

HIGHLIGHT

Mid-infrared spectroscopy applied to tank milk can be used to estimate the composition of the herd diet.

The Mid Infrared Spectroscopy (MIR), routinely used for milk payment according to quality, was used to estimate the composition of the herd diet and to ascertain the Cantal and Laguiole PDO cheese specifications. The MIR spectra of 7607 tank-milks from 1355 PDO and non-PDO farms in the Cantal and Aveyron departments were paired with the diet composition obtained by farm survey. The proportion of pastured grass in the total diet was estimated with an error of 11.7% and the proportions of pasture + hay, corn silage, preserved grass, fermented fodder and total grass were estimated with errors less than 15%. The MIR made it possible to certify, with errors acceptable for end users, the respect of all or part of the specifications related to herd feeding. This approach makes it possible to provide, at low cost, indications on the composition of the herd diet that can be used by the dairy chains actors to certify the promises they make to consumers and by the farmers to control the feeding of their herds, particularly when grazing.

Certifying the farming practices included in the specifications is a challenge for the cheese sector, particularly for cheeses with Protected Designation of Origin (PDO). The controls currently implemented are based on farm visits, could be better targeted, or even replaced by analytical tools.

The objective of this study was to test the ability of mid-infrared spectroscopy applied to tank milk to:

- 1) determine the composition of the diet of dairy herds,
- 2) certify the respect of the different criteria of the specifications related to herd feeding in two PDO cheese chains: Cantal and Laguiole.



Legend: Dairy cows grazing in the Cantal. Photo credit : C. Maître (INRAE)

The proportion of pastured grass in the diet was estimated from MIR spectra with a residual error of 11.7%. Similarly, the proportions of corn silage, stored grass, fermented forage and total grass in the ration were estimated with residual errors of less than 15%, which is acceptable according to end users for routine utilisation. Nevertheless, the models developed to estimate the proportion of concentrates or fermented grass in the diet are not satisfactory. At the scale of the year, the quality of the models discriminating farms respecting (or not) all the criteria included in the specifications of the 2 PDOs was also considered sufficient by end users for routine use (accuracy, specificity, sensitivity and precision > 90%). However, the models discriminating farms respecting (or not) the criteria of the specifications considered one by one are less sensitive or less precise, depending on the criteria considered.

The models developed enable providing, thanks to the routine analyses carried out on tank milk for milk quality payment, weekly indicators on the composition of the diet of dairy herds. These indicators, obtained at low cost, can be used:

- 1) by the dairy chain actors to consolidate and certify the promises they make to consumers via the specifications,
- 2) by the farmers to control the feeding of their herd, especially on pasture where the grass ingested is particularly difficult to quantify.

The consolidation of the models with wider data is in progress and a reflection has been launched with the partners from the laboratories and the dairy sector to specify the modalities of the routine use of these models.

Learn more:

M. Coppa, B. Martin, S. Hulin, J. Guillemin, J. V. Gauzentes, A. Pecou, and D. Andueza. 2020. Prediction of indicators of cow diet composition and authentication of feeding specifications of Protected Designation of Origin cheese using mid-infrared spectroscopy on milk. *J Dairy Sci.* TBC:1-14. doi.org/10.3168/jds.2020-18468

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