Analysis of Feather Meal using the DA 7250 NIR Analyzer

Introduction

For processors and users of feather meal, it’s essential to test samples for nutritional composition and rapid analysis of parameters such as moisture, protein, fat, and ash. The near infrared reflectance (NIR) technique is perfect for measuring these types of samples. In the past, instrument limitations have prevented users from reaping the full benefits of NIR. Instruments were slow and sample preparation required packing special cups and carefully cleaning between samples, making analyses laborious, time consuming, and error prone.

DA 7250 NIR Analyzer

The DA 7250™ uses novel Diode Array NIR technology and performs a multi-component analysis in less than 10 seconds. During this time a large number of full spectra are collected and averaged.

The instrument is handled by an intuitive touch screen interface and analyze samples in flexible open. As samples are analyzed in open cups, or even disposable petri dishes, no or minimal cleaning is required and there is no risk of sample cross-contamination.

The DA 7250 Sanitary Design version is IP65 rated and its stainless-steel design and open analysis area make it easy to clean and ideal for use in production areas as well as in the lab.

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Method

Around 3000 feather meal samples from various producers and countries were analyzed on multiple DA 7250 instruments. Spectral data were collected using open faced samples dishes. Calibrations were developed to model the relationships between the collected NIR spectra and reference chemistry results using PerkinElmer proprietary Hongis Regression, HR, algorithm type. HR is designed to handle large product variability and long calibration ranges.

Results and Discussion

Using HR calibration type, it was possible to include considerable product variability into models, while having high accuracy. The differences between the DA 7250 and the reference method results are of the same magnitude as typical differences between two different reference labs. The large product variability built into the calibrations will allow them to be robust and accurate even as raw materials source and product specifications change over time.

Table below summarizes statistics of developed calibrations. Reference vs NIR calibration graphs of the Moisture, Protein and Fat models are displayed in Figures to the right.

Table 1. Statistics of DA 7250 feather meal calibrations.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>N</th>
<th>Range</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture %</td>
<td>2900+</td>
<td>0.7 – 15.9</td>
<td>0.89</td>
</tr>
<tr>
<td>Protein % asis</td>
<td>2600+</td>
<td>38.2 – 89.1</td>
<td>0.96</td>
</tr>
<tr>
<td>Fat % asis</td>
<td>2800+</td>
<td>5.2 – 32.6</td>
<td>0.92</td>
</tr>
<tr>
<td>Ash % asis</td>
<td>2900+</td>
<td>0.6 – 43.2</td>
<td>0.95</td>
</tr>
</tbody>
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In summary it is concluded that the DA 7250 NIR Analyzer accurately can analyze feather meal in a few seconds with very convenient samples handling using large open faced dishes.