

Analysis of Meat & Bonemeal Using the DA 7200

Introduction

Compositional analysis of meat & bone meal is vital to running a rendering plant and to formulating pet foods. Rendering plants can use the essentially real time analysis to monitor and control the process avoiding production of out-of-spec material. Pet food plants can use the system to optimize formulation and cost control of ingredients.

The Near Infrared Reflectance (NIR) technique is particularly suited for this, but in the past instrument limitations have not permitted users to reap the full benefits of NIR. Sample preparation requirements, special cups, and a small analysis area made analyses laborious, time consuming and error-prone.

Diode Array 7200

The DA 7200 is a new full-spectrum, NIR instrument designed for use in the agricultural industries. Using novel diode array technology, it performs a multi-component analysis in only 6 seconds with no sample preparation required.

During this time approximately 300 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

Spectral data was collected on more than 1500 samples from several producers, using multiple DA 7200 instruments. Each sample was analyzed with 2 repacks in a 5” diameter open faced sample dish with no prior grinding. The large surface area helps to

remove effects of heterogeneity associated with the odd piece of large bone.

Perten Instruments developed calibrations using Partial Least Squares (PLS) regression. Multiplicative Scattering Correction (MSC) and Savitsky–Golay 1st Derivative were used as a data pre-treatments to improve the calibration models.

Results and discussion

The DA 7200 results are very accurate when compared to the results from the reference methods. Statistics for the respective parameters are presented in the table below and graphs are displayed on page 2.

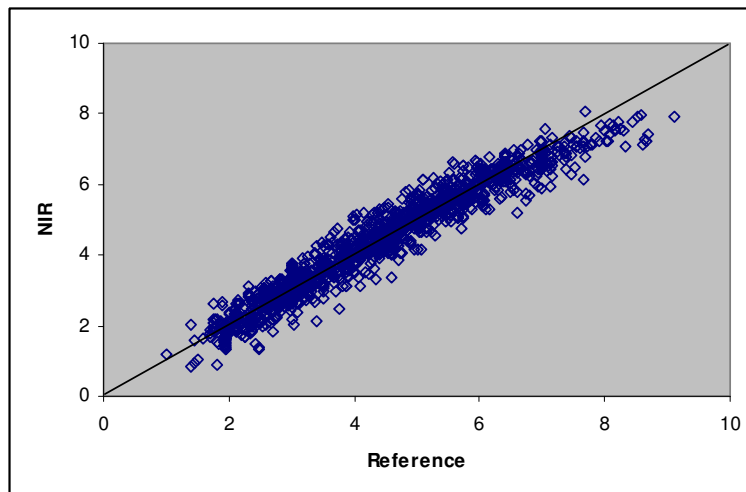
Parameter	Range	Samples	R ²	SECv*
Moisture	1.0 – 9.1	1500+	0.97	0.37
Protein	38.7 – 69.2	1500+	0.96	1.35
Fat	5.6 – 22.7	1500+	0.96	0.56
Ash	4.2 – 42.5	1500+	0.96	1.7
Arginine	2.9 – 4.8	300+	0.88	0.16
Cysteine	0.2 – 3.1	300+	0.97	0.11
Isoleucine	0.8 – 3.2	300+	0.96	0.11
Leucine	1.8 – 5.7	300+	0.97	0.16
Lysine	1.7 – 4.4	300+	0.92	0.20
Methionine	0.4 – 1.7	300+	0.91	0.09
Threonine	1.0 – 3.1	300+	0.96	0.11
Tryptophan	0.2 – 0.7	300+	0.87	0.05
Valine	1.4 – 4.9	300+	0.95	0.17

The differences between the DA 7200 and the reference methods are of the same magnitude as typical differences between two different reference labs. The DA 7200 is more precise than the reference methods meaning that replicate analyses are much more repeatable and representative.

In summary it is concluded that the Diode Array 7200 can analyze liquid meat & bonemeal for the aforementioned constituents. The overall sampling speed and analysis speed produces results in nearly real-time allowing for constant monitoring and control.

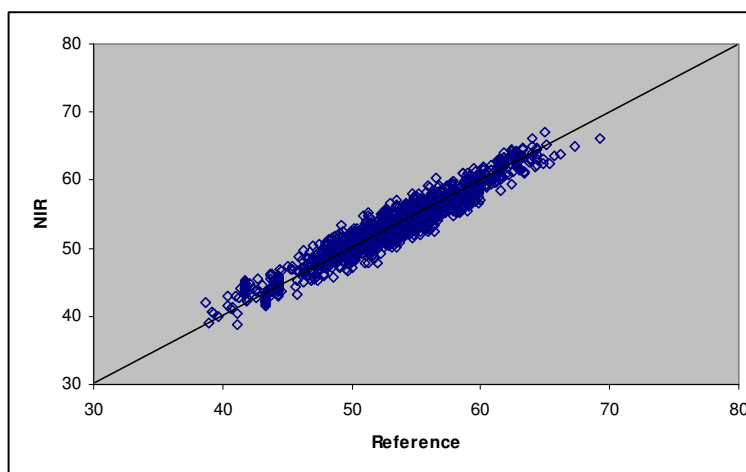
Moisture

The calibration covers a very wide range and will enable rendering facilities to optimize the process.



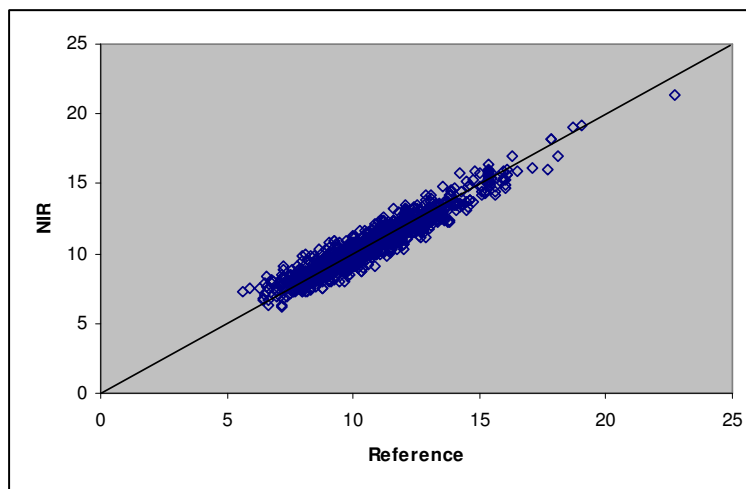
Protein

With the DA 7200 protein content can be determined very accurately. This makes it highly suitable for verification against product specifications.



Fat

The DA 7200 provides rapid and accurate results, from low fat contents to very high fat samples.



* SECV is the standard deviation between NIR and Lab data calculated in a way that describes the future performance of the calibration.