VS-3000 in a Craft Brewery

These slides compare readings from the *VS-3000 Beer Monitor* to readings taken in the brewery's QA lab. The data comes from a Craft Brewery, the *VS-3000 Sensor* was installed on a filling line.

- *VS-3000 Beer Monitor* is an online instrument which measures dissolved ingredients in beer 24 times per second. One sensor head measures Ethanol, Real Extract (°plato) and CO_2 simultaneously, 24x7. Original Extract, Real Degree of Fermentation, and Specific Gravity are also calculated using the same sensor.

- Data in the following charts is from 8 product runs and 5 beer types are shown
  - Pilsner, IPA, Brown Ale, Unfiltered Ale, Imperial IPA

- No offsets/brand adjustments were used on the VS-3000

- *VitalSensors* VS-3000 data recorded every 30 seconds

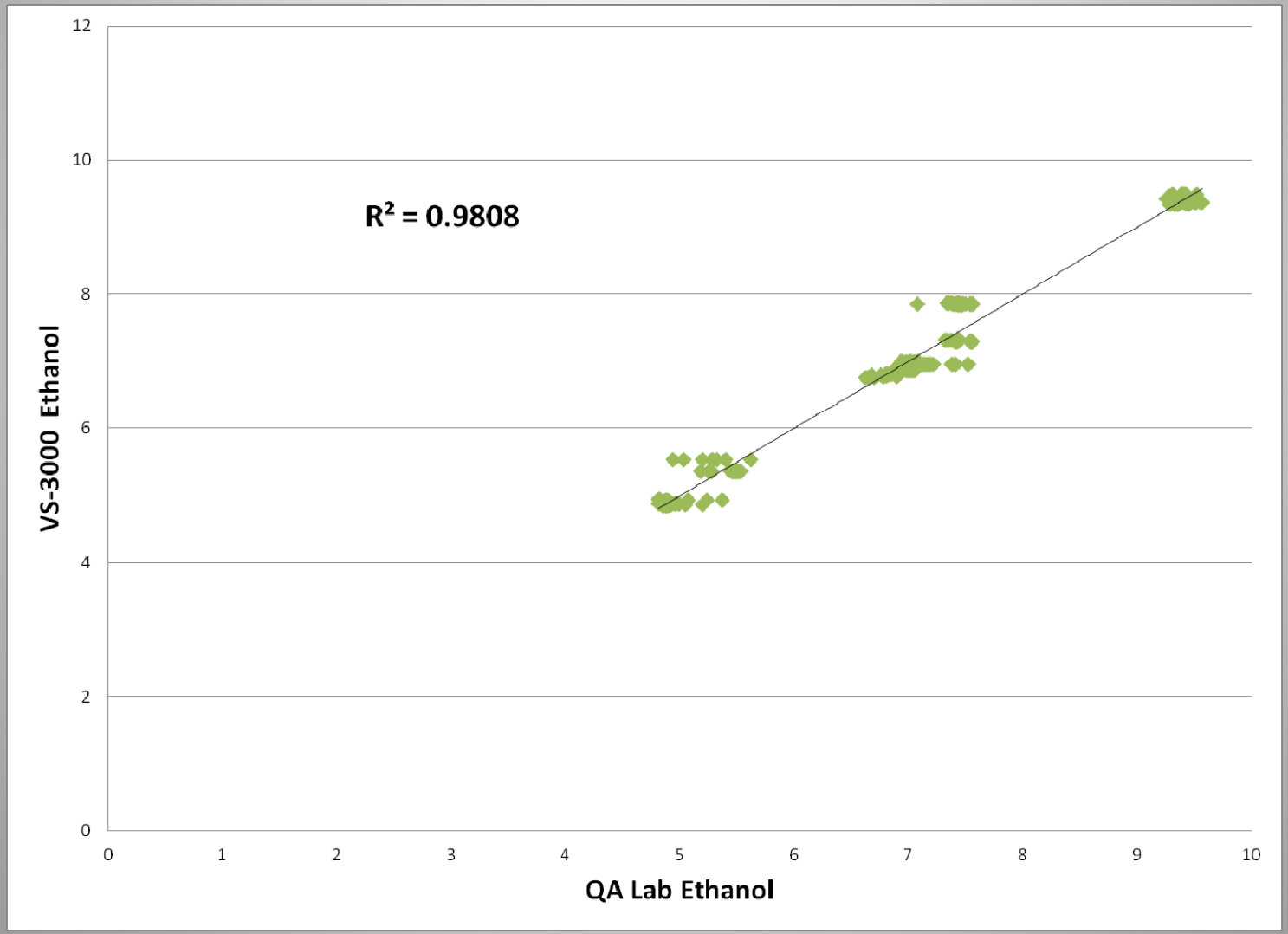
- 60 + laboratory measurements used for comparison

The VS-3000 is an accurate and versatile instrument. Infrared measurement is an ideal real-time technique for monitoring a typical Craft Brewery's varied product mix.

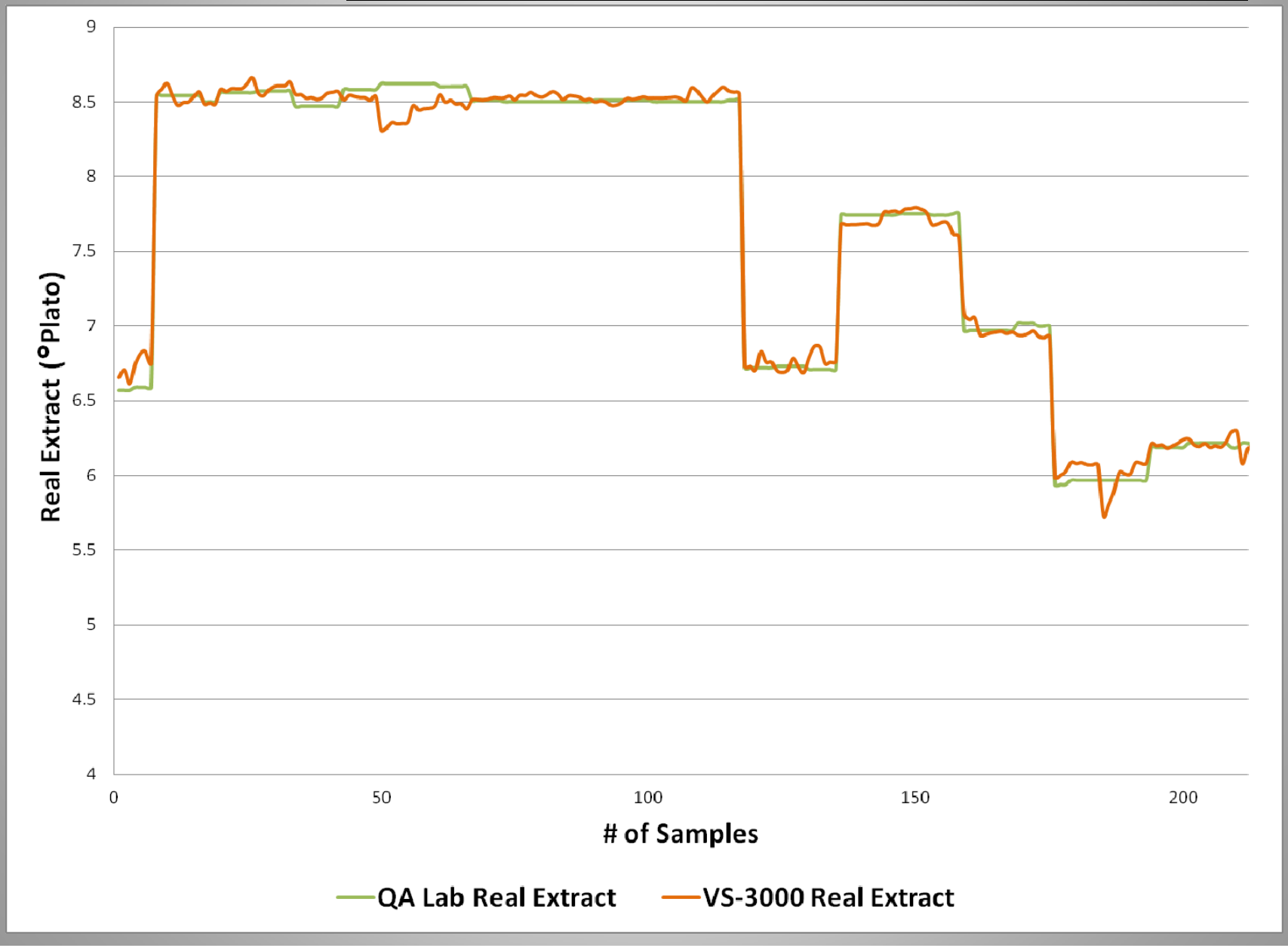
Ethanol: VS-3000 vs. QA Lab

R^2 for Ethanol: VS-3000 vs. QA Lab

There is an excellent correlation (R^2) between VS-3000 readings and QA laboratory measurements – 98.08 % correlation

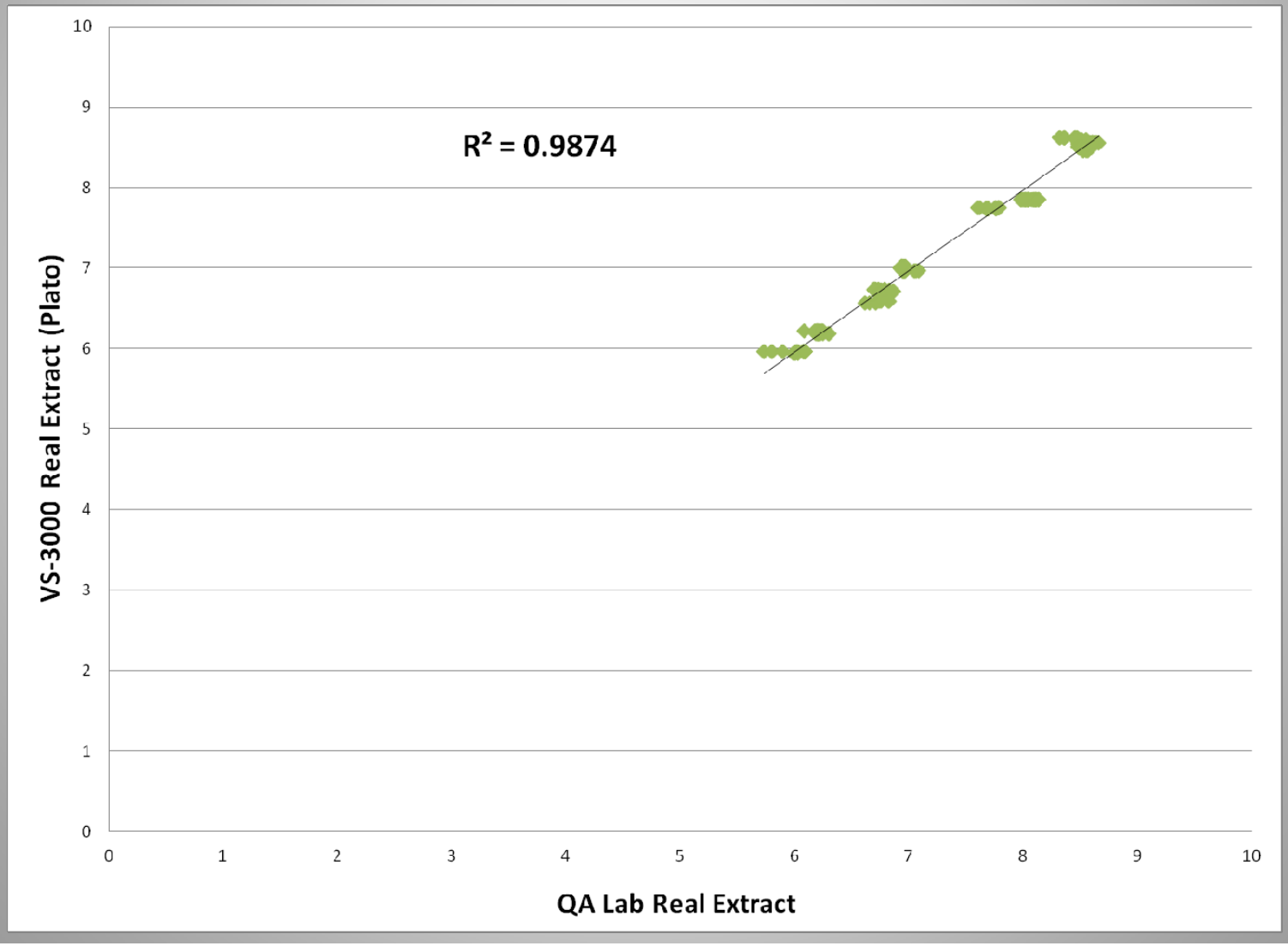


Real Extract (°plato): VS-3000 vs. QA Lab

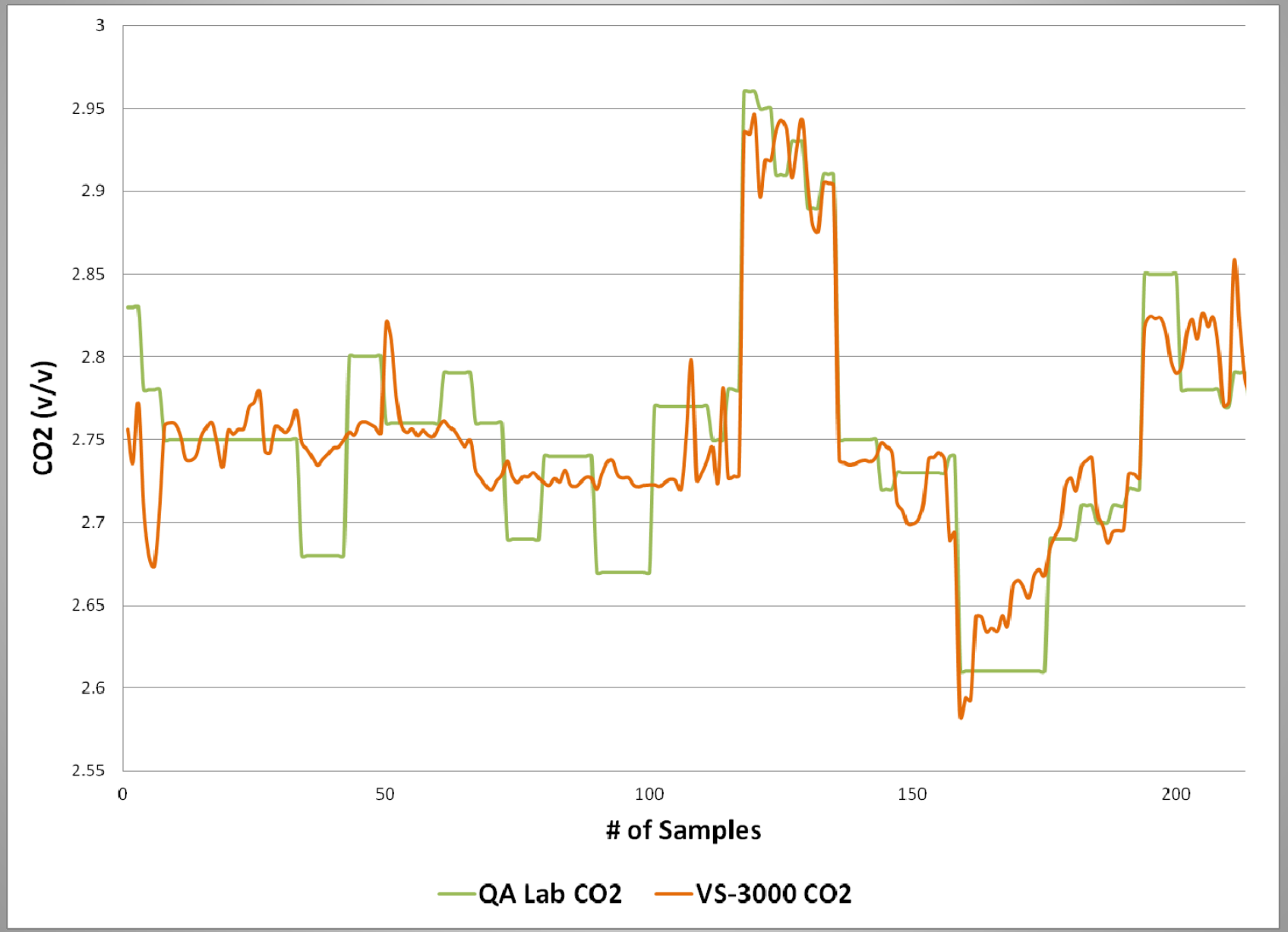


R^2 for RE (°Plato): VS-3000 vs. QA Lab

There is an excellent correlation (R^2) between VS-3000 readings and QA laboratory measurements – 98.74 % correlation



CO_2: VS-3000 vs. QA Lab



Observations

- For Ethanol and Real Extract (°plato), there exists an excellent correlation between VS-3000 readings and the Craft Brewery's lab readings (average R^2 of 98.41%)
- The VS-3000 Beer Monitor has a lower standard deviation of measurement for CO_2 than the laboratory instrument
- Product offsets and special product recipes are not required to measure a broad range of product.
- The VS-3000 captures product transitions, including CIP, instantaneously helping the Craft Brewer optimize production windows.