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The application of near infrared reflectance spectroscopy in nutrient ingredient determination of silage maize

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Key words: NIRS, silage maize, ADF, NDF, CP

Introduction Near infrared reflectance spectroscopy (NIRS) is a new analysis technique applied in many fields and many countries as the standard determination method. It is significant to establish near infrared determination technique of silage maize to accelerate determination speed and improve determination precision of silage maize quality in our country.

Methods 204 maize varieties in and abroad were selected in the study and were prepared to silage sample at ripening stage. Based on the two determinations of NDF, ADF and Crude fiber of silage maize, one by Dumas Combustion Method for Nitrogen Analysis and laboratory analysis, another by Near-Infrared spectrum analyzer DA7200 (Figure .1), the evaluation models of NDF, ADF and Crude fiber contents were established.

Table 1 Nutrient Ingredient Analysis of Silage Maize.

Constitutes	Sample No	Mean (%)	Min (%)	Max (%)	Average Deviation
CP	154	8.40	6.62	10.62	0.67
NDF	154	62.75	48.29	74.26	4.33
ADF	154	34.60	19.17	44.38	5.26
Energy	154	16.45	15.89	16.96	0.16
Crude fiber	154	28.16	74.26	29.88	2.46

CP: crude protein NDF: neutral detergent fiber ADF: acid detergent fiber

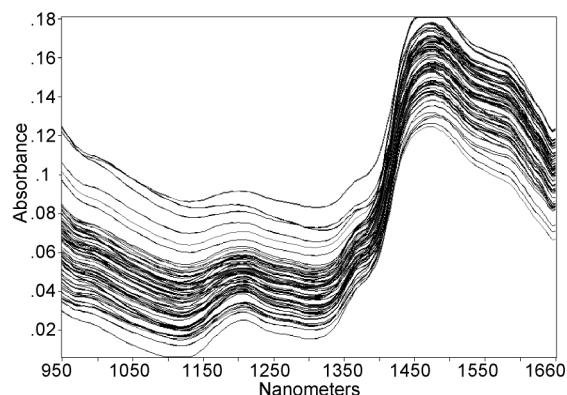


Figure 1 Near infrared spectrogram of silage maize.

Results The indices of CP, NDF, ADF and Crude fiber of sample silage maize vary widely and can be used in the establishment of each NIRS calibration model (Table 1). The NIRS calibration models of CP, Crude fiber, NDF and ADF were established based on the conventional spectral pretreatment and cross validation analysis. The correlation between chemical value and NIRS predicted value is remarkable (Table 2).

Table 2 Statistical Indices of NIRS Calibration Model.

	ADF	NDF	Energy	CP
Correlation coefficient	0.93	0.83	0.82	0.70
SECV	1.24	2.51	0.15	0.47
Factor number	9	9	9	9

SECV: standard error of cross-validation

Conclusions The establishment of near infrared determination technique is significant to improve rapid determination of silage maize quality further. Other indices should be considered in the determination of silage maize quality.

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