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Somatic cell counts as a selection criterion for goat mastitis resistance

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Genetic variability of mastitis resistance is well established in ruminants. Implementation in selection programs is based on an indirect criterion, milk Somatic Cell Counts (SCC), which heritability ranges from 0.13 to 0.24 in main dairy species. In France, in dairy goats, individual SCC are collected since the end of the 1990s by Milk Recording Organizations and stored in the national goat data base.

As part of MAMOVICAP project, SCC of dairy goats since the beginning of their recording, were analysed. SCC have increased over the last fifteen years: + 675,000 cells/ml in Saanen breed (+55%) and + 485,000 cells/ml in Alpine breed (+43%) in average. An acceleration of the trend was noticed over the last years. Differences between breeds are marked and increase over time. Parity, period of kidding, days in milk and milk yield were found as the most important non infectious factors of variation.

To study the possible effects of SCC-based selection, a divergent selection, using progeny-tested AI bucks, has been implemented in an experimental INRA flock of Alpine goats (Bourges, CAPRICEL and CAPRIMAM projects, region Centre). Based on 266 goats of parity 1 to 3, average SCC were 1,471,000 cells/ml and 930,000 cells/ml in SCC+ (high SCC) and SCC- (low SCC), respectively, i.e. a difference of 0.97 point of score of somatic cell (log transformed SCC to normalize data) between the two lines. Samples have been collected in order to detect the presence of pathogens in milk. Bacteriologically positive samples have a significant higher frequency in SCC+ (51 % ± 5) than in SCC- (32 % ± 5). The high correlation between cell count and bacteriological status suggests that SCC selection could be an efficient tool to reduce intra-mammary infections and decrease pathogen bacteria in milk. However, no difference have been found on cheese coagulation aptitude and sensorial quality of the product between the two lines.

Genetics being a tool to curb the increase of CCS, and therefore to improve quality of milk and animal health, a genetic evaluation has been implemented for this trait in both breeds. The next step was to include SCC in the breeding objective in order to enable the French Breeding Organisation Capgènes to consider this trait in selection scheme. Thus, expected genetic trend has been evaluated for different weighting of SCC index in the total merit index (ICC). The aim was to define the combination of elementary indexes in ICC which would allow SCC decrease while preserving production traits. In Saanen breed, for which exists is a genetic antagonism between cell count and milk, an annual decrease of 0.7 % is expected with the new ICC, that is to say 11,000 cells/ml of milk. In Alpine breed, the current ICC has a favorable impact on SCC because genetic correlation with milk production is null. With the new ICC, the expected genetic gain should be an annual average decrease of about 22,000 cells/ml in average for this breed.