

UMR Herbivores

Performances of animals and herds Team (Peraq)

Authentication of pasture feeding in lamb meat using visible spectroscopy : do we need breed-specific databases ?

Measuring the optical properties of the fat online at the abattoir using a portable spectrophotometer has shown high potential for distinguishing pasture-fed from stall-fed lamb carcasses. However, a recent study demonstrated a between-breed variability in the digestive and metabolic fate of some compounds involved in this discrimination process. We therefore used a large database of more than 1000 lambs from 3 breeds (Romane, Ile-de-France and Limousine) provided by 2 Inra Experimental Units to evaluate to what extent a breed-specific database may be necessary for authentication purposes using this method. The results show that the reliability of the discrimination between pasture-fed and stall-fed lambs was not significantly reduced when pooling all three breeds together than when using a breed-specific database (93.9% vs. 95.2% of lambs correctly classified). In this study, pooling the data for all 3 breeds together therefore did not reduce the reliability of the discrimination.

A number of factors have contributed to research interest in authentication of dietary background of animal products : first, the increasing consumer demand for assurance about mode of production because of several food crises ; second, the evidence that the mode of production strongly affects product quality from a sensory and nutritional perspective, and also the sustainability of the production system ; and finally, the interest for producers to obtain market recognition and premium and to avoid piracy of their brands.



Previous studies have shown that measuring the reflectance spectrum of perirenal fat within the visible light area (RS VIS) online at the abattoir using a portable spectrophotometer enabled to discriminate pasture-fed from stall-fed lamb carcasses (Dian et al 2007 in Limousine breed; Huang et al 2015 in Romane breed). These studies have identified the main wavelength areas involved in the discrimination process, which correspond to those where carotenoid and hemic pigments absorb light. As a recent study demonstrated a between-breed variability in the digestive and metabolic fate of carotenoid pigments (Macari et al 2007), we investigated to what extent a breed-specific database was necessary for authentication purposes.

This study was carried out over 6 years and used 1054 lambs from 3 breeds (Romane, Ile-de-France and Limousine) provided by 2 Inra Experimental Units (Herbipôle, Inra Auvergne-Rhône Alpes Centre and Physiologie Animale de l'Orfrasière, Inra Val de Loire Centre). We measured perirenal fat RS VIS. The reliability of the discrimination was not significantly different when pooling all lambs for the 3 breeds than when using a breed-specific database (93.9% vs. 95.2% of lambs correctly classified). In this study, pooling all lambs for the 3 breeds therefore did not affect the reliability of the discrimination between pasture-fed and stall-fed lamb carcasses.

Using the optical information contained in the visible and near infrared reflectance spectrum (RS VIS-NIR) has been shown to further increase the reliability of the discrimination (Dian et al 2008 ; Huang et al 2015). Perirenal fat samples used in the present study will therefore be measured using RS VIS-NIR. In the same way, we will evaluate to what extent a breed-specific database may be necessary for authentication purposes.

Valorisation

Prache S, Huang Y & Andueza D (2018). To what extent is a breed-specific database necessary to differentiate meat from pasture-fed and stall-fed lambs using visible spectroscopy ? *Animal*, 12 :8, 1682-1689.

Contact: Prache Sophie, sophie.prache@inra.fr, UMR Herbivores, F-63122 Saint-Genès-Champanelle, France.