



***NIRS Forage & Feed Testing
Consortium***

Calibration Committee

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***NIRS Forage & Feed Testing
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Calibration Committee

**Starch in Fermented
Corn Silage**



NIRSC Forage & Feed Testing Consortium Calibration Committee

2001-2002:

NIRSC members had begun to show interest

2003:

Attendees of the NIRSC annual conference agreed to pursue an NIRSC starch equation

- Sample exchange/check to assess the various reference methods under direction of Mary Beth Hall (14 labs participated using their usual methods)
- Mary Beth prepared a report, sent to all of NIRSC in Oct 2003.
- NIRSC questioned whether to use spectra and chemical data from labs that performed well (multiple methods) or wait for Mary Beth's recommendation on a single reference method.



NIRSC Forage & Feed Testing Consortium Calibration Committee

2004 annual conference

Mary Beth reported on the check test of 2003(See NIRSC website), stating the goal was

- "To evaluate the ability of labs to analyze accurately for starch and "sugars"
- Assess variability among labs
- Seek ways to improve accuracy."

Recommendations from Mary Beth's report included:

- Run the complete assay from start to finish ASAP
- Use an analysis that is specific for glucose
- Use glucose as the standard for the assay
- Check enzyme specificity on sucrose
- Include a starch control & reagent blank in each run
- Remove interfering substances
- Account for free glucose



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2005:

2005 annual conference Mary Beth related an update and a continuation on her evaluation of starch methods, noting a search for consensus and a literature review.

In July of 2005, Mary Beth reported that she had “been working on both a review of literature, analytical work, and contacting other carbohydrate analysts to make most rapid progress on factors that affect starch analysis.”

The take home message was that in the analysis of starch, there was yet no consensus on methodology that NIRSC could use as a recommendation to choose a reference method to begin developing a starch equation.



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2006:

At the 2006 annual conference Mary Beth covered

- analysis issues that labs encounter
- Reviewed and evaluated the types of starch analyses
- Mentioned a method she felt promising (Bach Knudsen, 1997)
- Take home message - there may be more than one acceptable analysis method if the results are accurate and represent true starch recovery.



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October 2006 –

Calibration Committee evaluated original work done with the starch check test in 2003. Common methods used - YSI and MBH's method. Acceptable reference method chosen and five reference standard samples collected for purpose of blind evaluation of the four labs invited to bid for job.

- Spectra solicited from NIRSC labs for sample selection.
- Nine labs sent in spectra from both MW and oven dried samples.
- The NIRSC board decided to include both drying methods
- 130 samples selected and scanned on NIRSC master instrument.
- Results from bidding labs returned November/December, 2006.



NIRS Forage & Feed Testing Consortium Calibration Committee

August 2007

NIRSC calibration committee selected AgSource Cooperative as the reference lab based on:

- Accuracy of results of the standards test
- Ability to meet a turnaround time and cost

Samples sent to lab for analysis in September, 2007

Analysis was completed in December of 2007 and data sent to Paolo. DAS/Mycogen supported the development of this equation with "seed" money of \$2000.

First version released December 2007 at no charge to those who signed up during trial period. Next sign-up the annual fee for the starch equation will be charged.

To date 7 NIRSC members have received the equation.



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For 2008, this starch equation will be added to the corn silage TDN package of equations. A separate line for starch on the equations sign-up and fee sheet will be added and an annual fee for the starch will be determined by the NIRSC Board.

The equation is based on a limited data set of 100 samples. This must be considered a starting point a more work (sample and analysis) is needed to make this equation stable, robust and very accurate. Nevertheless the data set embrace a large variability with a standard deviation of 10.

Constituent	N	Mean	SD	SEC	RSQ	SECV	1-VR
starch	97	24.73	10.00	1.83	0.97	2.26	0.95



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Sugar Equation



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2006:

Interest from NIRSC members led the Calibration committee to explore development

Mixed hay and grass hay are common products analysed for sugar. Common wet chemical methods include a modified hydrolysis and YSI.

One possibility was to find labs that run sugars, receive the spectra and chemistry data, and create a calibration.

The question of accuracy of method was raised here, since there is no one standard sugar method.



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2006 continued:

Mary Beth Hall previewed sugar analysis in several of her NIRSC annual conference starch presentations, especially 2006. She noted, “Define “sugars”, and we can choose an analysis. To define sugars, we need to know what matters to the animal.”



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2007:

Of interest in area of warm and cool season grasses are water soluble carbohydrates to seed breeders and fructose, fructosans, and glucose to horse nutritionists. Dr. Kevin B. Jensen of Forage and Range Research Lab, Utah State University in Logan, UT is assisting us with this equation.



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November 2007

NIRSC standardized Dr Jensen's instrument and he provided their sugar equation.

Sam Stratton sent spectra in and Paolo selected 50 samples to add to Logan lab's equation.

Data is to be entered into NIRSC database on selected samples, and then samples will be requested.

The Logan lab will then run the samples and we will add them to the donated equation.

A sugar equation in fermented corn silage is of interest as well.

This would be a different equation than that described for grasses.