

Nutritive quality of silages by conventional laboratory methods and near infrared reflectance spectroscopy

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Introduction Preservation of forages as silages is needed by dairy farmers in NW Spain to feed their cows during the dry (summer) and cold (winter) seasons. The objective of this work was to compare the prediction of *in vivo* digestibility values by conventional laboratory methods and by near infra-red reflectance spectroscopy (NIRS) for herbage and maize silages.

Material and methods The *in vivo* digestibility of 197 herbage and 93 maize silages from experiments and from farms was determined with sheep in the feeding unit of CIAM and their analysis by conventional laboratory methods was carried out to determine organic matter (OM), crude protein (CP), acid and neutral detergent fibres (ADF and NDF) and *in vitro* OM digestibility with rumen fluid (IVOMD) and pepsin-cellulase (PCOMD). Regression equations of *in vivo* OM digestibility (OMD) on laboratory parameters were obtained for both herbage and maize silages by Flores (2004). NIRS calibration equations were developed to determine OMD with the same sets of samples (Castro *et al.*, 2002, 2004) on a 6500 NIRSystem Spectrophotometer (Foss NIRSystem, Silver Spring, Washington, USA). Cross-validation values of OMD predicted by conventional methods were compared to those obtained by NIRS with WinISI 1.5 software (InfraSoft International, Port Matilda, PA, USA).

Results Best updated equations to predict *in vivo* OMD from laboratory parameters were those based on IVOMD and CP for herbage, $R^2_{cv} = 0.77$, $SECV = 3.24$ (for equation 1), and maize, $R^2_{cv} = 0.50$, $SECV = 2.33$ (2), silages

$$(1) \text{ OMD} = 12.63 + 0.716 \text{ IVOMD} + 0.521 \text{ CP}$$

$$(2) \text{ OMD} = 12.77 + 0.701 \text{ IVOMD} + 0.516 \text{ CP}$$

Regression of cross-validation results from equations (1) and (2) and NIRS analysis ($R^2_{cv} = 0.84$, $SECV = 2.76$ for herbage and $R^2_{cv} = 0.55$, $SECV = 2.13$ for maize) on *in vivo* OMD values of herbage and maize silages are shown in Figures 1 and 2, respectively.

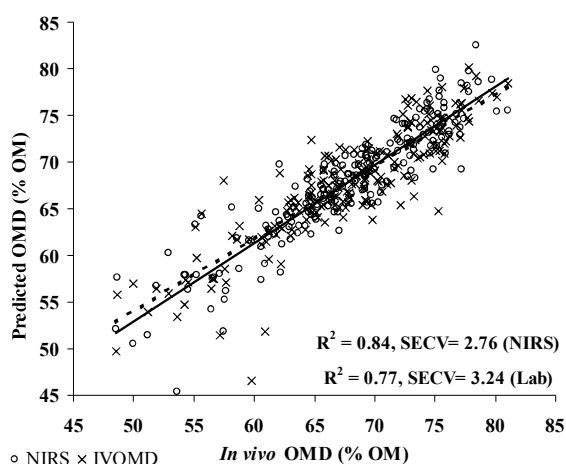


Figure 1 Organic Matter Digestibility (OMD) of herbage silages by conventional methods (Lab) and NIRS

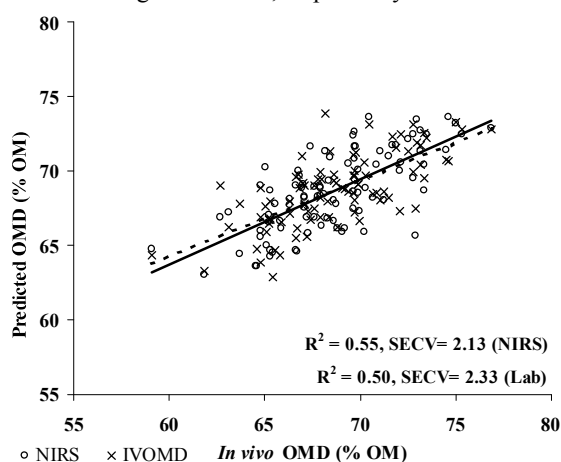


Figure 2 Organic Matter Digestibility (OMD) of maize silages by conventional methods (Lab) and NIRS

Conclusions The results from the present study demonstrate that NIRS analysis is the best method to predict *in vivo* OMD, not only because of practical reasons (faster, cheaper, easier) but also because of its higher precision.

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