

# NSIP Concept #2: Accuracy & Connectivity



## Overview

The accuracy of an animal’s estimated breeding values (EBVs) reflects the relationship between the **estimated** breeding value and its **true** breeding value for a particular trait. Because EBVs are based on an animal’s performance relative to other animals under the same management, accuracy is improved when additional data are collected on an animal, as well as its progeny and other relatives, over multiple years and/or in different systems. The higher the accuracy, the closer the EBV is to an animal’s true breeding value for that trait, and therefore, less likely to significantly fluctuate in performance over time. Improvements to accuracy rely on careful data collection and timely submission. Similar to accuracy is the concept of connectivity, often referred to as genetic linkages. When connectivity is adequate between flocks, the EBVs of an animal raised in a different location and even under different management conditions may be compared between flocks. Furthermore, less fluctuation in EBVs over time should be expected when moving an animal between flocks (acquiring a new ram for instance), when that animal’s EBVs have high accuracy and the two flocks have adequate genetic linkages.

## Understanding Accuracy

The accuracy for each animal’s EBVs is provided for each trait on the **Individual Listings Report** received from LAMBPLAN (see example below). This value is reported as a percentage ranging from 0 – 99% in the row beneath the EBV. LAMBPLAN does not report EBVs when accuracies are below certain thresholds, typically 30 – 40% depending on the trait.

<b>Sires</b>				BWT	MWWT	WWT	PWWT	PFAT	PEMD	WFEC	PFEC	PSC	NLB	NLW	USA Hair
Animal ID	Inbreeding	Prog:Fiks		kg	kg	kg	kg	mm	mm	%	%	cm	%	%	
Ram A	0.4%	40:2		0.2	0.4	2.6	4.4	-0.1	-0.6	42	-25		15	15	107.2
		Acc:		82	51	81	84	54	46	86	91		49	45	
Ram B		82:3		0.7	0.3	3.0	5.7	-1.0	-0.8	-62	-83	1.9	4	5	103.3
		Acc:		88	70	87	90	64	73	91	94	78	66	60	
Ram C	1.3%	13:1		0.0	0.6	0.8	0.6	0.4	0.0	-78	-94		13	14	106.8
		Acc:		70	44	70	73	46	40	75	83		39	36	

A variety of factors affect the accuracy of an EBV including:

- Heritability:** It is easier to estimate an animal’s performance when the trait has higher heritability. Also, traits with higher heritability may achieve higher accuracy more quickly because it requires fewer data to reliably prove their performance. Traits that are measured directly on the animal often have higher heritability and consequently EBVs with higher accuracies. As shown above, traits such as weights (BWT, WWT, and PWWT) and parasite resistance (WFEC and PFEC) typically report higher accuracies than reproductive traits (MWWT, NLB, and NLW).

- **Amount of performance data:** Accuracies of an animal's EBVs will increase as additional performance data are analyzed for a specific trait. Performance data on the animal itself, as well as from its progeny, parents, and siblings all contribute to improved accuracy. In the example above, Ram B, has more progeny (82) in multiple flocks (3), and thus has greater accuracies across all traits than Ram C with only 13 progeny in one flock.
- **Genetic linkages:** Accuracy is further improved when genetics are shared in two or more flocks (e.g., a proven sire or his son used in multiple flocks). Using at least one ram that has been used in a previous year or season, or in a different NSIP flock will provide genetic connections and increase accuracy, especially for small flocks.
- **Contemporary group structure:** Small but important improvements to accuracy may be achieved by careful attention to sound contemporary group structure. Contemporary groups representing more than one sire with at least 10 lambs per sire will generally have EBVs with higher accuracy compared to those with a single sire or with too few progeny per sire.

## Accuracy and Connectivity Work Together

An animal's EBVs are powerful tools to use for genetic selection, but they are merely "estimates" of its genetic potential. Accuracies assist breeders in determining the degree of confidence that an animal will produce progeny as predicted by its EBVs. For example, when selecting between two rams with similar EBVs, a ram with an accuracy of 70% for the trait of interest is more likely to perform as predicted than one with an accuracy of 40%.

The accuracy of an animal's EBVs are strengthened when multiple flocks are genetically linked (connected), even though they may differ greatly in environment or in management. When flocks have adequate genetic connections, the EBVs of animals in one flock can be compared with confidence to those in another flock. The volume of data collected and submitted from these related animals further adds to the accuracy of their EBVs by separating genetics for a particular trait from environmental influences. Higher accuracy means the EBVs become a stronger estimate of an animal's "true" breeding value, whereas connectedness simply tells us how reliable the comparisons of EBVs are across flocks.

The sire has the single greatest influence on the future lamb crop and represents the most common and simplest means of moving genetics between flocks to establish genetic connections and improve accuracy. Sires used in multiple flocks, with more progeny, will also increase accuracies quicker than sires used in a single flock and/or on fewer ewes. In addition to sharing or purchasing proven sires, other options for creating connections include using sons of proven sires, or purchasing multiple ewes from an established NSIP flock. Small, growing flocks and especially those that are newly enrolled in NSIP would benefit from acquiring proven sires from established NSIP flocks.