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CONSIDERATION OF FECAL NEAR-INFRARED SPECTRA TO ESTIMATE METHANE ERUCTED BY DAIRY OR BEEF CATTLE

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Reference methods to measure methane (CH_4) emissions at animal level are particularly expensive, time consuming, difficult to apply in commercial farms and for some of them, binding for animals. This is why indirect and cost-effective methods to evaluate individual CH_4 emissions from cattle present great interest especially to perform large scale studies e.g. screening of a specific population or genetic evaluation. Milk composition or milk mid infrared spectra (MIRS) are relevant proxies to estimate CH_4 emissions for lactating dairy cows. However, this is not applicable for young animals, dry cows or beef cattle. The relevance to consider fecal near-infrared spectra (NIRS) to predict digestible organic matter (DOM) has been established. On another hand, eructed CH_4 is consecutive to rumen fermentations process also related, among others, to the ingestion of DOM. Based on this it seems relevant to investigate the feasibility to estimate eructed CH_4 from fecal NIRS. Thanks to Smartcow European project, historical reference data from Belgian, French and Swiss teams have been merged. Greenfeed system (GF) was used to collect reference data for CH_4. Only values including at least 20 visits of the GF during the period considered were considered as representative. A period of 3 weeks has been fixed to maximize the dataset. In parallel feces were collected weekly before sampling or with a unique spot sample at the end of the period. In this study, only data related to spot fecal sampling were considered. Data from lactating cow (LC) (n = 91, CH_4/day (mean ± SD): 361 ± 86, Holstein (lactating cows), diet based on grass or hay) were considered separately from beef cattle (BC) data (n = 346, CH_4/day (mean ± SD): 221 ± 43, Charolais (heifer), Blanc bleu Belge (reformed cow), Blanc bleu mixte (suckling cow), diet based on grass and/or hay). From the data available, the best models presented for LC and BC respectively, a R^2 of calibration about 0.43 and 0.62, and a standard error of calibration about 65 and 26 g of CH_4/day. The better results for BC than for LC were expected because this calibration set include more data and consequently more variability, which is essential to develop such models. These results suggest the feasibility of having a proxy based on fecal NIRS to estimate CH_4 emission which is particularly interesting to consider individual variability of eructed CH_4 for non-lactating animals. More data have to be collected with the same sampling protocol but presenting other variability (e.g. other diets and breeds) to confirm this trend and to improve the model robustness.