Ag Health News
LABORATORIES
August 2011

445 Barnard Blvd.
Sunnyside, WA 98944
Phone: (509) 836-2020
Fax: (509) 836-2030
ahlabs@aghealthlabs.com

For more information about Ag Health Labs, and NFTA go to:
www.aghealthlabs.com
www.foragetesting.org

Email us at ahlabs@aghealthlabs.com to be added to our email

New Shipping Options

Now we can send our clients labels for shipping samples to Ag Health, and shipping will be charged to Ag Health's shipping account. You will be billed for the shipping after the lab work is completed at a lower rate than before. Please call or e-mail us to request labels. When requesting a shipping label, please include your name, address, email address, how you would like your label sent, and if you'll need it picked up by UPS or are dropping off at a UPS drop site.

Contacts:
Lynn VanWieringen, PhD
Crystal Maiden, BS
Fred J. Muller, DVM

Why do Ag Health Lab's Results Differ from Other Labs?

This is a commonly asked question. The simple answer is: *variation*. However, what does that mean, what are the sources of variation, how can variation be minimized, and why do labs vary when they are all National Forage Testing Association (**NFTA**) certified?

All analytical results are an estimate of the true value. The only way to get the true value of a nutrient (such as crude protein, ADF, NDF, etc) in a bunker of silage or a stack of hay would be to test the entire bunker or stack. Obviously, this is not possible; therefore, a few samples get taken throughout a stack of hay (with a hay corer) or grab samples get taken from a silage bunker. The cores from the stack of hay get mixed together and sent to the lab.

Sources of variation include:

In the Field (recap of 'Hay Sampling' Newsletter Article – July 2011)

1. Sampling equipment
   - Did the two samplers use different sampling equipment/corers?
2. Sampling technique (how is the sample obtained?)
   - Is the stack of hay representative of one field vs. many fields or one cutting vs. multiple cuttings?
   Did the broker/grower sample the same bales as the dairyman/nutritionists?
   Did they sample randomly or select bales by color or leafiness?
3. Sample handling by the person obtaining the sample
   - Some nutrient analyses are affected by temperature. If wet feeds are left at room temperature for an extended length of time or in the hot sun or a hot vehicle for a short period of time, it can affect nutrient analysis results such as dry matter, volatile fatty acids, and ammonia nitrogen.
   Are wet samples kept cold or frozen during transport to the lab?

Why do labs vary when they are all 'NFTA certified?'
NFTA proficiency test samples are sent to all labs pre-dried, ground, and mixed. **Therefore NFTA has removed much of the variability between labs as discussed.** Primarily, NFTA has ground the entire sample and not allowed a lab to sub-sample prior to grinding, a major factor in lab to lab variation.

In the Laboratory

1. Sample handling
   - If feeds are dried at too high of a temperature (> 60° C or 140° F) it causes chemical changes in the sample that affects subsequent fiber, lignin, and acid detergent insoluble crude protein (ADICP) analysis.
2. Grinding
   - **Few labs grind the whole sample as Ag Health Labs does.** Other labs grind only a portion of the sample, increasing the probability of having more variability.
   - If too large of a sample is brought into the lab it increases the likelihood the sample will be sub-sampled and only a portion will be ground. This reiterates the importance of proper sampling technique in the field (Newsletter Article July 2011 – Hay Sampling).
   - Grind size can affect results. Different labs use different grind size.
3. Mixing and sub-sampling
   - It is important to take adequate time to thoroughly mix a sample after grinding. Failure to do so can increase the variability in the results.
   - Prior to sub-sampling for a specific nutrient analysis, it is important to mix the sample with a spatula or other sub-sampling tool to reduce variability.
4. Analytical Procedure
   - There is variability in all analytical procedures not only *between labs* but also *within a lab*. Every lab has a slightly different way of doing each analytical procedure.
   - Different sources of chemicals can affect results.
   - Different lab technicians doing analysis can affect results.
   - Changes in the equipment used to test for nutrients can affect results.
   - How the lab dries and grinds the sample prior to nutrient analysis can affect results.
   - Different analytical methods for a given nutrient (DM, CP, ADF, etc.) can affect results.

"Sampling Variation is almost Always Greater than Analytical Variation"
Mertens Innovation & Research LLC, 2010

(Continued on next page…)

Ag Health Labs
445 Barnard Blvd
Sunnyside, WA 98944

Check out our website at:
www.aghealthlabs.com

How can variation be minimized:

1. Learn proper sampling techniques and implement them.
   - The ***NFTA website*** (www.foragetesting.org) has information on how to take a proper hay sample. Click on the tab titled 'Hay Sampler Exam.'
   - ***Replicated analysis*** is the key to getting closer to the true value of the feed. From the replicated analysis an average and standard error can be calculated. *The more times the analysis is done (replication) the closer the average value will be to the 'true mean.'* The more times you sample and do a nutrient analysis of a feedstuff there is more information about the feedstuff. This will reduce the standard error. For example, if a hay sample is analyzed 2 times for NDF it may have an average of 29.4 and a standard error of ±3.5. The range or 2 standard error is = 22.4 to 36.4, meaning that if another NDF sample was taken out of the stack of hay it would have a 95% probability of falling between 22.4 and 36.4%; however, if the stack of hay was sampled 12 times the average may still be 29.4, but the standard error could be ±1.4 (the range for ±2 standard error = 26.6 to 32.2%). Now that there are 12 bits of information to use in the calculation, the NDF value will be closer to the true mean and the standard error is lower because there is more information about the sample (Mertens, 2010).
2. Ask questions or visit the lab that you are using to see what they are doing to minimize variation.
   - Does the lab participate in the NFTA Certification program?
   - Does the lab run wet chemistry samples in duplicate?
   - Does the lab run quality control samples with each run of samples?
   - What system does the lab have in place for evaluating quality control?
   - How does the lab decide if a sample needs to be rerun?
   - What techniques or systems does the lab have in place to minimize variation?

If 20 cores are taken from a 200 ton stack of hay it = ~10 ounces

This is ~1/640,000 of the 200 ton stack of hay

Labs analyze 1 gram of the sample brought into the lab

This is ~1/181,600,000 of the 200 ton stack of hay

Any wonder that 2 samples won't agree exactly?

Mertens Innovation & Research LLC, 2010

Summary

Variation is unavoidable in any measurement. Variation cannot be eliminated it can only be minimized and controlled. Make sure proper steps are being taken by the person sampling the feedstuff and by the laboratory to minimize variation.

References

Mertens, David. R. 2010. Forage Variability and Multiple Sampling – Rock River – West Open House Meeting. Mertens Innovation and Research LLC, Belleville, WI.