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

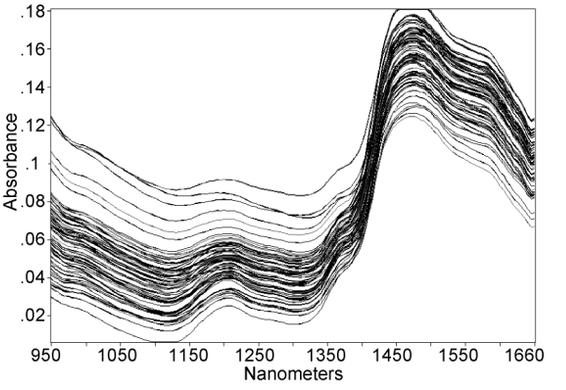

Figure 1 *Near infrared spectrogram of silage maize .*

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 .

References

Argillier , O . , Barriere , Y (1996) . Genetic variation for digestibility and composition traits of forage maize and their change during the growing season . *Maydice* , 41 , 279-285 .
Argillier , O . , Mechin , V . , Barriere , Y (2000) . Inbred line evaluation and breeding for digestibility related traits in forage maize . *Crop Sci* . , 40 , 1596-1600 .