Analysis of Meat and Bone Meal using the DA 7250 NIR Analyzer

Introduction

Fast compositional analysis of meat and bone meal is very valuable when running a rendering plant producing the meal or formulating pet foods from it. Rendering plants can use results to monitor and control the process avoiding production of out-of-spec material. Pet food manufacturers can use the results to verify the purchased meal is correct in specification and to optimize formulation and cost control of ingredients.

The Near Infrared Reflectance (NIR) technology is highly suitable for these purposes. Instead of the time consuming and labor intensive traditional wet chemistry methods, with NIR the multi component analysis is done in seconds. The latest technology and software developments allows the benefits to be even further exploited with easy to use instruments and web based instrument networking.

DA 7250 NIR Analyzer

The DA 7250 is a Near Infrared Reflectance (NIR) instrument is designed for optimal use on agricultural products. Using novel Diode Array technology, the DA 7250 is unique in its measurement speed, versatility and accuracy.

The instrument is handled by an intuitive touch screen interface and analyze samples in flexible open dishes in less than ten seconds.

The DA 7250 instrument is IP 65 rated and also available in stainless steel sanitary design version, allowing it to be used in the lab as well as in the production environment.

Method

Spectral data were collected on more than 1500 samples from several producers, using multiple DA 7250 instruments. Each sample was analyzed with 2 repacks in a large 150 mm diameter open faced sample dish with no prior grinding. The large surface area, in total arund 350 cm^2, helps to remove effects of heterogeneity associated with odd pieces of large bone.

Calibration models were developed to model the relationships between the instruments NIR spectra and related reference chemistry results of moisture, protein, fat and ash. Model development were done using scatter correcting spectra pre-treatments and multivariate Partial Least Squares, PLS, regression and Perten Hongis Regression, HR, a proprietary calibration methology designed for handling complex heterogeneous samples like meat and bone meal.

Results and Discussion

The developed meat and bone calibrations for the DA 7250 showed high correlation and accuracy, similar to the reproducibility of the reference methods. Statistics are presented in the table 1 and calibration graphs for protein, moisture and fat models are displayed on second page.

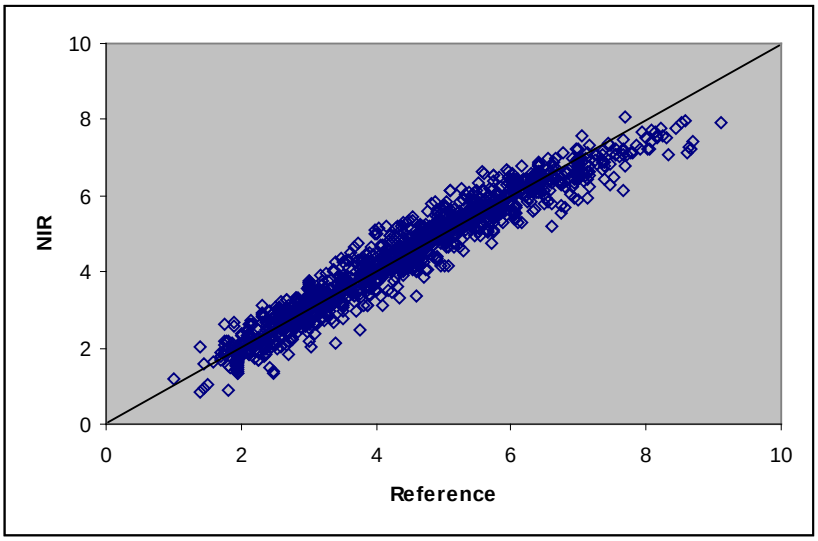
Parameter	Range %	Samples	R
Moisture	1.0 – 9.1	1500+	0.97
Protein	38.7 – 69.2	1500+	0.96
Fat	5.6 – 22.7	1500+	0.96
Ash	4.2 – 42.5	1500+	0.96

Table 1

In summary it is concluded that the DA 7250 accurately can determine moisture, protein, fat and ash in meat and bone meal in a few seconds with very convenient samples handling using large open faced dishes.

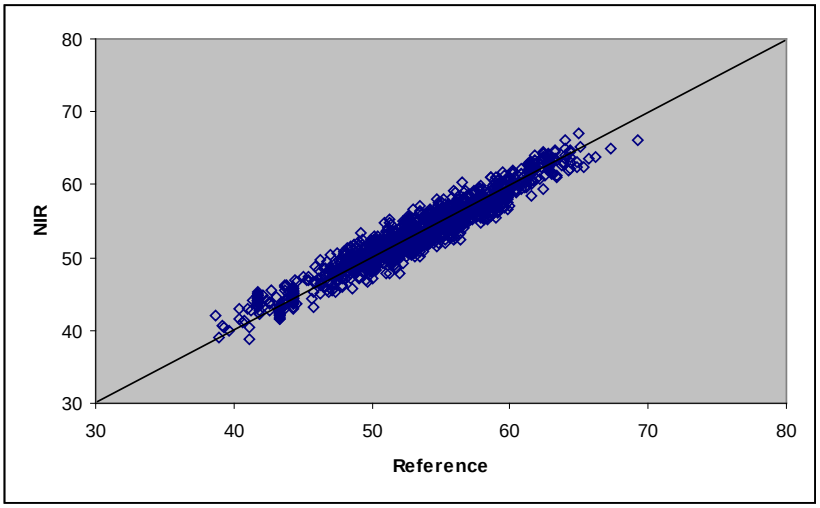
Moisture

The calibration covers a very wide range, enabling rendering plants to use moisture readings to optimize production process and get product closer to specification.



Protein

The protein calibrations covers a wide range and is very accurate. This makes it highly suitable for verification against product specifications.



Fat

The DA 7250 provides rapid and accurate results from low to high fat content samples.