Determination of Cellulose, NDF, ADF and Lignin Content Using Non-Destructive Method (FT-NIR Spectrometry) in Hay from Apuseni Mountains

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Abstract. The nutritive value of forages is variable and because of this are made different tests in chemical composition. The objectives of study are to build calibration model for direct, non-destructive analysis of crude cellulose, NDF, ADF and lignin contents based on FT-NIR spectroscopy. The samples for analysis were collected in 2010 from field trials, Apuseni Mountains, Gârda Area. In order to construct the model, references values are needed, for this reason the crude cellulose, NDF; ADF and lignin content was determined using the classical Fibertec FiberCap system (FOSS Tecator). The values for crude cellulose ranged from 20.13% to 32.86%, the values for NDF content ranged from 32.67% to 59.40%, the values for ADF content ranged from 28.29% to 42.91%, the values for lignin content ranged from 4.74% to 11.15% in the dry matter basis. The regression models build was based on Partial Least Squares (PLS) calculated with the Modified PLS algorithm, using different pre-processing techniques and leave-one-out cross validation, under ISI Monitor v.1.50e. First time was validating the results using the calibration of the CRA-W, to see if classical methods used give good results. Because the samples contain Arnica montana (known like "leopard herb" or "tobacco montana") the calibration model contain tropical herbs. The robustness of the model was confirmed by applying it to independent samples (external validation) where the SEP for crude celluloses is 1.2, for NDF content is 2.0, for ADF content is 2.4, for lignin content is 2.3. The results obtained indicated that NIRS can be used to determine crude cellulose, NDF, ADF and lignin content, which could be used as a criterion for quality control of mountain hays.

Keywords: NIRS, hay, crude cellulose, NDF, ADF, lignin, PLS, non-destructive method.

REFERENCES