Analysis of Ruminant Feed Using the DA 7250 Feed Analyzer

Introduction

Animal performance and milling cost are dictated by nutritional requirements. Feed producers must have full knowledge of the nutritional value of raw materials and finished products.

The Near Infrared Reflectance (NIR) technique is highly suitable for this purpose, but limitations in older instrument have not permitted users to reap the full benefits of NIR. Sample preparation requirements such as grinding or special cups made analyses laborious and time consuming.

DA 7250 Feed Analyzer

The DA 7250 is a proven, full-spectrum NIR instrument designed for use in the feed industry. Using novel diode array technology it performs a multi-component analysis in only 6 seconds with no sample preparation required.

During this time a large number of full spectra are collected and averaged. As the sample is analyzed in an open dish, the problems associated with sample cups are avoided and operator influence on results is minimal.

Experimental

Several thousand samples of pelletized feed and mixed feed were collected over 10 years, from feed producers globally. The samples were analyzed on multiple DA 7250 Feed Analyzers, with no grinding or other sample preparation. Each sample was analyzed with 2 repeats and 2 repacks.

Calibrations were developed by Perten Instruments using Partial Least Squares (PLS) regression, a method which develops robust and stable calibrations. Savitsky-Golay1st derivative and SNV data pretreatments were used to improve the calibration models.

Results and discussion

The DA 7250 Feed Analyzer measured the samples similarly in accuracy to the reference method results. Statistics for the respective parameters are presented in the table below and graphs are displayed on page 2.

Parameter	Samples	Range	R
Moisture	2400+	7.1 – 25.2	0.88
Protein	2700+	5.2 – 43.0	0.97
Fat	2000+	0.8 – 15.3	0.97
Fiber	1200+	0.9 – 20.5	0.92
NDF	100+	11 – 42	0.94
ADF	100+	8 – 20	0.97
ADL	100+	1.2 – 6.6	0.91
Starch	100+	16.8 – 44.0	0.96
Ash	700+	2.0 – 18.3	0.81
Calcium	300+	0.3 – 6.9	0.82
Phosphorus	100+	0.4 – 2.0	0.98

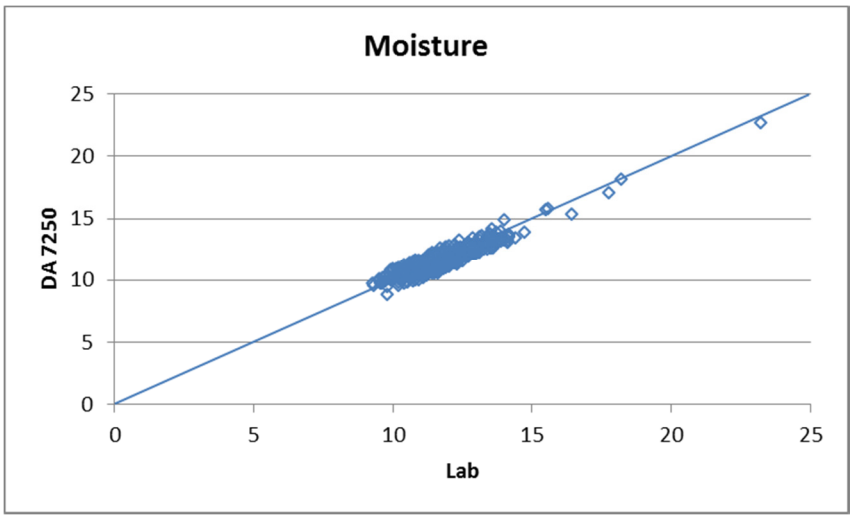
The differences between the DA 7250 and the reference methods are of the same magnitude as the typical differences between two reference labs.

Considerable product variation is built into these calibrations. This is important as ingredients and formulations change over time. The statistics reported above therefore represent true future performance.

In summary it is concluded that the DA 7250 Feed Analyzer can analyze the aforementioned parameters in ruminant feed accurately in 6 seconds. The calibrations can be used on any DA 7250 instrument, for many different product types/formulations, and without any grinding of samples.

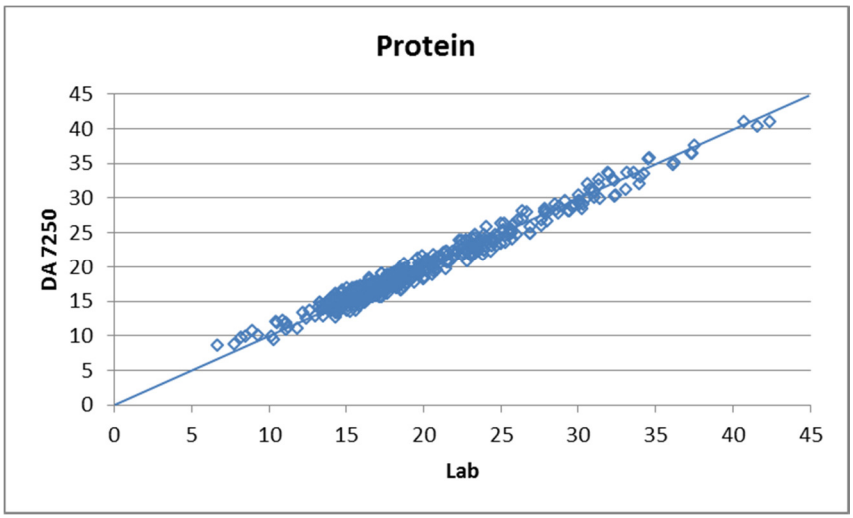
Moisture

The DA 7250 determines moisture very accurately. It is highly suitable for monitoring of the cooling/drying, and for verifying moisture content at load-out helping avoid mold issues.



Protein

The calibration covers a very wide range, and accurately measures high protein samples. This means that all types of products can be analyzed with the same calibration.



Fat

Results are very consistent from low to high fat samples with very small differences between reference analysis and NIR.