Estimation of individual CH4 emissions using fecal near infrared spectra for young, dairy and beef cattle

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Last years several indirect methods/proxies have been investigated to predict individual enteric CH4 emissions from cattle without using reference measurement methods which are expensive and time-consuming. However, there is a lack of proxy allowing to take into account individual variabilities for non-lactating animals: young cattle, dry cows or beef cattle. Faeces analysed by near infrared (NIR) spectrometry are relevant to consider because such spectral information has already demonstrated their interest to predict forages dry matter intake and digestibility. Otherwise, CH4 emissions can also be correlated to these last parameters. A dataset of 851 reference values has been constituted including CH4 values measured with Greenfeed system averaged on 14 days (274 ± 135 g CH4/day) and corresponding spot fecal NIR spectra (sampled on day 14). 256 data were from lactating cows (Holstein), 249 data from young cattle (Holstein heifers, young Belgian blue bulls) and 346 data from beef cattle (Charolais, dual purpose Belgian blue, Belgian blue cows, beef-on-dairy crossbred bulls). These categories of animals have been used to develop independent and common prediction models (10% of animals per category discarded for independant validation (P)). The PLS model including all categories of animals showed the best statistics: RPD=3, R^2P=0.87 and SEP=48 g/d, demonstrating the great potential of this approach even if the robustness needs to be improved.