

**Glossary of Terms:
for NSIP Members and Users of EBVs
By Kathy Bielek & Roxanne Newton**

(reviewed by Dave Notter, PhD, James Morgan, PhD, Michelle Canfield & John Stenger)

Accuracy – a numerical value (from 1 to 99) that gives an estimate of an EBV’s reliability. EBVs with high accuracy are unlikely to change significantly, while EBVs with low accuracy are more likely to change as the animal gets older and more data becomes available. Since EBVs are based on comparisons between different animals under the same management, accuracy is improved by greater numbers of offspring over multiple years and/or in different systems. Every sire should ideally have 20-25 lambs for growth EBVs, 10-15 lambs for FEC EBVs and 10 daughters used over at least two lamb crops for maternal EBVs. Using at least one ram that has been used in a previous year or season, or in a different NSIP flock will provide connections and increase accuracy, especially for small flocks. The accuracy value for each trait is provided on the Individual Listings Report received from LAMBPLAN.

Across flock EBV – with adequate linkages or genetic connections to other NSIP flocks, EBVs on individual animals can be compared, even if they are in different flocks. In cases where animals are new to the NSIP system and do not have many or any relatives from other flocks in the database, then their across-flock EBV accuracy will be low.

Balanced EBVs – all the EBVs for each measured trait for that animal are at or above average for the breed.

Birth weight – the weight of the lamb taken within 24 hours of birth.

Contemporary group – a group of animals, usually lambs, of approximately the same age (within 45 days) and managed together in one group so that all receive the same treatment (same feed, shelter, de-worming application, same environment). Good contemporary group structure increases the accuracy of the EBVs. There should be at least two sires per contemporary group, ideally with 20 lambs per sire.

EBV - Estimated Breeding Values are numbers that reflect the inherited genetic potential of an animal as expressed in future generations. EBVs are available for several economically important traits. These values change and become more accurate over the life of the animal as more data are accumulated on the individual animal, its progeny and its relatives in connected flocks. The EBVs reported by LAMBPLAN for Katahdins include:

BWT – Birth Weight EBV – estimates direct genetic effects on weight at birth. The bigger the number, the larger the lambs will be at birth. Both extremely large and extremely low birth weights can cause problems at lambing.

MWWT – Maternal Weaning Weight EBV – estimates the genetic merit for mothering ability. This EBV mainly reflects genetic differences in ewe milk production, but other aspects of maternal behavior are also involved. A higher number generally indicates more milk production and/or higher quality milk.

WWT – Weaning Weight EBV – provides an estimate of pre-weaning growth potential and will likely receive positive selection emphasis in most flocks. Your target selling weight and the time period during which you will keep the lambs could impact the desired growth rate.

PWWT – Post-weaning Weight EBV – combines information on pre-weaning and post-weaning growth to predict genetic merit for post-weaning lamb weight. Your target lamb selling weight should strongly influence the desired level of post weaning gain.

NLB – Number of Lambs Born EBV – evaluates the genetic potential for prolificacy. This EPD is expressed as numbers of lambs born per 100 ewes lambing. A higher number will mean more multiple births while a number near zero will select for an average of twins in adult ewes.

NLW – Number of Lambs Weaned EBV – evaluates the combined ewe effects on prolificacy and lamb survival to weaning. The NLW EBV is expressed as numbers of lambs weaned per 100 ewes lambing. A number weaned EBV equal to or higher than the number born EBV indicates that the ewe is able to raise her lambs to weaning.

WFEC – Weaning Fecal Egg Count EBV – evaluates the genetic merit for parasite resistance based on worm egg counts recorded at weaning or at early post-weaning ages. The lower the number, the fewer parasite eggs and less vulnerable the animal will be to parasites. WFEC and the PFEC are important for everyone with sheep grazing in areas where parasites are a problem.

PFEC – Post-weaning Fecal Egg Count EBV – can be reported at either the early (90-150 days of age) or late post-weaning age (150-210 days). As with the preceding measure, low numbers indicate fewer parasite eggs and less loss due to parasites.

USA HAIR Index EBV – also called the Katahdin Index, Ewe Productivity Index or Ewe Productivity Trait (EPT) – combines EBVs for various production traits into an index designed to maximize pounds of lambs weaned per ewe lambing. The ewe productivity index gives substantial positive weight to Number of Lambs Weaned, Maternal Weaning Weight, and Weaning Weight EBVs.

Errors - one of the steps in entering data into Pedigree Wizard is to validate your data to check for errors. The most common errors are:

Code 1 – these are serious errors and must be fixed before exporting data

Code 2 – these are generally caused by data outside the age or weight range and data should be checked for accuracy. If the data are correct, ignore the error; otherwise make necessary corrections and run validation again.

Code 8 – dam (or sire) ID not standard format – these do not need to be corrected. These errors can be eliminated from your report by choosing “N” in the “standard ID system” option when running the data validation.

Fees -

Annual enrollment fee – yearly flock fee paid to NSIP and based on the current number of breeding ewes in the flock. Payment is required before data can be run.

Data fee – individual animal fee paid one time for the life of the animal, and based on the number of lambs with post-90 day data submissions. No data fee is assessed on animals that have been marked as cull or commercial animals at the first post-90 day data submission; no more than 25% of the lamb crop can be submitted as cull or commercial.

Genetic connections or linkages – this provides a way to link flocks through common genetics. In order for two or more flocks to be compared, at least one ram (or multiple ewes) must be used in both flocks. This can be achieved by purchasing ewes from an NSIP flock, and/or by sharing or purchasing proven sires or sons of proven sires. Without significant genetic connections, EBVs on unconnected flocks cannot be compared to other flocks in the breed.

Heritability –refers to how much of the differences observed between animals are due to genetic differences versus management or environment. It is usually assumed that 10 to 30% of the differences seen in performance between animals are due to genetics. Heritabilities are generally highest for post-weaning weights and ultrasound scanning measurements and tend to be lower for reproductive traits.

ID Number – each animal in LAMBPLAN is identified with a 16 digit ID. An example is given below. It is essential that once assigned, this number does not change. An animal purchased from an NSIP flock must maintain the exact ID number he/she was assigned in that flock or the valuable connections between flocks will be lost.

16-digit unique animal identification
640 123 2006 ABC123
Breed Flock YOB Tag Number

kNSIP – Katahdin National Sheep Improvement Program- the group of Katahdin breeders involved in NSIP.

LAMBPLAN - the national sheep performance program of Australia. North America's NSIP has partnered with LAMBPLAN to provide the service of performing the EBV calculations for NSIP members. The data calculation runs are performed every two weeks.

Management group – same as contemporary group

NSIP – National Sheep Improvement Program is an organization developed in the U.S. that provides genetic evaluation for performance. This organization delivers EBVs for the various US sheep breeds. It contracted with LAMBPLAN in 2010 for the service of providing the EBV calculations and subsequent reports.

Pedigree EBV – an EBV that is estimated and based only on the average of the sire's EBV and the dam's EBV for each trait, with no actual performance data on the lamb in question. This is often used when planning matings, and until the weaning weights are submitted to LAMBPLAN and actual EBVs for that animal are returned.

Pedigree Wizard – a free software application provided by LAMBPLAN for use by NSIP participants to enter, store and submit their data to LAMBPLAN.

Percentile ranking – a report generated by LAMBPLAN that shows the distribution of the EBVs by trait of all animals in the breed. It allows breeders to see how their animals compare to the breed as a whole in each trait. These data change over time based on the EBVs of the animals enrolled.

Post-weaning weight – post-weaning weight is adjusted to a standard age of 120 days. Post-weaning weights are taken on all the lambs on the same day, when lambs are 90-150 days of age, and when the group average is close to 120 days.

Progeny –offspring of a ram or ewe. The more progeny with data submitted, the greater the accuracy of the parents' EBVs. Progeny on multiple farms, either in the same year or subsequent years, also increases accuracy.

Proven Sire – a ram with sufficient progeny and sufficient genetic connections with data submitted to NSIP that results in accurate EBVs. A proven sire is more desirable than an unproven one with the same EBVs because he is more predictable and has greater accuracy.

Reports – several reports are returned from LAMBPLAN after every data submission, including:

Genetic Trend report – this report includes a series of graphs and tables that show the progress in your flock for different traits from year to year. The average value for your flock is shown along with the average for the Katahdin breed as a whole. This allows you to see at a glance if you are making overall progress in your flock from year to year and compared to the breed average.

Individual Listings report – this report shows the EBVs for every animal in your flock on which data were submitted. It is separated into four sections: sires; dams; male progeny and female progeny. Only ewes and rams with progeny in the current year will be included on the report.

Scrotal circumference – new EBV for Katahdin breeders that should be available in 2013. The measurement is taken at the fullest part of the scrotum of ram lambs between 150-240 days of age and submitted to LAMBPLAN. Submitting data for scrotal circumference is predicted to increase the accuracy of predicting NLB, NLW and the USA Hair Index. This measure is correlated with fertility and sexual maturity. Use of scrotal circumference measurements should emphasize “adequacy” and are not intended to be used as a “bigger is better” measure. The goal is to avoid rams which have too-small scrotal circumferences.

Uses for EBVs

Culling – EBVs can be used to decide which animals to remove from a flock. While the term culling often refers to old or infirm animals sold for meat, in a highly selected NSIP flock, culling may be simply selling quality animals to make way for genetically superior replacements.

Selection – EBVs can be used to select replacement animals from within a flock, or to purchase new animals.

Weaning weight – weaning is assumed to be at 60 days to allow the comparison of lambs from different systems. Weaning weights are taken on all the lambs on the same day, when lambs are 45-89 days of age, and when the average for the group is close to 60 days (not when each lamb is 60 days of age). Depending on your management system, actual “weaning” (separation of ewes and lambs) is not required after recording the 60-day weight.

Within-flock EBV –A flock without genetic links to other NSIP flocks can only compare the EBVs obtained to the animals in that individual flock. So, two ram lambs could be compared within the same flock, but their EBVs cannot be accurately compared to ram lambs in another flock unless the flocks have genetic linkages.

USDA-ARS Katahdin Sheep Sale Notes

Bids due August 23, 2018 12:00 Noon Central

Registrations/recordation

Ewe lambs that are 87.5 % or more can be hair coat inspected for registration after one year of age if inspected with an A or B coat. Less than 87.5% can be recorded.

Ram lambs that are 87.5 % or more can be hair coat inspected for registration after one year of age if inspected with an A or B coat, AND dam must be inspected with an A coat. Less than 87.5% can be recorded.

All mature ewes are registered/recorded (indicated in description of individual animals). All mature rams except USD17093 are registered.

Hair Coat Definitions:

A- Completely sheds

B- Less than 25% of body does not shed

C- Greater than 25% of body does not shed

Estimated Breeding Values

EBVs - Estimated Breeding Values are provided by the National Sheep Improvement Program. The genetic evaluation is overseen by Sheep Genetics, Australia. EBVs evaluate relative performance of animals raised in different flocks and different years. By evaluating "relative performance" and the use of advanced mathematical and statistical analyses, EBVs are more accurate at determining the relative genetic merit of animals. This helps breeders factor out the environmental differences including but not limited to nutrition, number born/reared, heat and humidity. EBVs are a more accurate estimate of genetic potential for growth than raw weights, adjusted weights and mature size.

Using EBVs - A simplified approach is that an animal with a value greater than zero is predicted by NSIP (which uses the standard genetic evaluation procedures used by all livestock species) to be above the breed average for that performance trait. Selecting animals with positive values for growth and milk traits will identify animals that are predicted to be above average for the breed for those traits (using the best technology available to the livestock industry). Selecting animals with a 0.0% Lamb Crop (or number of lambs born/NLB) EBV predicts that they will pass on twinning genetics. In the Katahdin breed, a ewe with a 0.0% Lamb Crop EBV is predicted to have a 210% lamb crop/litter as a mature ewe (3-6 years of age).

EBV Definitions:

Wwt - 60-Day Weaning Weight EBV provides an estimate of preweaning growth potential. (e.g. Sheep with a value of above 0.0 are predicted to be greater than the breed average). Provides an estimate of preweaning growth potential and will likely receive positive selection emphasis in most flocks.

PWwt - The 120-day Postweaning Weight EBV combines information on preweaning and postweaning growth to predict genetic merit for postweaning weight at 120 days. Positive selection on Postweaning Weight EBV is expected to favor rapid growth to typical market ages.

MWwt - Maternal Weaning Weight (MWwt) EBV estimates genetic merit for mothering ability. This EBV mainly reflects genetic differences in ewe milk production, but other aspects of maternal behavior may also be involved. The Maternal Weaning Weight EBV is derived by evaluating if individual ewes produce lambs that are heavier or lighter than expected based on the weaning weight EBVs of the parents. Ewes whose lambs grow faster than predicted are assumed to be better milk producers, whereas ewes whose lambs grow more slowly than predicted are assumed to produce less milk. Selection for high maternal milk EBVs is expected to improve milk production and mothering ability and considered to be important for maternal breeds.

NLB - evaluates genetic potential for prolificacy. This EBV is expressed as numbers of lambs born per 100 ewes lambing. An EBV of 0.05 (or +5.0% when multiplying by 100) for Number of Lambs Born indicates that an animal is expected to produce daughters who will have an average of .05 more lambs at each lambing, or 5.0 more lambs per 100 lambings, than an average ewe. Selection on Number of

Lambs Born EBV is expected to increase prolificacy in the flock. The Katahdin breed average in NSIP is 210%.

NLW—evaluates combined ewe effects on prolificacy and lamb survival to weaning. The NLW EBV is expressed as numbers of lambs weaned per 100 ewes lambing. An EBV of +0.05 for Number of Lambs Weaned indicates that an animal is expected to produce daughters who will wean an average of .05 more lambs at each lambing, or 5.0 more lambs per 100 lambings, than an average ewe. Selection on the Number of Lambs Weaned EBV is expected to increase weaning rates in the flock.

WFEC & PFEC – (weaning fecal egg count & post weaning fecal egg count) evaluates genetic merit for parasite resistance based on worm egg counts recorded at weaning or at early or late post-weaning ages. Animals with low (negative) Worm Egg Count EBVs are expected to have greater parasite resistance, and selection to reduce Worm Egg Count EBVs is recommended in areas where internal parasites are a problem. Most research would suggest that post-weaning WEC EBVs are the most useful genetic indicator of parasite resistance, but studies with Katahdin sheep in the USA have shown that weaning worm egg counts provide useful information on parasite resistance in young lambs. Weaning and post-weaning Worm Egg Count EBVs are strongly correlated. Post-weaning Worm Egg Count EBVs are likely adequate for most selection and marketing purposes. -100 is considered the highest parasite resistance for the breed.

PSC – post-weaning scrotal circumference

Index (EPT) – The Ewe Productivity Index (%) combines EBVs for various traits into an index designed to maximize pounds of lambs weaned per ewe lambing.