

Calibration equations for determining nutritional components of forage soybean in near-infrared spectroscopy analysis ⁽¹⁾

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Abstract

The purpose of this study was to establish the calibration equations for determining the chemical components of forage soybean by near infrared spectroscopy (NIRS). 274 samples were collected and scanned by NIR spectrums for setting up the basic calibrations. The determined constituents included crude protein (CP), acid detergent fiber (ADF) and neutral detergent fiber (NDF). The regression coefficients (R^2) of CP, ADF and NDF were 0.98, 0.83 and 0.95, the standard error of calibration (SEC) were 0.58, 1.66 and 1.31% and the standard error of cross verification (SECV) were 0.70, 1.77 and 1.44%, respectively. The basic calibration equations were verified with another 51 samples. The predicting results showed that the biases of the means for CP, ADF and NDF were 0.09, 0.11 and 1.25%, the standard error of prediction (SEP) were 1.16, 2.82 and 2.08%, the slope were 0.99, 1.09 and 1.08, respectively. It indicated that the basic calibration equations were accurate for samples from various sources. Then, the new sample sets were added to update the basic calibration. The R^2 of the updated regressions for CP, ADF and NDF were 0.97, 0.84 and 0.95, the SEC were 0.65, 1.72 and 1.31% and the SECV were 0.71, 1.92 and 1.47%, respectively. The RPD (the ratio of the standard deviation of constituent to the standard error of prediction) were 6.7, 2.6 and 4.5 for CP, ADF and NDF, respectively. All of the calibration equations were acceptable for accurately predicting the above-mentioned constituents. The diversified samples of the calibration equations including different sources of variety, cropping area, cropping season, maturity and ensiling. The results showed that the calibration equations established were acceptable and accurate for constituents predicting both in fresh or ensiled forage soybean.

Key words: Forage soybean, Near infrared spectroscopy, Rapid analysis.

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