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Summary

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Abstract text

France is the leading European producer of goat milk. A large majority of this milk is used for cheese processing, with 97,960 tonnes of cheese produced (FAO, 2020) (1/6 of which is produced on the farm), and 15 PDO cheeses. The French goat industry therefore has an interest in producing quality milk. The rate of lipolysis of milk is a quality criterion which must be controlled to maintain the quality of milk and dairy products. Indeed, a high rate of lipolysis leads to a degradation of the organoleptic (rancid taste) and technological (inability to process) properties of the milk.

In France, a prediction equation has been calibrated using bovine mid-infrared spectra (MIR) to quantify the free fatty acids indicative of lipolysis. Although the use of MIR spectra has been developed strongly in dairy cattle since the end of the 2000s to phenotype new traits on a large scale, to date, there is no instrumental method to evaluate lipolysis in goat milk.

The present study aims to develop a prediction equation for milk lipolysis that is specific to goat milk. For this purpose, 518 milk samples were collected from 4 experimental farms, i.e., about 40 goats per farm sampled 3 times (spring, early summer and autumn 2021), to maximise the variability of diets, physiological stages, and breeds (Alpine, Saanen). A joint analysis of lipolysis according to ISO/TS 22113 (BDI method) and by MIR spectrometry was performed on each sample.

The level of lipolysis measured on our population by the BDI method is on average 0.85 mmol/100 g fat, with a median value of 0.51 mmol/100g fat and a standard deviation (sd) of 1.00 mmol/100 g fat.

The equation was developed by partial least squares regression after square root transformation. It has a coefficient of determination $R^2=0.91$, with a residual standard deviation ($S_{y,x}$) of 0.20 mmol/100 g fat.

The relatively high accuracy of this equation should allow to use it to explore the genetic determinism of milk lipolysis in goats. This work offers new perspectives to deepen our knowledge of the mechanisms of lipolysis in goat milk and to improve its control on the farm by a more refined management of the herd, or even by selection.

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