NIRS Forage and Feed Testing Consortium NEWS

March/April 2003

Dedicated to Increasing the Accuracy and Knowledge of NIRS Testing.

http://www.uwex.edu/ces/forage/NIRS/home-page.htm

NIRS Consortium Round-Robin Starch Determination

Stemming from discussion at the NIRS Consortium annual conference in February, 14 member labs have agreed to participate in a Starch Sample Exchange, with 3 more members interested in participating in the equation development in some capacity. Mary Beth Hall and Don Sapienza have developed a standardized protocol for labs to follow. Labs will analyze 11 samples (those labs participating in the NFTA program, will additionally analyze their March corn silage sample) prepared by Mary Beth Hall. All subsamples have been scanned on the Consortium master instrument to record spectra for homogeneity. Each lab will analyze the samples using their "routine" method and report information about their instrument, reagents, and results of starch and sugar.

The unknown samples were sent out to labs on April 14th and we expect analysis and reports to be completed within 14 days of a lab's receipt of samples. Data will be compiled by Mary Beth Hall. After this, samples will be identified and results discussed with the labs. As noted at the conference, the analyzed data from labs, with lab anonymity preserved, is likely to be published by Mary Beth Hall in a research journal.

FOSS Software Package Deadline May 2, 2003

A reminder to those labs considering a software upgrade from FOSS North America: The deadline for their promotional package outlined at the annual conference is **TODAY, May 2, 2003**. If your lab has any questions regarding this package, contact Mark Host, Regional Sales Manager, ph: 952-974-9892 mhost@fossnorthamerica.com

Microwave versus Oven Drying Under Study at USDFRC

- Patty Laskowski, Susan Selman

After the Consortium presentation on microwave versus oven drying at the annual conference, along with Don Sapienza's image of starch granules having undergone different drying methods, the group had a lot to think about in terms of where to go. After some work from Dave Taysom, Don Meyer, and Mark Heidgerken in developing a description of issues, the project has been taken on by the US Dairy Forage Research Center.

Last fall, the USDFRC sent out detailed surveys asking labs using microwave ovens to report on sample handling and drying using microwaves as well as details of the oven itself.

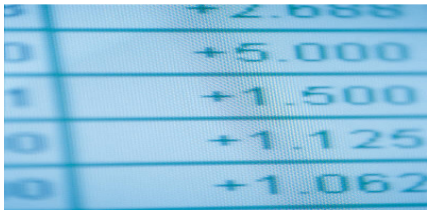
Four labs have decided to participate in this study. They will analyze 3 different products. (Hay, Haylage, and Corn silage) using their microwave procedures and oven drying methods.

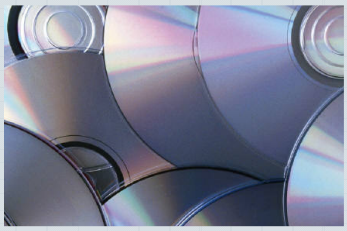
The purpose of this research is to try to identify a method of drying using microwave ovens that can be used to prepare feed material for chemical, biological (in vitro), and NIRS analyses.

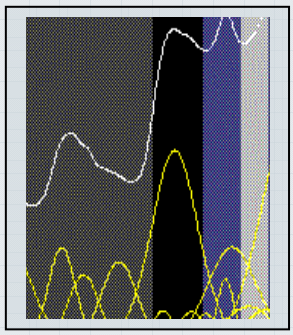
This goal requires a multi-step process:

1. Determine if the diverse microwave drying methods currently in use result in differences in NIRS, chemical, and in vitro analyses from convection oven dried samples and identify technique differences that affect differences between microwave and convection drying.
2. Use information from step 1 to systematically evaluate the effects of alternative microwave drying techniques on NIRS spectra and chemical analysis of feed materials and try to develop a standard microwave drying method that minimizes any negative effects and matches convection oven results.

After the labs have collected and dried their samples, chemical analysis will be done and data will be analyzed at the USDFRC.







Plan to Attend the Summer NIRS Workshop!

The NIRS Consortium will again put on a summer NIRS workshop. This year it will be held in the month of August. We will keep you posted on the details as they develop. Plan on getting in some practice with the FOSS ISIscan software!

Send in your comments if you have any ideas on what you'd like to see in training at the Workshop.

For further information on any of these topics, please contact Patty Laskowski.

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Release of NIRS Consortium 5000 Equations

- Susan Selman

Following are Standard Error of Prediction Stats for 5000 equations for certain constituents.

Standard Error of Prediction Stats for 5000 hay equations for certain constituents.

5000 Hay equations

	SEP	MEAN LAB	MEAN NIR	BIAS	R^2	SLOPE	#
PROTEIN	1.32	18.58	18.56	0.025	0.95	1.04	43
ADF	1.67	32.94	33.38	-0.433	0.94	1.10	40
NDF	**2.34**	**43.60**	**43.40**	**0.176**	**0.88**	**0.99**	**23**
NDF	**1.84**	**43.38**	**43.65**	**-0.277**	**0.94**	**1.07**	**29**
dNDF	2.25	20.01	19.9	0.103	0.86	1.08	19
Ash	0.617	9.67	9.73	-0.062	0.52	0.73	40
Lignin	0.629	7.01	7.15	0.152	0.70	1.18	8

I have two SEP for NDF. I have used two different sources of spectra for validation for NDF. The first one is a mixture of data from 3 labs, that has been submitted for next years updates. The last NDF are samples that went in for updates for this year, not used in the calibration.
number of samples tested on the equation.

Standard Error of Prediction Stats for 5000 haylage equations for certain constituents.

5000 Haylage Equations

	SEP	MEAN LAB	MEAN NIR	BIAS	R^2	SLOPE	#
PROTEIN	1.07	20.81	20.58	0.228	0.94	1.08	18
ADF	2.92	32.26	34.00	-1.75	0.88	1.06	25
NDF	**2.57**	**45.40**	**45.61**	**-0.211**	**0.91**	**0.90**	**26**
NDF	**2.38**	**42.92**	**42.71**	**0.202**	**0.91**	**0.94**	**22**
dNDF	1.85	21.62	21.51	0.109	0.95	0.85	13
Ash	1.37	10.98	10.76	0.220	0.87	1.06	32
Lignin	0.83	7.49	6.67	0.821	0.32	0.71	3

I have two sep for NDF. I have used two different sources of spectra for validation for NDF. The first one is a mixture of data from 3 labs, that has been submitted for next years updates. The last NDF are samples that went in for updates for this year, not used in the calibration. # number of samples tested on the equation. Lignin low R^2 is on only 3 samples.

5000 Grass equations

	SEP	MEAN LAB	MEAN NIR	BIAS	R^2	SLOPE	#
PROTEIN	0.943	12.62	12.72	-0.102	0.95	1.05	15
ADF	2.34	36.68	35.75	0.93	0.89	0.99	15
NDF	2.83	55.34	54.97	0.367	0.86	0.99	12
dNDF	2.33	27.84	27.74	0.098	0.57	0.90	11
Ash	1.50	10.39	9.76	0.626	0.78	1.45	13
Lignin	Not	Enough	Sample	To validate			

Standard Error of Predictions on Past NFTA Samples

Past NFTA Predictions
5000 Legume Hay equation

As Received		Mean	Mean			GH=.469 NH=.211
Lhay NFTA	SEP	Lab	NIRS	Bias	R^2	Slope
Protein	0.855	19.25	20.01	-0.764	0.97	0.97
ADF	1.16	28.83	29.35	-0.521	0.96	1.1
NDF	1.31	35.11	36.05	-0.942	0.97	1.04

5000 Grass equation

As Received		Mean	Mean			GH=.747 NH=.427
Grass NFTA	SEP	Lab	NIRS	Bias	R^2	Slope
Protein	0.427	12.65	13.04	-0.395	0.99	1.03
ADF	2.05	34.14	36.12	-1.976	0.99	1.13
NDF	**4.46**	51.38	55.65	**-4.27**	0.99	1.15

After updating the 5000 legume hay equation with drought samples, NFTA past hay samples are predicting quite well. As for the updating of the 5000 grass equation with the drought samples, NFTA samples for **NDF** are having a tuff time (see above). I only have 5 grass samples from NFTA. Samples where predicted on a dry matter basis, things were a bit better.

5000 grass equation Dry Matter basis

Dry		Mean	Mean			GH=.699 NH=.417
Grass NFTA	SEP	Lab	NIRS	Bias	R^2	Slope
Protein	0.397	13.73	13.67	0.063	0.99	1.07
ADF	1.02	36.89	37.76	-0.872	0.99	1.12
NDF	**3.84**	55.47	59.00	**-3.53**	0.99	1.2

4500 Grhy97m equation

As Received		Mean	Mean			GH=.621 NH=.376
Grass NFTA	SEP	Lab	NIRS	Bias	R^2	Slope
Protein	0.59	12.65	13.17	-0.518	0.99	0.98
ADF	1.16	34.14	35.52	-0.379	0.99	1.37
NDF	2.288	51.38	53.44	-2.059	0.99	1.12

The new 5000 grass equation has predominantly all grass in it. The NFTA samples may have some legume hay mixed in with some. As for now I would use the 4500 ghy97m equation to predict NFTA grass samples. I have not biased the equation, if I do; most of my validation sets have a higher SEP. I hope I can obtain more grass samples to help ease the use of 2 equations for grass.

Standard Error of Prediction Stats for Corn Silage each of the above equation for certain constituents.

		Mean	Mean			
Constituents	SEP	chem	NIRS	Bias	R^2	Slope
NDF	1.51	41.70	41.25	0.45	0.93	1.03
dNDF	5.25	28.56	23.46	5.09	0.86	0.96

5 samples not in calibration**. dNDF SEP and bias are high, but the NDF constituent is just fine. In this dNDF equation it's having a hard time predicting at least for these 5 samples. This would be reflected in the NDFD calculated values, of differences of about 10 units.**

Constituents		Mean	Mean			
	SEP	chem	NIRS	Bias	R2	Slope
NDF	1.72	38.68	38.67	0.012	0.95	0.93
dNDF	2.23	22.80	22.59	2.24	0.85	0.93
Ash*	3.8* / .95	8.59	6.42	2.17	0.80	

50 samples in the calibration

Ash* SEP is high with high lab ash samples: the equation is having a hard time predicting high ash contents believed to be from soil or debris contamination

NDF and dNDF SEP are ok in these 50 samples, but remember that they have been used in the calibration. Even with acceptable errors as these the NDFD calculated difference could be as large as 5 or more units.

Standard Error of Predictions on Past NFTA Samples

Past NFTA Corn Silage samples

Constituents		Mean	Mean			
	SEP	chem	NIRS	Bias	R2	Slope
Protein	0.27	6.52	6.74	-0.21	0.90	0.95
NDF	0.98	40.87	41.73	-0.86	0.99	0.97
ADF	1.18	25.00	26.14	-1.14	0.99	1.04