

How to produce a representative sugarbeet sample

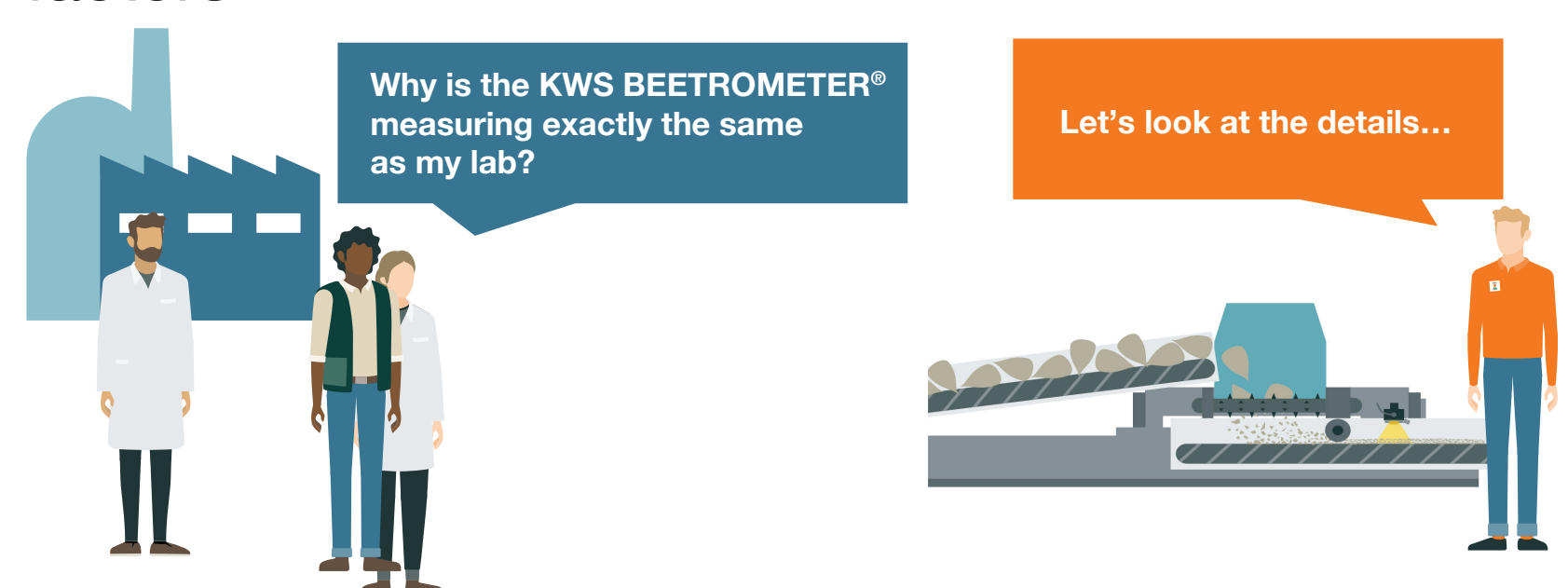
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Comparing Lab Analytics and the KWS BEETROMETER®

The heterogeneity in sugarbeets has the largest impact on the estimation of the sugarbeet quality. Sampling and brei processing are critical components in analytical procedure and are influenced by many factors.



The sample preparation is crucial for reliability and reproducibility of sugarbeet quality determination. Different steps in manufacturing method of brei and measurement cycles have an impact on analytical bias and are reasons for deviations in comparison of analytical results.

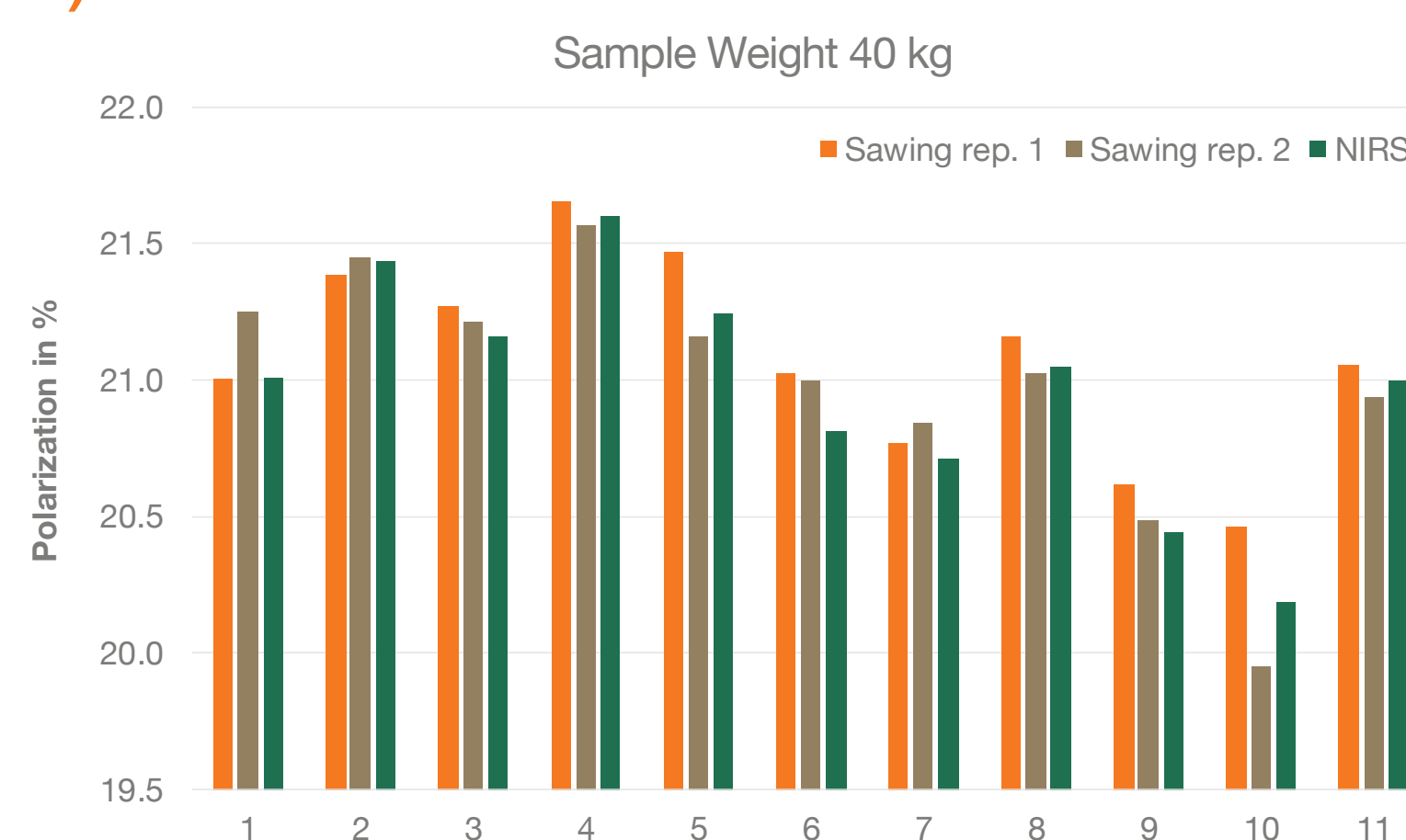
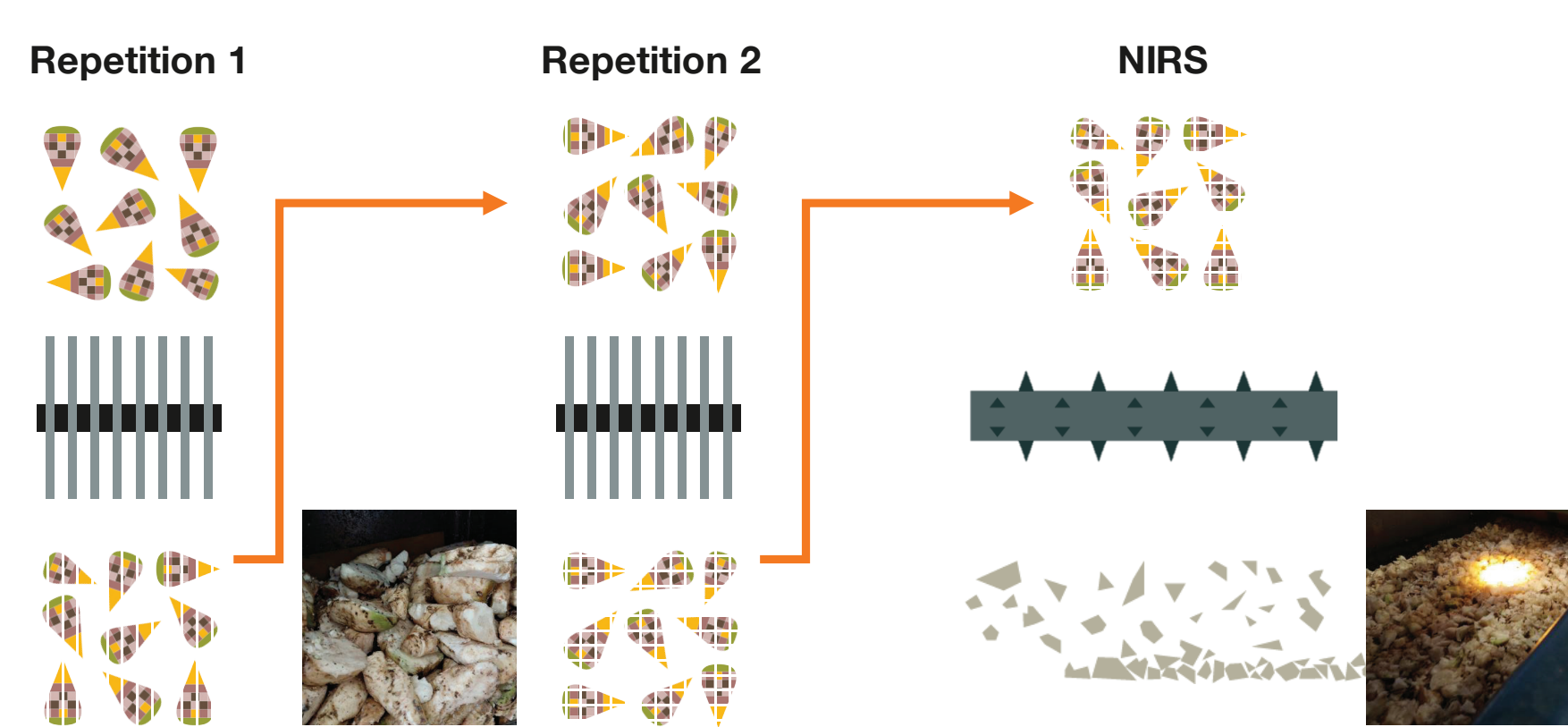
It is not only instrumental comparison, every process step in the quality analysis of sugarbeets must be considered.

Non Standard Sample Preparation	1	Brei Production Type of saw, speed of saw, Yield of brei.
	2	Brei Processing Sampling, homogenization, carry over, time.
Standard Analytical Methodology	3	Preparation Filtrates Ration scale, extraction temperature, extraction time.
	4	Preparation Aliquots Process filtration, carry over.
	5	Measurement Aliquots Calibration analytical systems.

Impact of Brei Production on Deviations in Measured Sugar Content (Polarization) Brei Processing by Multibladed Saw (KWS)

Equipment & Method

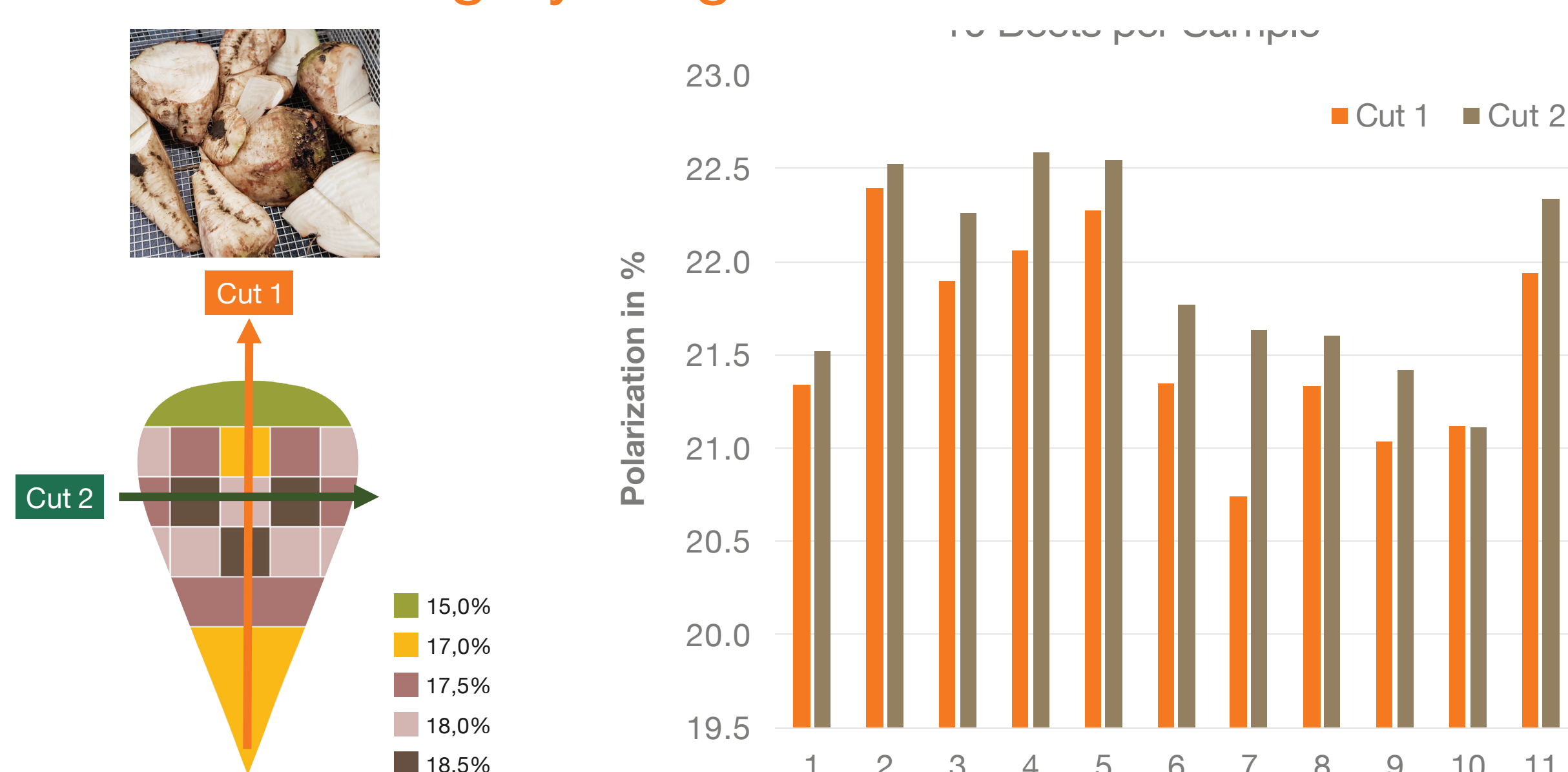
- Brei Saw:** 8 saw blades, diameter 500mm, speed 2500rpm
- Brei Yield:** 2,5 – 3% of sample weight (40kg sample = 1200g brei)
- Brei Homogenization:** rotating brei tube and mixing by hand
- Brei Sampling:** round brei cups (30g), shock freeze at -40°



	Polarization in %				
	Brei Values Averaged	Difference in Repetitions		Difference NIRS Values	
		Min	Max	Min	Max
Sawing Repetition #1	21,1	-0,51	0,3		
Sawing Repetition #2	20,9				
NIRS	20,0			-0,2	0,02

- Various sugarbeet samples (11) of 40 kg each were repeatedly processed by saw for brei production.
- Beet slices after sawing repetition 1 were collected and processed on the same saw in second repetition (sawing rep. 2).
- In final step beet slices were chopped and analyzed by the KWS BEETROMETER®
- Brei samples were analyzed in lab for quality compounds.
- Brei production by saw has the highest impact on variations in sugar content.**

Brei Processing by Single Bladed Saw

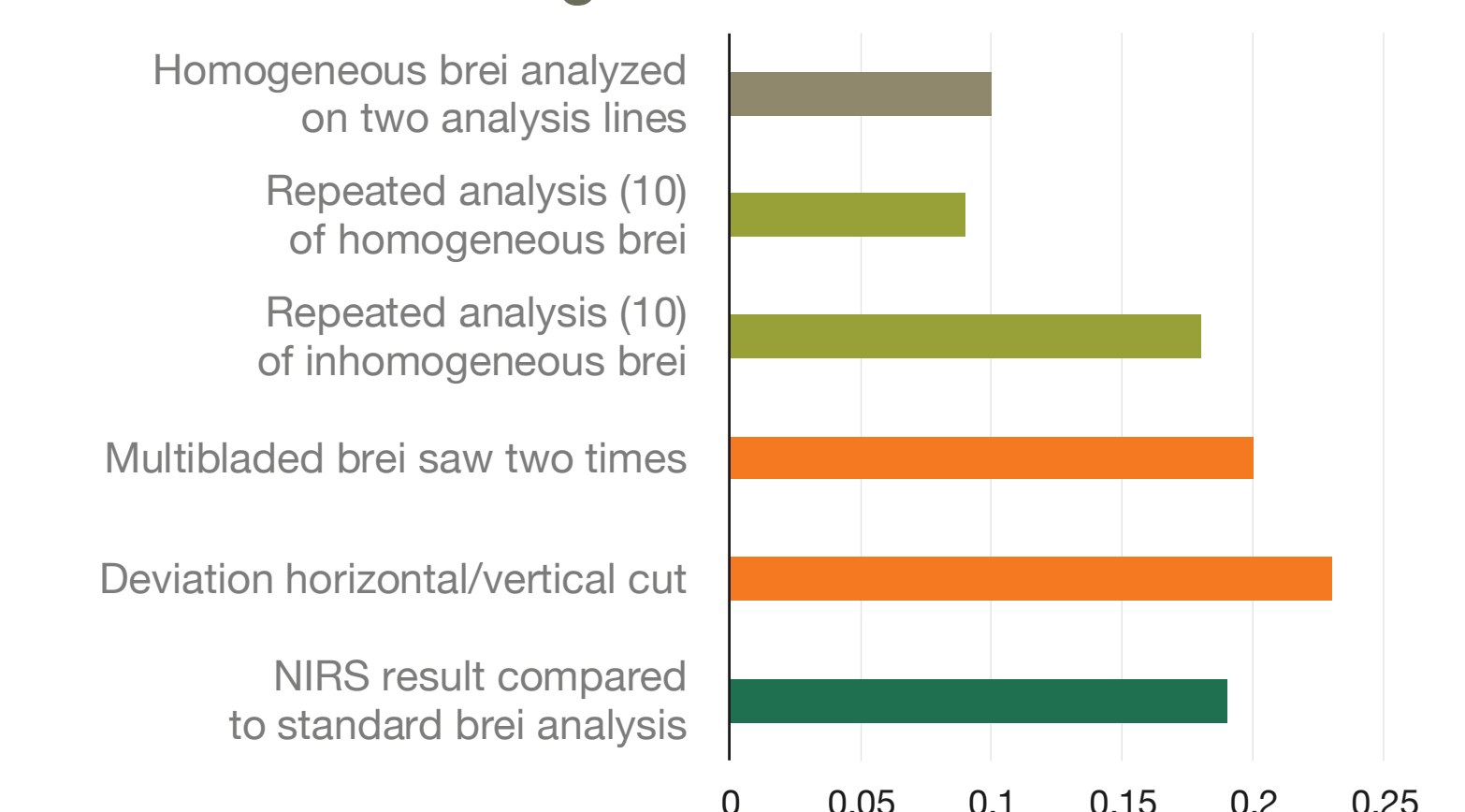


	Polarisation Averaged	Difference in Polarisation Cut 1 x Cut 2	
		Min	Max
Cut 1	21,6	-0,1	0,89
Cut 2	21,9		

Horizontally cut brei samples have higher sugar content: +0,3% in average.

Summary Standard Deviations for Polarization

The main causes of deviations in the sugar content are the production of brei samples and the lack of homogenization.



Summary: KWS BEETROMETER® – an Innovative and Reliable Approach

- Comparison to the legacy analytical method is one of the main concerns during implementation of KWS BEETROMETER® in sugar factories.
- It is important to prove that the legacy, brei-based lab method can be replaced by NIRS without compromising analytical quality.
- Deviations in comparison of methods to determine sugarbeet quality are dominated by brei production, brei processing and brei sampling.
- The limits in comparison are the variations of the legacy method itself and the respective quality lab.
- The KWS BEETROMETER® replaces all non-standardized processes of brei production and brei processing as well as analytical processes in quality labs.
- It is an innovative approach to provide quality analysis of whole sugarbeet samples with high reliability and it is already implemented at multiple sugar factories worldwide.

	Legacy Method	KWS BEETROMETER®
Sample Preparation	Brei process → High variation based on sawing process	Chopping process → Standardized approach for whole sample
Sampling	Homogenization step → Variation brei sampling	Whole sample → All parts of beet and all beets of a sample are included
Measurement Preparation	Lab work Influence of speed, analysis time and temperature	Automated process Standardized process
Manpower Requirements	High	Low, fully automated process
Reliability	Restricted	High, standardized process

→ Variation in comparison tests are in the same range as variation in legacy method itself.

