

## Evaluation of organic matter digestibility on individual faeces samples on beef cattle in the tropics

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**Take home message** Prediction of organic matter digestibility by NIRS on individual dung or rectal samples may be a good indicator of feed efficiency in beef cattle in the tropics.

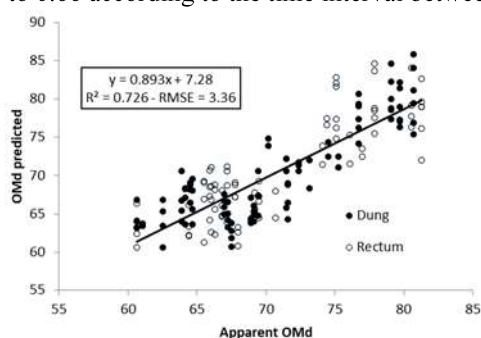
**Introduction** The improvement of feed efficiency in ruminants is a challenge, for its possible benefits on the economic results and on the environmental impacts. Moreover, it may have great implications in the tropics, where grass and forage feeding systems are predominant. However, the individual variations of feeding efficiency are difficult to assess, especially at pasture. Prediction of OMD by the mean of NIRS maybe a useful tool to evaluate this parameter (Boval *et al.*, 2004).

**Material & methods** Our experiment involved 8 Creole steers, 15 months old, maintained in individual feeding cages during the 8 week trial. They were fed with *Digitaria decumbens* grass, cut on the same forage plot. A first cut was performed three weeks before the beginning of the experiment, in order to allow a homogenous regrowth of the grass in the plot. The animals were fed *ad libitum* daily with the same forage, so that the age of the proposed grass varies from 24 days to 55 days.

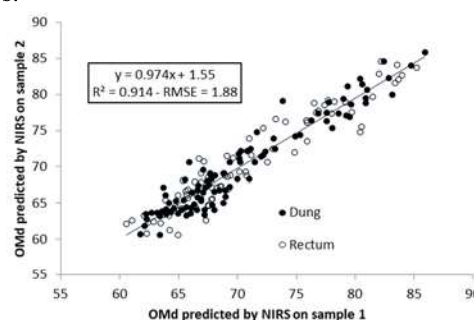
Each day (Monday to Thursday), the individual amount of forage offered was weighed, and distributed in two meals (at 7 and 12 h); a unique forage sample for the group of steers was collected. The forage refusal was also weighed daily (Tuesday to Friday) for each steer, before the first meal, and individual samples of the forage refusal were collected. Three types of faecal samples were collected daily: Tuesday to Friday, after the first meal, an individual sample was collected from a dung pat, for all the steers (sample 1); after the second meal, a second sample was collected either from a dung pat or from the rectum (sample 2), on 4 steers each type of sample; finally, Wednesday to Saturday, the total amount of faeces was weighted and homogenized, and a mean sample was collected. These daily mean samples were pooled weekly for each steer.

The laboratory analysis consisted of a standard determination of organic matter (OM) of the pooled faeces and of the forage samples, as well as an NIRS measurement of each faecal sample (samples 1 and 2, and pooled mean sample). The apparent mean OM digestibility was calculated weekly, as the ratio of OM retained (proposed – refused - excreted) on the ingested OM (proposed – refused); these values served for the calibration of the NIRS spectrum. The NIRS spectrum of samples 1 and 2 were used to predict the OMD on each sample. A total of 45 weekly measurement of apparent digestibility, and 371 predictions of OMD on individual samples were collected. The statistical analysis consisted of a correlation assessment of the individual measures of OMD among them or with the weekly means.

**Results** As expected, the apparent digestibility varied throughout the experiment, from 81.3 % at about 27 days of age to 61.6 % at about 53 days of age, according to the individual and the week. NIRS predictions of OMD on individual samples reflected the variability of the apparent mean digestibility (Figure 1) observed. NIRS predictions made on independent sub-samples collected daily were highly correlated ( $R^2=0.91$ ) (Figure 2). The correlation of subsequent NIRS predictions made during the week varied from 0.87 to 0.66 according to the time interval between the samples.



**Figure 1** Relationship between apparent OMD and NIRS prediction on individual dung or rectum samples (sample 2).



**Figure 2** Relationship between OMD predicted by NIRS on samples 1 and 2.

**Conclusion** This trial confirms that OMD predicted by NIRS in single samples may be useful to evaluate feed efficiency. These results may have practical applications in the field, for instance for the evaluation of individual variations. They have to be tested on more experimental and field trials, on different feeding regimes and type of animals, with more individuals.

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### References

Boval M, Coates DB, Lecomte P, Decruyenaere V and Archimede H 2004. Animal Feed Science and Technology 114, 19-29.