

# GENETIC IMPROVEMENT PROGRAM FOR DAIRY SHEEP

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Dairy sheep industry is very developed in Europe, especially in Mediterranean area where there is a strong tradition for dairy sheep farming. By comparison, the dairy sheep industry in North America is much smaller and certainly much younger but it has been growing and there are substantial opportunities for future growth.

A genetic improvement program for milk yield and composition as well as meat production in dairy sheep is an important component toward the development of a viable industry. To remain competitive, the industry needs to increase its productivity and a genetic program is the only alternative it has for improving the biological efficiency of producing milk for cheese and lambs for meat.

Milk production is a quantitative trait, i.e., controlled by a large number of genes. The genetic parameters for the milk traits in dairy sheep for Lacaune breed (F. Barillet and D. Boichard, 1987, Genet. Sel. Evol., 19:459-474) are shown in Table 1. Note that they are very similar with the genetic parameters of milk traits in dairy cattle. It is ver

Table 1. Genetic parameters for milk traits in Lacaune breed (France). Heritabilities on the diagonal and genetic correlations below diagonal.

Trait	Milk Yield	Fat Yield	Prot. Yield	Fat %	Protein %
Milk Yield	<b>0.30</b>				
Fat Yield	0.83	<b>0.28</b>			
Prot. Yield	0.91	0.89	<b>0.29</b>		
Fat %	-0.31	0.26	-0.06	<b>0.35</b>	
Protein %	-0.40	-0.04	-0.03	0.65	<b>0.46</b>

A breeding strategy to improve dairy traits may involve either crossbreeding or within purebred selection programs. The method most generally used in Europe for genetic improvement is purebred selection. Though some crossbreeding is also used, the crossbreeding programs implemented are very simple schemes which involve upgrading of a local population by an established dairy sheep breed.

The genetic programs implemented for several European breeds (Lacaune and Manech in France, Sarda and Comisana in Italy) are similar to those in dairy cattle, but adapted to the biological and management characteristics of the population of dairy sheep for which the programs were designed.

These programs involves progeny testing of young rams in milk recorded flocks, selection of best rams and their use in elite matings to product superior breeding rams. In general, a genetic pyramidal structure is developed in the population served by the program, with an open selection nucleus at the apex of the pyramid, where genetic progress is generated, and a mechanism to disseminate the genetic progress generated in the nucleus throughout the entire population. Genetic improvement is disseminated from the nucleus flocks to the rest of the population via the sale of breeding rams or via AI.

Among the major obstacles that need to be overcome are the fragmented nature of the population with essentially no genetic ties between flocks, inadequate production recording system, and use of AI.

Effective genetic programs have been implemented and North American dairy sheep industry should carefully evaluate existing programs and develop and implement a program to serve the industry.

The principal steps in the development of a program are:

1. Specify the direction of the program. It involve the goal definition and a description of the desirable characteristics of the end product. This is very important and the breeders should spend considerable effort to define objective goals, keeping in mind that, at least during the initial phases of the program, the focus should be on tangible goals.
2. Choose a production methods. For dairy sheep most likely should be purebreed selection. Though crossbreeding is often mentioned, we should remember that a cross breeding program requires a strong purebred programs for all breeds involved in the cross-breeding.
3. Specify the records to be kept. Efficiency is critical.
4. Define selection criteria for choosing parents. For dairy sheep, the preferable criteria are progeny testing for rams and own performance combined with information from relatives for ewes.

It should be kept in mind that an efficient genetic improvement program must not only generate genetic gain but also ensure its diffusion to the entire population. What is needed is a program that serves an entire population and not only a few breeders