Faecal near infrared spectroscopy to assess diet quality in tropical and temperate grassland

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Objective

✓ To better assess the potential of natural grasslands to feed tropical and temperate livestock, by measuring diet quality in situ conditions.

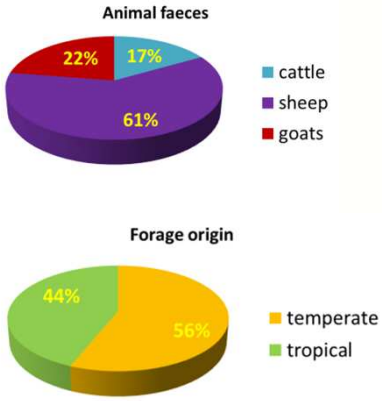
✓ To provide two essential characteristics of the diet quality, i.e. ***in situ digestibility of organic matter (OMD) and voluntary intake (DMVI, g / kg of metabolic weight)*** of grazing ruminants, from a large heterogeneous faecal NIRS (FNIRS) database, and by using various chemometric tools.

Material & Methods

- Three animal origins : **goat, sheep and cattle.**
- Two forage origins : **tropical** or **temperate** forages.
- 2214 original data : **OMD and DMVI** measured during various digestibility trials conducted in tropical and temperate zones

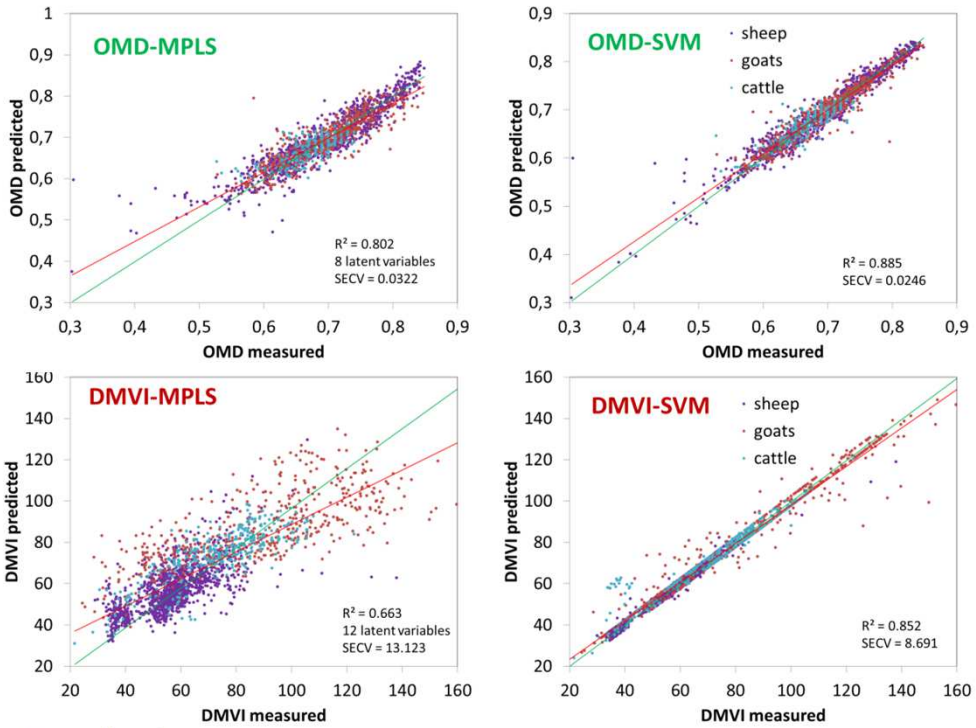
	Mean	Min	Max
OMD (digestibility unit)	0.687	0.303	0.849
DMVI (g/kg metabolic weight, MW)	66.1	24.0	163.0

- Two chemometric methods
  - Spectral treatment: SNV + Detrend + Second Derivative
  - MPLS: Modified Partial Least Squares procedure with cross validation
  - SVM: Support Vector Machines



Results & Discussion

Figure 1. FNIRS models for predicting OMD and DMVI of tropical and temperate forage : MPLS and SVM chemometric methods



MPLS model gives good precision for **OMD** with R^2 higher than 0.8 and standard error of cross-validation (SECV or prediction precision) close to 0.03 digestibility units.

DMVI appears more difficult to predict. MPLS model is poor (R^2<0.8, SECV>12 g/kg MW), probably due to a slightly non-linearity.

The SVM method allows correcting the non-linearity and improving the accuracy of both predictions of **OMD** and **DMVI**, as illustrated by higher R^2 and better SECV.

Conclusion

The use of appropriate chemometric models allows the **use of large temperate and tropical merged FNIRS databases for predicting *diet characteristics of grazing ruminants*** . The **best improvement is for dry matter intake**, where the error of estimation reached 13 % of the mean.

Working with large databases that encompass digestibility and intake level of various types of animals and forages is promising, associated to good chemometric models. The procedure proposed here can be a good alternative to reference methods for diet quality control.