

Application Note

Wet forage



Introduction

Forage - grass and maize silage - is widely used for feeding cows, and it is mandatory to know all the major components and the feeding value of these products. NIR analysers have replaced most of the traditional methods analysing the forage dried and ground. The NIR analysis time per sample is less than one minute but the drying and grinding of the sample takes several days so there is a need for analysing the wet forage to save time and money.

Q-Interline has developed a system for analysing wet forage where it is possible to get a representative measurement of the sample giving representative results.

Analyser: AgriQuant B8 with Spiral Sampler

The AgriQuant B8 is based on the latest generation FT-NIR technology and has the following main features:

- Cutting edge spectral performance and best signal to noise ratio on the market
- Very easy to operate and maintain
- Strong software package with InfraQuant and Horizon QI
- Maintenance free. The lamp has an expected lifetime of 10 years.

Analysis:

The sample is analysed by reflection measurement in a glass tube with lids, which is rotating – and moved forward – during analysis. By rotating the glass tube and bringing it forward at the same time a very large area of the sample is scanned ensuring representative sampling and reducing effects from product heterogeneity. The area analysed can be as large as 375 cm² and this is almost 20 times large than the area scanned using a normal petri dish.

The glass tube has a large opening for easy filling. After analysis the sample can easily be removed since there are lids in both ends of the tube.

See a video presentation of the AgriQuant B8 on our homepage: www.q-interline.com and experience how easy it is to perform the analysis on the AgriQuant B8.

Calibration

The AgriQuant B8 is calibrated against certified methods for the different components.

The NIR region contains both combination and overtone information. The most sensitive bands are those derived from the O-H, N-H and C-H stretch regions.

Different pre-processing has been used for the different components, typically mean centring and manual base line correction – sometimes 1st or 2nd derivative (Savitsky-Golay). A Partial Least Squares (PLS) model was developed based on the analytical and spectral data.

Calibration Performances

More than 300 samples of wet maize silage and 200 samples of wet grass silage have been used for the calibrations. The material was taken directly as received at the laboratory and put into the glass tubes. Some of the samples have been frozen before thawed and analysed. Table 1 shows the performance of the calibrations developed. All properties (except dry matter) are on dry matter basis.

Maize silage	Range	SECV
Dry Matter	18-56	1.3
Protein %	4-9	0.39
Starch %	10-65	2.6
Cellulose %	16-23	0.71
D-Cell %	60-74	0.76
Ash %	2.9-5	0.22
NDF %	31-45	1.6
Lactic Acid g/kg	5-85	4.3
Grass silage	Range	SECV
Dry Matter	15-60	1.1
Protein %	6-20	0.7
Oil %	1-6	0.29
ME (MJ/kg)	9-12	0.23
Ash %	4-13	0.6
NDF %	36-62	1.7
Lactic Acid g/kg	5-105	8
Grass and Hay silage	Range	SECV
Dry Matter	15-92	1.6
ME (MJ)	8-12	0.24

Table 1: Performance of the wet forage calibrations

Conclusion

The AgriQuant B8 is a strong FT-NIR analyser for wet forage supplying results in less than 2 minutes for multiple components. With the AgriQuant B8 you can eliminate drying and grinding of the sample and save both time and money.

The AgriQuant B8 is excellent for analysing heterogenic samples since the sample area analysed can be as big as 375 cm².

The AgriQuant B8 comes with the intuitive InfraQuant software which guides the operator through the steps of the analysis and the results are displayed with easy to understand color codes. The system can be used with barcode option for easy entering of the sample ID and it can also be equipped with a label printer to get the result on a label to stick directly on the bag the sample arrived in. Analytical results are automatically exported in .xml files for use in your Lims or Sap system.

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