Analysis of Wetcake Using a Perten DA 7250 Diode Array Based High Speed Analysis System

Introduction

Ethanol production is a fast growing segment of grain processing. To make the ventures profitable, fast and accurate analyses are required to move as much product through the process while optimizing use of raw materials and enzymes and reducing energy use. One critical control point is monitoring wetcake.

The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of syrup, but 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.

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 prep or clean-up required.

During this time 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

Spectral data was collected on over 200 wetcake samples using multiple DA 7250 Analysis systems. A primary advantage of the DA 7250 is its use of non-contact sampling. Each sample was placed into a large sampling dish, analyzed, and discarded. The large dish removes the need for time consuming cell cleaning, possibilities of cross contamination, and significantly speeds up the analysis process. The reference analyses used for calibration development were supplied by the processors. Perten Instruments 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	39.80 - 73.98	560+	0.982
Protein	8.90 - 16.30	250+	0.978
Fat	1.93 - 7.31	105+	0.983
Crude Fiber	1.80 - 10.00	80+	0.845
Ash	0.66 - 4.60	100+	0.920
ADF	0.84 - 8.02	75+	0.836
NDF	8.3 - 14.6	50+	0.772
Starch	1.35 - 6.44	180+	0.925
Sulfur	0.12 - 0.51	120+	0.889
Phosphorous	0.15 - 0.61	55+	0.969

The differences between the DA 7250 and the reference results are of the same magnitude as typical differences between two different reference labs. The DA 7250 is a rapid way to monitor results without the need to wait for lengthy lab results. Replicate analyses are generally more precise than the reference methods

In summary it is concluded that the Diode Array 7250 can analyze wetcake for the aforementioned constituents. The large dish allow users to quickly and accurately analyze samples without any sample prep and minimal cleaning requirements. The overall sampling speed and analysis speed produce results in nearly real-time allowing for rapid feedback to monitor wetcake for dryer control at an Ethanol facility

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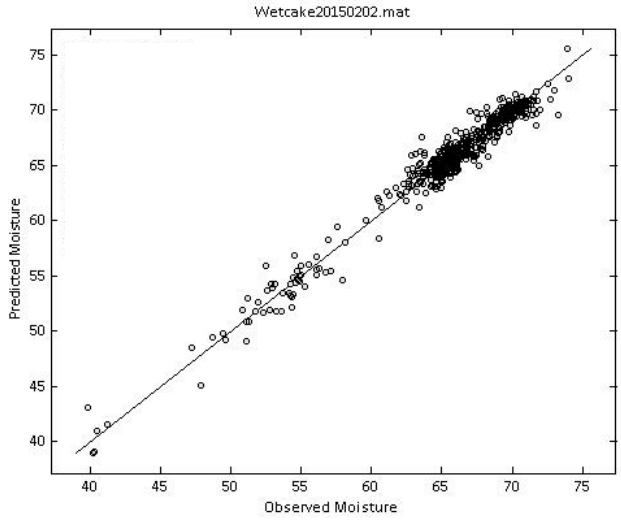
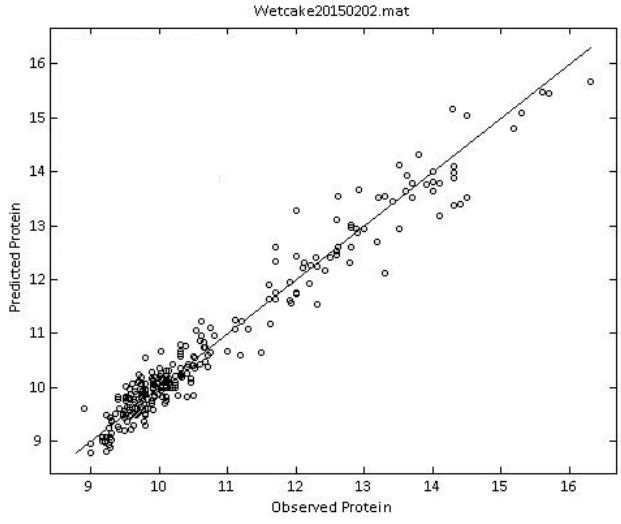
Moisture

Moisture is a critical parameter as it can be used to reduce dryer energy use. It is also an important value to know for product safety.



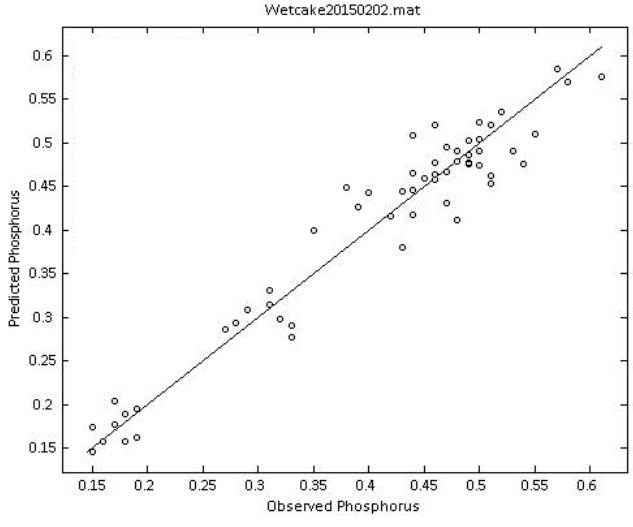
Protein

Protein measurement provides important nutritional information for feed manufacturers.



Phosphorous

Phosphorous is an important measurement when using wetcake and DDGs as a feed ingredient or supplement.



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