P6-10

THE USE OF NEAR INFRARED REFLECTANCE SPECTROSCOPY (NIRS) TO PREDICT CHEMICAL COMPOSITION ON MAIZE SILAGE

D. Cozzolino, Fassio, A. , Mieres, J. and Y. Acosta

INIA La Estanzuela, National Institute for Agricultural Research, Animal Nutrition. Ruta 50 – km 12. Colonia, Uruguay. CC 39173. FAX: ++ 598 522 4061. Email: cozolino@inia.org.uy

Microbiological examination of silage is of little value in gauging the outcome of silage, and so chemical analysis is more reliable and meaningful indicator of quality. On the other hand chemical assessments of the principal fermentation products provide an unequivocal basis on which to judge quality. Livestock require energy, protein, minerals and vitamins from their food. While fresh forages provide these essential items, conserved forages on the other hand may be deficient in one or more of them. The aim of the conservation process is to preserve as many of the original nutrients as possible, particularly energy and protein components (Woolford, 1984). Silage fermentation is important to preservation of forage with respect of feeding value and animal performance. Chemical and bacteriological changes in the silo during the fermentation process can affect adversely nutrient yield and quality (Moe and Carr, 1984). Many of the important chemical components of silage must be assayed in fresh or by extraction of the fresh material, since drying either by heat or lyophilisation, volatilises components such as acids or nitrogenous components, or effects conversion to other compounds (Abrams *et al.*, 1987). Maize silage dorms the basis of winter rations for the vast majority of dairy and beef cattle production in Uruguay. Since nutrient intake, particularly energy, from forages is influenced by both voluntary dry matter intake and digestibility; there is a need for a rapid technique for predicting these parameters in farm advisory systems. Near Infrared Reflectance Spectroscopy (NIRS) is increasingly used as a rapid, accurate method of evaluating chemical constituents in cereals and dried forages. For many years NIRS was applied to assess chemical composition in dry materials (Norris *et al.*, 1976, Flinn *et al.*, 1992; Murray, 1993, De Boever *et al.*, 1996, De la Roza *et al.*, 1998). The objectives of this study were (1) to determine the potential of NIRS to assess the chemical composition of dried maize samples and (2) to attempt calibrations on undried samples either for farm advisory systems or for animal nutrition research purposes in Uruguay. NIRS were used to assess the chemical composition of whole - plant maize silage samples (*Zea mays, L*). A representative population of samples (n = 350) covering a wide distribution in chemical characteristics were used. Samples were scanned at 2 nm intervals over the wavelength range 400 – 2500 nm in a NIRS 6500 (NIRSystems, Silver Spring, MD, USA) in reflectance mode. Cross validation was used to avoid overfitting of the equations. The optimum calibrations were selected on the basis of minimising the standard error of cross validation (SECV). The calibration statistics were R^2 0. 86 (SECV: 11.4), 0.90 (SECV: 5.7), 0.90 (SECV: 16.9) for dry matter (DM), crude protein (CP), acid detergent fiber (ADF) in g kg^{-1} on dry matter, respectively for maize silage samples. This work demonstrates the potential of NIRS to analyse whole - maize silage in a wide range of chemical characteristics for both advisory farm and nutritive evaluation.