

Analysis of Dried Distiller's Grain (DDG) Using a Perten DA 7250 Diode Array Based High Speed Analysis System

Introduction

Analysis of Dried Distiller's Grain (DDGs) is an important aspect of Ethanol Production and Feed Manufacturing. The composition affects processing of the materials and the profitability of selling & buying this important by-product / ingredient. Ethanol producers can use the real time analysis to monitor and control the process. Monitoring moisture content allows operators to optimize the drying process ensuring an acceptable end product while reducing energy usage. Feed plants can use the system to monitor suppliers, optimize formulation, and for cost control of ingredients.

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

DA 7250 NIR Analyzer

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



During this time approximately many 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

DDG samples with reference values were supplied by several Ethanol Manufacturers and Feed Companies. The DDGs represented different feed stocks and process variations. Spectral data was collected on multiple DA 7250 instruments. The samples were analyzed in the large sample dish for collection on maximum sample area. Perten Instruments combined the data from the

separate instruments and developed calibrations using Honigs regression (HR). Harmonization was used as a pre-treatment to improve the calibration model.



Results and discussion

The DA 7250 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.

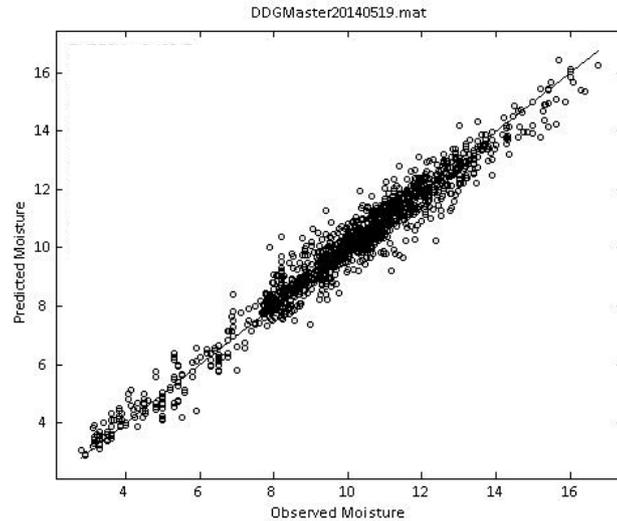
Parameter	Range	Samples	R
Moisture	3.00 - 16.75	1380+	0.980
Protein	20.40 - 38.49	1240+	0.981
Fat	5.40 - 13.22	750+	0.912
Fiber	4.75 - 12.50	470+	0.793
Ash	2.69 - 6.80	510+	0.795
ADF	8.48 - 17.90	360+	0.772
NDF	20.04 - 37.60	320+	0.736
Starch	0.45 - 14.59	430+	0.956
Sulfur	0.28 - 1.16	600+	0.889
Phosphorous	0.44 - 1.02	330+	0.754
L (color)	41.42 - 63.60	190+	0.920

The differences between the DA 7250 and the reference method are of the same magnitude as typical differences between two different reference labs. The DA 7250 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 7250 can analyze DDGs for the aforementioned constituents. The large spot size and analysis area remove the effects of sample heterogeneity thereby producing more reliable and representative results. The speed allows users to easily and accurately analyze many samples a day in nearly real-time with no sample prep or clean-up.

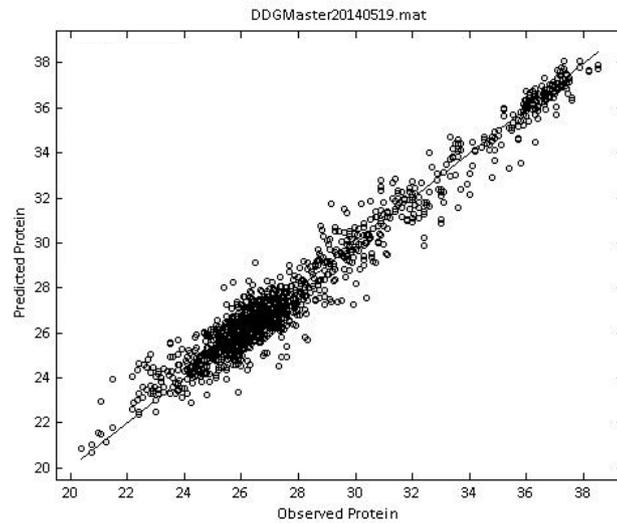
Moisture

The DA 7250 can be used to monitor and control moisture content. Moisture impacts production cost, safety via mold/toxins growth, and pricing.



Protein

DDG protein has fast become a valuable source of protein for animal feeds..



Starch

Starch measurement serves as a valuable analysis for producers to measure efficiency. Starch is also a valuable energy source in animal feeds.

