

# SELECTION AND HERITABILITY IN FLOCK IMPROVEMENT

## WHAT IS MEANT BY THE HERITABILITY OF A TRAIT?

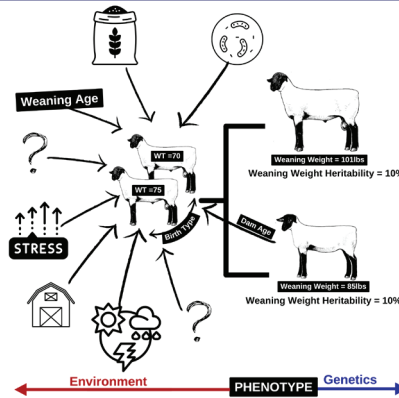
IT IS THE AMOUNT OF VARIATION IN A MEASURABLE TRAIT THAT IS CAUSED BY THE ANIMAL'S GENES RATHER THAN BY ENVIRONMENTAL FACTORS.

## Heritability OF SHEEP TRAITS

**PHENOTYPE =  
GENOTYPE + ENVIRONMENT**

**ENVIRONMENT =  
CLIMATE + MANAGEMENT**

**GENOTYPE =  
ADDITIVE GENETICS +  
GENE COMBINATION VALUE**



To properly compare lambs within a flock (on farm records) or across flocks (NSIP), the environmental component of phenotype needs to be estimated and removed from consideration, as it is not genetic. Systems like NSIP allow for (replace “true” with “more comprehensive”) true genetic comparison. Over time, selection pressure on a specific trait (example weaning weight) will improve that trait genetically.



### TOOLS

NSIP allows for genetic comparison within flocks and between flocks by using Estimated Breeding Values.

Digital Suffolk platform to record data points of individual animals and whole flock reporting.

Selection for economically important traits over time, within and preferably between flocks, will ultimately improve the breed, making it more relevant in commercial operations.



### CAUTIONS

Single trait selection should be cautioned as a single-trait focus may lead to the deterioration of traits receiving less attention.

Genetic antagonism also exists between some traits in Suffolks such as growth rate and muscle (selection for one trait may partially oppose gains made in the other trait).

Conformation and breed character should always be considered along with the other traits that are more economically driven.

LOW HERITABILITY	
TRAIT	HERITABILITY
EWE FERTILITY*	.05
LAMB SURVIVAL*	.05
PROLIFICACY*	.10
60-DAY WEIGHT*	.10
DRESSING %*	.10
RECTAL PROLAPSE**	.14
BIRTH WEIGHT*	.15
90-DAY WEIGHT*	.15
ENTROPION***	.17

MEDIUM HERITABILITY	
TRAIT	HERITABILITY
120-DAY WEIGHT*	.20
SCROTAL CIRCUMFERENCE**	.21
PARASITE RESISTANCE*	.21

HIGH HERITABILITY	
TRAIT	HERITABILITY
12TH RIB FAT THICKNESS*	.30
MATURE BODY WEIGHT**	.30
LOIN EYE AREA*	.35
% TRIMMED RETAIL CUTS*	.40
GESTATION LENGTH*	.53

The chart below illustrates the rate of progress that can be expected from phenotypic selection for traits that range from low to high heritability.

	SURVIVAL	REPRODUCTIVE	GROWTH	CARCASS
HERITABILITY	LOW	LOW	MODERATE	HIGH
GENETIC PROGRESS	SLOW	SLOW	MODERATE	FAST

\*Sheep Production Handbook (2002) + Brown, 2007  
 \*\* Safari et al. 2005  
 \*\*\* Sakul & Kellom, 1997  
 ++ Schoenian, 2021

