

PhénoFinlait, a French national program for high scale phenotyping and genotyping to study fine composition of small ruminant milks

G. Lagriffoul^{1*}, C. Dragan¹, A. Varenne¹, J.M. Astruc¹, M. Brochard¹, F. Barillet², M. Douguet¹, S. Esvan¹, F. Faucon-Lahalle¹, M. Ferrand¹, H. Larroque², J. Legarto¹, R. Rupp², G. Thomas¹, I. Palhiere²

¹ *Institut de l'Élevage, antenne de Toulouse, Castanet-Tolosan,, France*

² *INRA UR631 SAGA, Castanet Tolosan, France*

(Gilles.lagriffoul@idele.fr)

The dairy industry is more and more concerned by the fine composition (especially fatty acid) of the product, which is mainly cheese in small ruminants. It is now well established that the fatty acid (FA) profiles of the full cream cheeses are directly related to those of the milk. Scientific and economic stakeholders, from milk production to milk processing, formed the consortium called *PhenoFinlait* in order to carry out a R&D phenotyping and genotyping project on fine composition of cattle, sheep and goat milks. The aims of this project are: in a first time, the development of a affordable and large scale phenotyping system for milk components (FA and proteins) using Mid Infra-Red (MIR) spectra and, in a second time, the utilization of this procedure on a specific design in farms allowing an analysis of the genetic and environmental (feeding, physiology) factors, influencing fine milk composition.

Since its beginning in 2008, the project has allowed the development of equations to estimate FA content using the MIR spectra. The data collection, including milk samples (fatty acid composition), blood samples for DNA genotyping and questionnaires (feeding and management), was carried out and involved cows, ewes and goats coming from 1 500 commercial farms spread in different representative French areas. In a preliminary study on *PhenoFinlait* small ruminant data, we selected information coming from 24,300 goats and 8,900 ewes bred in 90 goats herds and 60 dairy sheep flocks. First results confirm all the interest and relevance in using MIR spectra to predict the FA profile of small ruminant milk. Indeed, we found, in field conditions and in a large scale analysis, the classical factors affecting FA profile of the milk such as (i) the diet: maize silage type diets tend to increase saturated fatty acids content compared to grass-based diets which increase unsaturated fatty acids including polyunsaturated; (ii) or the lactation stage: the percentage of saturated fatty acids was lower during the early part of lactation than in the middle of lactation.

This work will be completed until 2012 by an analysis of the genetic determinism of fine milk composition which will include the estimation of the genetic parameters and QTL detection (Quantitative Trait Loci) to open the way for a possible genomic selection.

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