

Achieving the same Prediction Quality on different NIR Spectrometers

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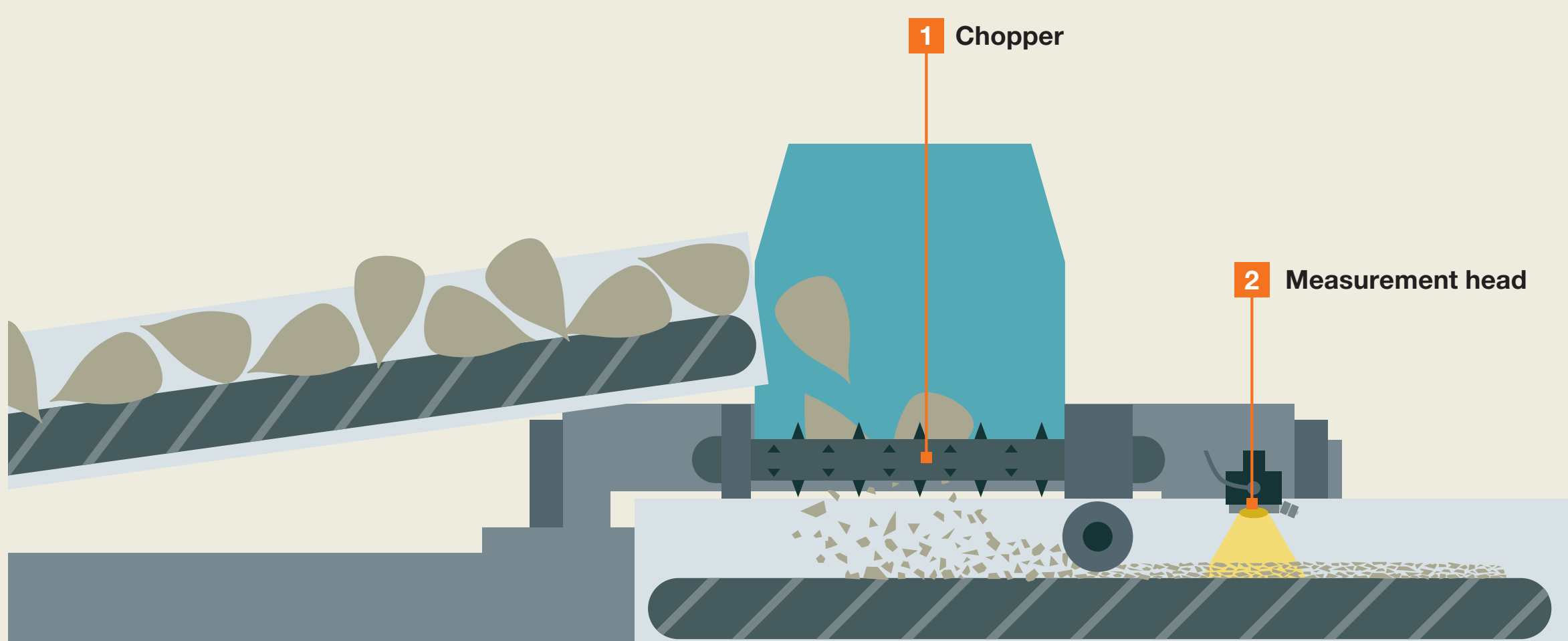


NIR measurements are an established method for chemical analysis in many industries like the pharmaceutical and agricultural sector. The KWS BEETROMETER® is a NIR-based system that provides real-time quality parameters for sugarbeets and a direct alternative to the classical wet-chemistry based on brei. Any analytical system whether based on NIRS or brei-based wet chemistry can have deviations between different units or lines. To minimize deviations between systems protocols were developed to ensure a fair payment for both growers and sugar factories based on exact and comparable quality parameters independent of line and location. This ensures that the KWS BEETROMETER® can be used anywhere in the world.

Standardization ...

...of the Setup

The KWS BEETROMETER® measures samples by near-infrared spectroscopy in a standardized and reproducible procedure: The whole sample is fed through a chopper that combined with a roller ensures a uniform and representative sample preparation and measurement within 20 seconds without any free water on the surface or sample degradation. This guarantees the same conditions at all installations and reduces adverse influences as well as reproducing calibration conditions.

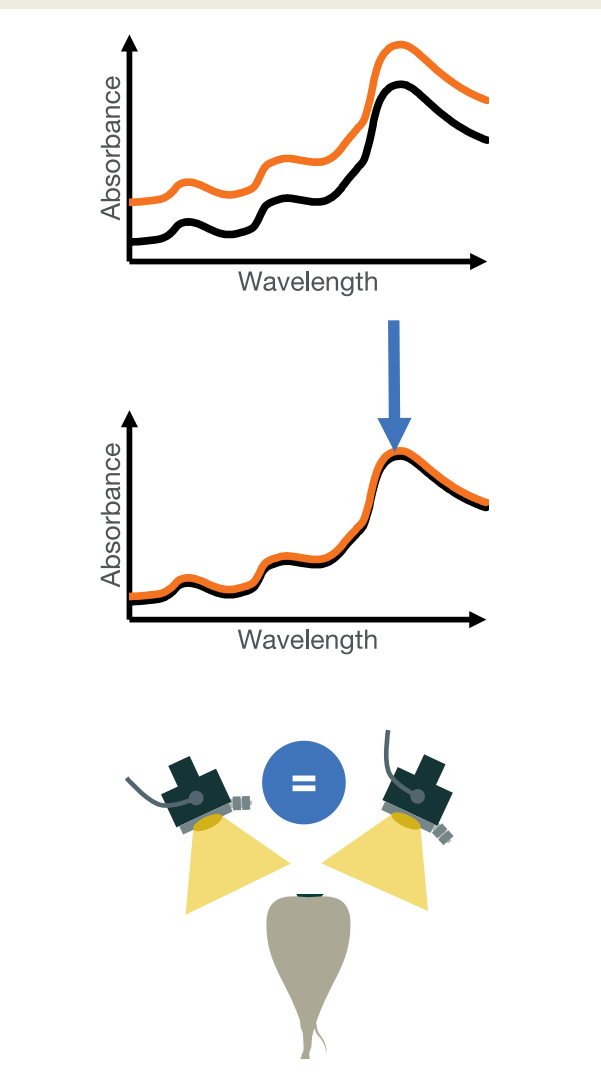


KWS BEETROMETER® with chopper, roller and measurement head

...of the Spectroscopic Behavior

Similar setups only work if the spectroscopy is also harmonized. We selected the best quality process analytical spectrometer type. All undergo thorough annual maintenance to align spectroscopic behavior and ensure season-long reliability.

This is safeguarded by strict testing, monitoring of spectroscopic behavior over time and regular recording of references and standard samples.



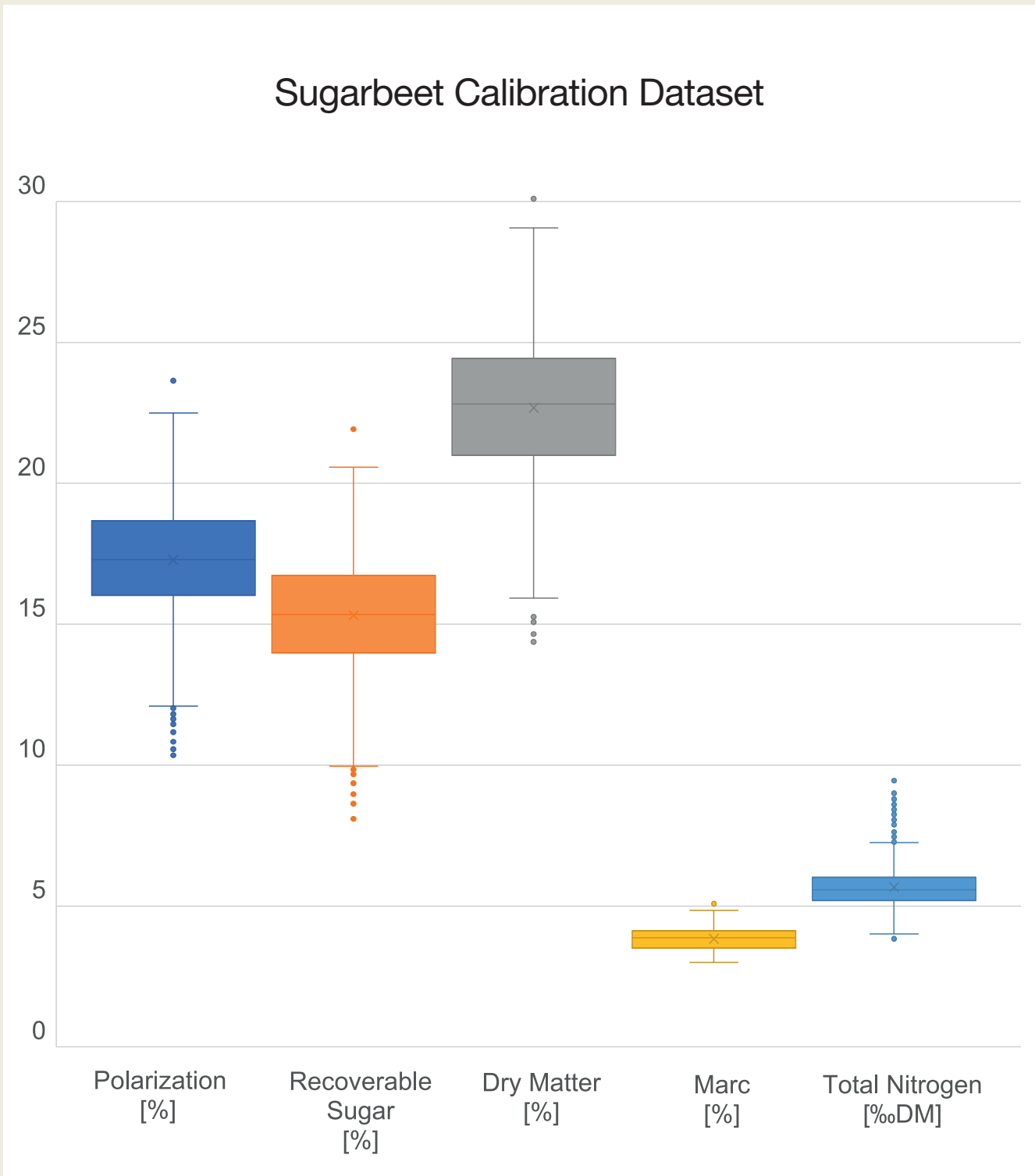
Aligning uniform spectrometer systems to similar spectroscopic performance through maintenance protocol

Calibration

Development of a robust Calibration

Our quality-managed laboratory provides a consistent and accurate analysis of reference samples. Over more than 15 years of building an unmatched reference value collection allows us to develop a calibration matching those to the associated sample spectra. Besides a broad span of quality parameters we also cover different varieties and all growing conditions like temperature, drought, soil types, etc. Still, the data collection and calibrations are constantly expanded by yearly updates.

Over the years, influencing factors and characteristics between spectrometers have been identified. This allowed us to develop calibrations that work on all our spectrometers including approaches like spectral pre-treatment to reduce unavoidable small, remaining differences between spectrometers and enhance the real signature of quality parameters in the NIR measurements.



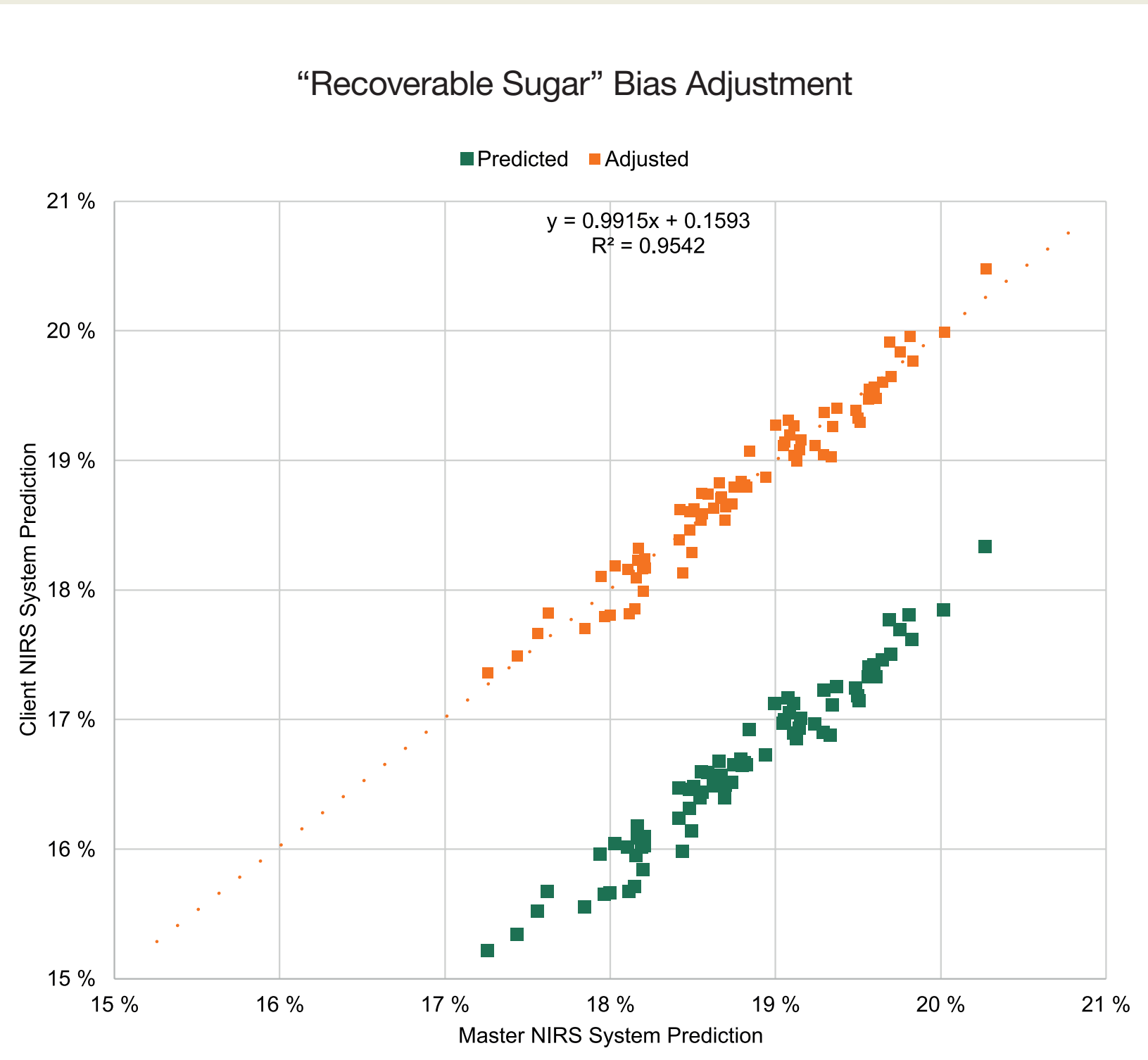
Variation of reference values of more than 15 years

Bias Adjustment

While wet-chemistry instruments are calibrated with standard solutions, other ways must be used with the KWS BEETROMETER® as it measures directly on freshly chopped beets – thus perishable samples.

The KWS BEETROMETER® only needs to be bias adjusted on an annual basis after maintenance of the systems.

Using a clearly defined methodology the readings of all systems are aligned to closely match and stay stable for the whole campaign.



Annual bias testing allows alignment of all systems

Quality Management



Start-up phase

Preparation of the installation

Multi-day visit to accompany first campaign start

Analyzing the full process and local environment

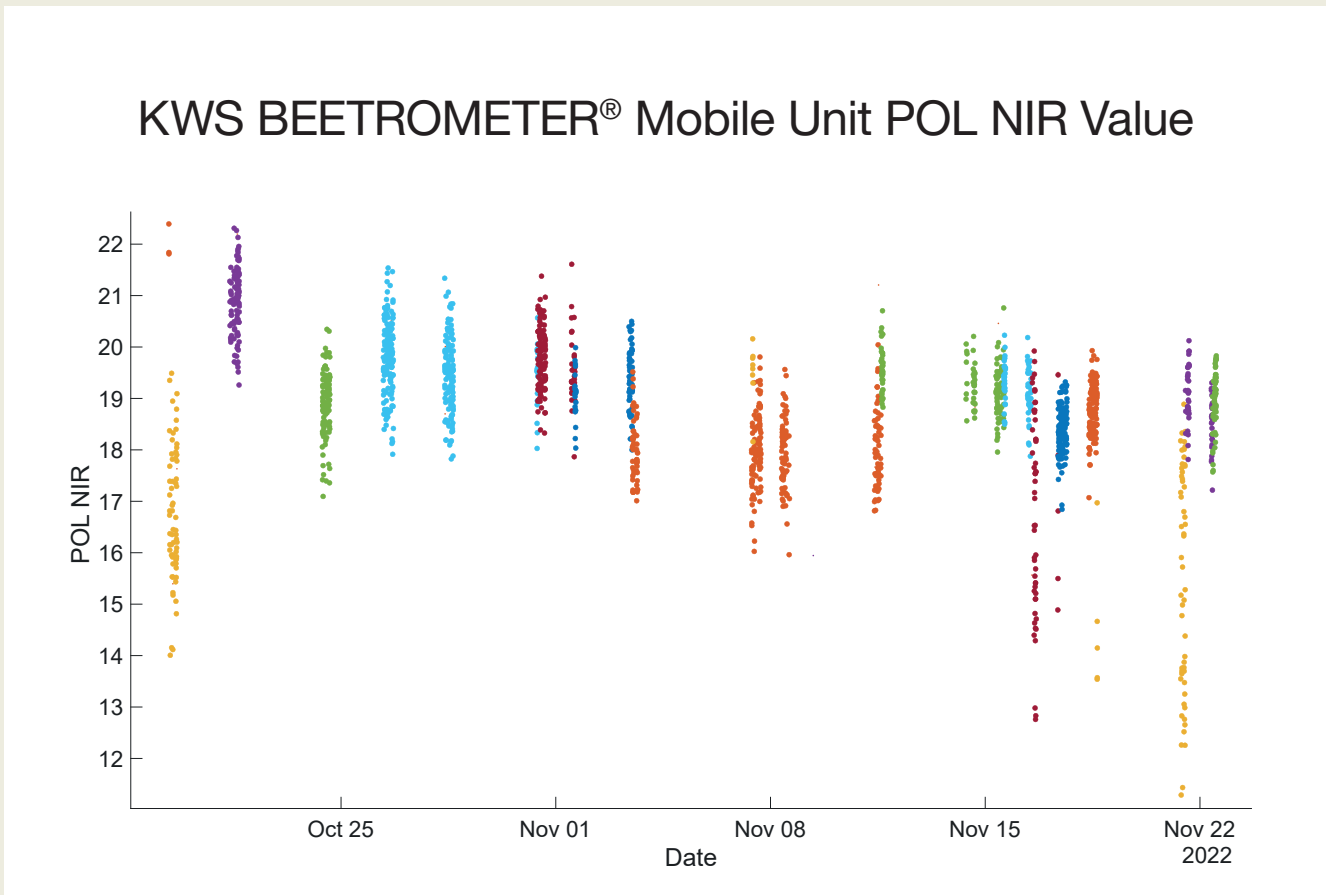


Empowering the customer

Training and certification of the operators

Routine checks of the whole system

Warning levels of the KWS BEETROMETER®



Support

Data checks

On-site and remote support

Maintenance

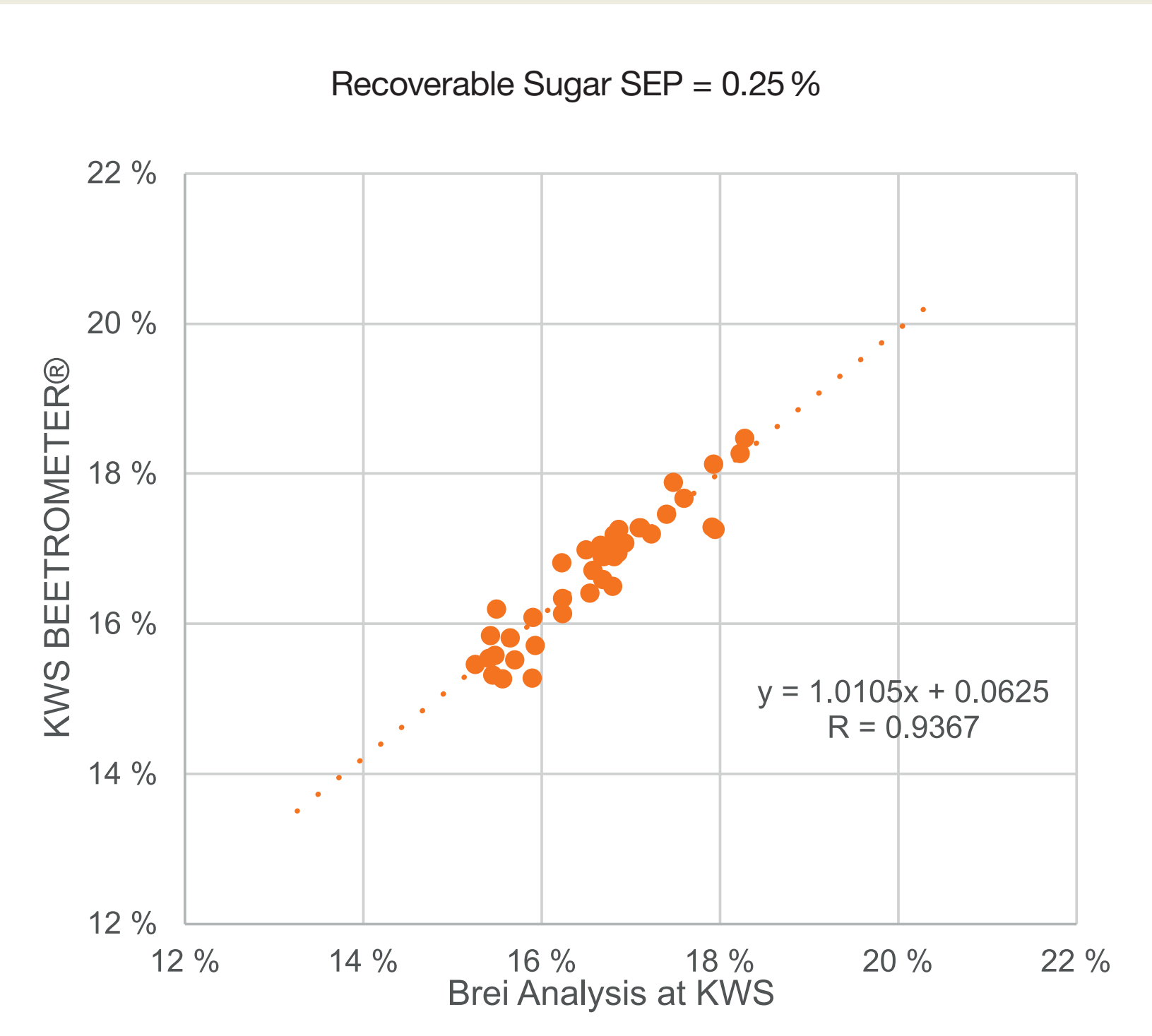
Comparative analysis

Validating Result Quality

Brei collection on-site and analysis is part of annual service and allows comparison of

- prediction performance and
- analytical labs and processes.

Understanding all processes and analytics helps to ensure a smooth transition from the brei-based methodology to the KWS BEETROMETER®.



Validation proves the accuracy of the NIRS-based analysis

