

**FOSS**

## Near Infrared Technology Application for Ethanol Yield Potential in Corn Grain

### Optimize Ethanol Yield from the Start

Success in ethanol production has a lot to do with the corn that is being processed. Sourcing the highest quality corn feedstock enables ethanol producers to make significant improvements in process yield. Rapid grading of corn grain for ethanol yield potential (EYP) at the receiving point is a key step in enabling ethanol producers to optimize plant yield by identifying and discouraging delivery of substandard grain.

Obtaining rapid results for ethanol yield potential (EYP) empowers ethanol producers to react

by managing the purchase and handling of corn grain feedstock according to process outcome in their plants.

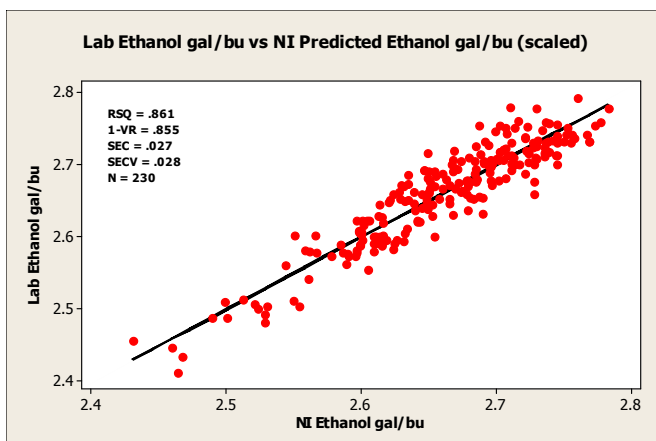
In order to identify genetic variation and enable point-of-sale measurement of ethanol yield potential of corn grain, Pioneer Hi-Bred developed a robust laboratory fermentation procedure which mimics commercial dry-grind ethanol process and then converted results from that process into a rapid, nondestructive method of analysis based on near infrared spectroscopy.

### Infratec™ - A Proven Worldwide Solution

Near Infrared Transmittance (NIT) technology has many advantages, including accuracy, repeatability, high speed, low cost, and non-destructive analysis. Infratec 1241 uses this technology to provide reliable measurements of key parameters for grain. It is ideal for analysis of grain at receiving. Ready to use ANN or PLS calibrations are available, and the patented stabilizing technique ensures that calibrations are transferable from instrument to instrument.



**FOSS Infratec 1241 is officially approved and established worldwide as a standard for determining protein, moisture, oil, starch in corn and other grain types.**



**Figure 1**

The Pioneer Ethanol Yield calibration is a PLS model for analysis of whole corn grain. The EYP model is robust and highly accurate, and developed to run on the Infratec 1241 (figure 1). The model reports ethanol yield potential (EYP) in gallons of denatured ethanol per bushel at 15% moisture and scaled to commercial plant process efficiency.

The model has been validated with an independent sample set in the laboratory (figure 2) and in commercial use (figure 3) and shown to be highly predictive of ethanol yield potential.

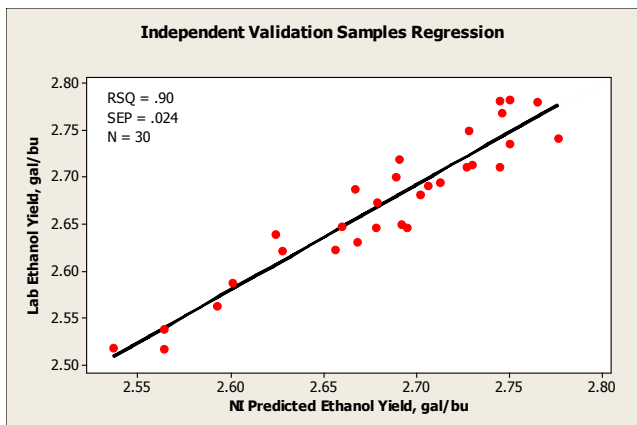


Figure 2

**Commercial Validation with Grain Segregated for Ethanol Yield Potential using NIR at Receiving**

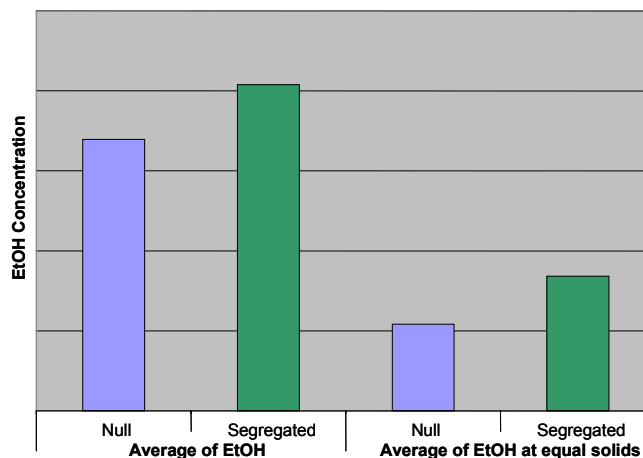


Figure 3. Calculations based on NIR predicted ethanol yield potential of segregated grain indicated that ethanol concentration would increase 1.1% in the final beer of fermentations using segregated grain. The actual increase in ethanol concentration was 1.7%.

**FOSS and Pioneer Collaboration**

As the industry leader in NIR technology, FOSS provides dedicated, accurate analytical solutions that provide analysis and control throughout the production process. Having worked in the grain industry for decades, FOSS is the ideal partner.

Pioneer is a leading developer of new measurement systems designed to quantify end-use functionality of corn grain for the major grain consuming industry segments.

The Pioneer QualiTrak<sup>SM</sup> system provides data reporting services for ethanol plants to simplify

summarization of grain quality data generated with this NIR technology and sharing of the information with grain vendors.

Together, FOSS and Pioneer are able to help ethanol producers take control of their ethanol production with timely information delivered at key decision points in the process.

FOSS and Pioneer have the experience, the products, and the global presence to ensure a rapid return on investment and a lasting plan for profitable production.



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