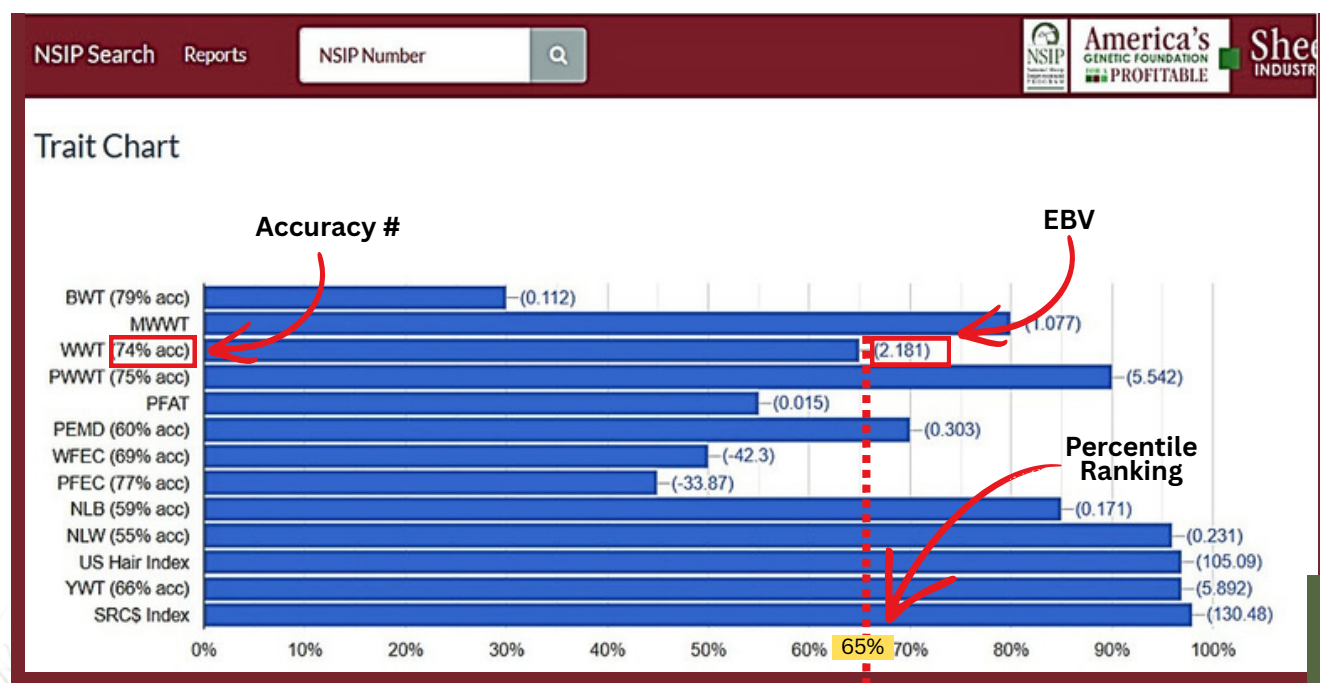
EBV	Definition	Unit	Description
SC	Scrotal Circumference	Centimeters (cm)	Can help improve breeding ability in rams and reproductive performance in ewes. Selecting for a higher SC may help ewe lambs and yearlings reach maturity sooner and may slightly increase the number of lambs older ewes produce and raise.
US Indexes			Description
Western Range Index			Combines multiple EBVs into an economic index that emphasizes early growth and ewe prolificacy, while also placing moderate emphasis on maternal ability, fleece weight, and reducing fiber diameter.
Maternal Index			Combines multiple EBVs into an index related to profitability, with a focus on the number of lambs weaned, maternal weaning weight, and weaning weight.

Putting It All Together

To find an animal's current Estimated Breeding Values, go to the NSIP search page: <http://nsipsearch.nsip.org/#!/search> and enter the animal's NSIP number. Then review the trait chart provided in the results. The chart shows both the animal's percentile ranking and the accuracy value for each trait.

In the example below, the Weaning Weight EBV (WWT) is 2.181, has an accuracy of 74, and a percentile ranking of 65. This means the animal's weaning weight genetics rank in the top 35% of the breed. As a result, its lambs are expected to wean heavier than about 70% of lambs in the breed.

An accuracy score of 74 indicates a fairly high level of confidence in this estimate. As more performance data is collected, the EBV is less likely to change significantly.



For More Information: <https://nsip.org>

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