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Selection of sheep for resistance to gastro-intestinal nematodes in France: where are we and where are we going?

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Genetic selection of sheep for resistance to gastro-intestinal nematodes (GIN) is one alternative method to anthelmintic treatments. In France, this method has been experimented in two ovine breeds: a meat sheep breed (Romane) and a dairy sheep breed (Manech Tête Rousse). Current French breeding schemes are pyramidal: at bottom, a large number of sheep breeders are only users of genetic progress, above, a selection nucleus is composed of sheep breeders where individual performances of animals are recorded and pedigrees are fully known and on top, young rams, coming from the selection nucleus, are tested in individual control stations (ICS), later, a sub-group of them (= elite rams) are used for artificial insemination. These elite rams are bred together in ram centers (RC). The originality of the French breeding scheme is to collect phenotypes for resistance to GIN after *Haemonchus contortus* experimental infections of rams in ICS and RC in Romane and Manech Tête Rousse breeds. This protocol includes two one-month periods of infection separated by two weeks of recovery. Fecal egg counts are performed at the end of both infection periods. In the Manech Tête Rousse breed, estimates of the heritability of egg excretions were 0.06 in the first infection and 0.24 in the second one. Preliminary estimated breeding values (EBVs) were established in this breed and their relationships with production traits EBVs regarding milk production or fat and protein milk contents were neutral. Phenotypic measures are in progress in the Romane breed. In parallel to this program, a genome scan was carried out using Romane x Martinik Black Belly lambs. The Illumina OvineSNP50 Bead Chip was used for QTL detection. Four QTL regions associated with fecal egg counts were identified (OAR5, 12, 13, 21) on this population. A customized assay including 1000 SNP was created to increase the density of marker coverage in these regions. The interest of these QTL regions was recently confirmed in a Romane pure breed population challenged with *H. contortus* and genotyped with the dedicated 1000 SNP Bead Chip. In the next future, sheep breeders associations in France will decide how this new control method will be applied in their breeding schemes.