

Abstract

Rapid near infrared spectroscopy screening for fructan content in fresh grass to estimate the risk potential of laminitis for horses

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Introduction

Grass species of temperate climate zones can produce increased amounts of fructans depending on weather conditions and cultivation measures. Fructans may cause laminitis, a severe horse disease. Therefore it is reasonable to improve existing preventive measures like grazing and feed management based on fructan content. For this reason, a rapid test for estimating the fructan content in fresh grass by NIR spectroscopy was developed.

Materials and Method

A field trial with 16 special grass mixtures for horse pastures was established comparing 2 nitrogen fertiliser levels including 3 cutting dates. In total, 192 samples were available for calibration experiments. Measurements of fresh samples were carried out using a diode array spectrometer covering a wavelength range from 850 to 1650 nm (PSS 1721, Polytec, Germany). The spectral acquisition of fresh plant material at harvest time is performed with at-line equipment. Measurements of dried, ground samples were carried out using the NIRSystems 5000 (FOSS, Denmark) covering the spectral region from 1100 to 2500 nm. For the development of calibration models, mPLSR in combination with data preprocessing (WinISI II; Infrasoft International) was used.

Results and Discussion

As expected, the standard error of prediction in calibration of fresh samples (RMSEP: 1.19 %DM) is about double that of dry samples (RMSEP: 0.71 %DM). However, the accuracy of prediction for the assessment of fructan content in fresh grass is sufficient. The model performance metered by the RPD scale according to Williams et al. (1996) is very good (RPD = 6.55).

Conclusion

The calibration results show that the fructan content of fresh grass can be estimated by NIRS with sufficient accuracy and can be used to reasonably support horse grazing and feed management.