

# Inbreeding vs. Outbreeding

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In the late 1970's and 1980's adding 1/4 and 1/2 Finnsheep genetics to commercial flocks or developing new breeds such as the Polypay was all the rage. At the same time purebred Finnsheep breeders were quick to close their registry to what was called upbreeding. This had allowed 15/16 Finnsheep to be registered as purebred Finnsheep. The losses due to this very slight outbreeding, while anecdotal for individual Finnsheep breeders, are more easily observed in research flocks such as at Cornell University. In the early 1980's the Cornell Finnsheep flock gave birth to a 380% lamb crop. The Cornell Dorset flock gave birth to a 140% lamb crop, a 1/2 Finn 1/2 Dorset flock from these two parent lines produced a 197% lamb crop, an example of outbreeding depression. With no depressive effect, the lamb crop would have averaged 260%.

In order to recover from outbreeding depression resulting from upbreeding, Finnsheep breeders took an approach that was both phenotypic and genotypic. They voted to disallow the docking of Finnsheep lambs to be registered and selected heavily for the traditional very short tail. The genotypic approach was to strongly encourage but not limit the registrations of lambs from mature ewes that gave birth to four or more lambs annually and raised three lambs or more without supplemental milk.

For the Finnsheep genome, selection on these unique phenotypic and genotypic traits in a closed gene pool have been powerful tools in the recovery of epistatic (i.e., non-allelic) gene interaction (otherwise known as co-adaptive gene interaction) for maternal traits. The successful weaning of three or more lambs from a single lactation is an example of a unique co-adaptive gene interaction. While ample milk production is important, a small teat canal and a soft mouth in the lamb help evenly distribute colostrum and subsequent milk and lower stress on the udder to prevent mastitis. In addition, the precocious Finnsheep lamb will seek and consume high quality creep feed in the first few days of life.



Finnsheep ewe with newborn quads.

At Cornell University in 1978 we demonstrated that Suffolk-sired 1/2 Finnsheep lambs could be weaned from lamb milk replacer at 10 days of age to a high quality dry feed. A control group raised as singles and weaned from the ewe at eight weeks reached market weight only two to three weeks ahead of the ten-day weaned lambs. These are examples of a few of the many co-adaptive gene interactions in Finnsheep.

Further evidence of the depressive effect of outbreeding on reproductive excellence of a foundation breed of sheep is reported in a study of a 50-year data set from the U.S. Sheep Experiment Station, Dubois, Idaho (J. An. Sci. 58, p.22). The foundation Dubois Rambouillet was outbred with Lincoln to produce the Columbia and later the Columbia was outbred with Corriedale to produce the Targhee. After fifty years of selection the original Rambouillet, despite or because of a higher coefficient of inbreeding, which through selection could build maternal epistatic traits,

outproduced by more than ten percentage points for lambs born per ewe exposed than the outbred Columbia and Targhee.

The higher co-efficient of inbreeding reveals negative recessive traits that can be reduced through selection and thereby strengthening the foundation population. Negative population effects of inbreeding can be greatly reduced in a single generation by crossing more remotely related individuals while losses from outbreeding shown by Columbia and Targhee take decades to recover. Finnsheep breeders within a closed registry have the opportunity, despite the limited size of individual flocks, to pursue management practices such as grazing vs. confinement, accelerated lambing, and fleece characteristics, maintaining high reproductive excellence at the same time.

For those believing that Finnsheep need an improved carcass, consider results published by Clay Center USMAFIC 1972. Researchers found that one-half Finn Carcasses of Rambouillet, Targhee, Corriedale, and Dorset had slightly heavier, boneless, lean meat than purebred lambs of those four breeds. ■



Same ewe at weaning 70 days later, the four lambs weighed a total of 140 pounds, equal to the ewe's weight.