Forage Sampling for Best Results

Bob Schultheis
Natural Resource Engineering Specialist

UNIVERSITY OF MISSOURI Extension
Stage of Growth Affects Nutrients

- Protein, %
- Leaves, %
- Minerals, %
- Fiber & Lignin, %
- Stems, %

Composition, Relative Values

Growth Stages:
- Grasses
- Legumes
- Leafy
- Prebud
- Heading Bud
- Bloom

Low to High
Stage of Growth Affects Intake

![Graph showing the relationship between growth stage, dry matter, digestibility, yield, and intake.](image)

- **Dry Matter - Tons/Acre**: The graph plots the dry matter from grasses, legumes, leafy, and other growth stages.
- **Digestibility**: The graph shows the digestibility of different growth stages.
- **Yield**: The graph indicates the yield increase with growth stages.
- **Intake**: The graph illustrates the intake trend across different growth stages.

**Growth Stages**:
- Grasses
- Leafy
- Boot
- Prebud
- Heading
- Bud
- Bloom

**Axes**:
- Y-axis: Dry matter in tons per acre
- X-axis: Growth stages
- Additional axes: Digestibility (%), yield, intake (% of body weight)
Steps for Proper Hay Sampling

- Identify a single “lot” of hay
- When to sample
- Choose a sharp, well-designed coring device
- Sample at random & take enough samples
- Use proper technique
- Handle samples correctly
- Not too big; not too small
- Never split sample without grinding
- Choose an NFTA-certified lab
Identify a single “lot” of hay

- A single cutting, a single field & variety, and generally be less than 200 tons
- Don’t mix cuttings, fields, or hay types
When to sample

- As close to feeding, or as close to point of sale as possible
  - Allow 7-10 days for return of lab results
- After hay has gone through “sweat” & stabilized at 87-90% DM (10-13% MC)
Choose a sharp, well-designed coring device  

- Coring device should be 3/8”-3/4” diameter
- Tip can be serrated, scalloped or straight
- Tip should be 90° to shaft & slightly smaller
- Shaft length = 12”-24”
- Ability to sharpen or replace tip
  - Fairly represent the leaf-stem ratio
- Produce ½ lb. of sample in about 20 cores
Choose a sharp, well-designed coring device.
Sample at random & take enough samples

- Square bales = 20 cores (10 minimum)
- Round bales = 2 cores each from 10 (5 minimum) different bales
- Try to represent all areas of the stack
- Don’t avoid or choose bales because they look especially bad or good
Sample at random & take enough samples
Use proper technique

- Square Bales = probe from end, between ties
- Round bales = probe from rounded side toward bale center after removing exterior rot
- Use low speed for electric-driven corers
- Never send in flakes or “grab” samples
  - “Grab” samples tend to under-estimate nutrients
Handle samples correctly

- Combine cores in plastic bucket
- Seal composite sample in plastic bag
- Deliver to lab as soon as possible
  - Mail early in the week
- Do not allow samples to be exposed to excess sun or heat (e.g., in the cab of a pickup truck)
- Refrigeration not necessary for dry hay samples
  - Refrig. or freeze fresh hay or silage samples
- Be sure to mark “RFV test” on lab form
Handle samples correctly

Custom Laboratory, Inc.  
Telephone 417-537-8337  
P.O. Box 391 • 204 C. Street  
Golden City, Mo. 64748  
email: customlb@keinet.net

"WET-CHEMISTRY" Analysis Of Feed,  
Forages, Water, Manure,  
Soil, Plant Tissue Soil Recommendations.  
Certified By:  
National Forage Testing Association  
NAPT Soil Testing Program  
(ASCS and SCS Approved)  
(Wet/Nil)

Prices Effective 12-01-08  
Monty Dade & Associates

ANALYSIS INFORMATION SHEET

GROWER
Name: 
Address: 
Phone Number: 

Bill: Grower 
Copy to: Grower

SUBMITTED BY
Name: 
Address: 
Phone Number: 
Bill: Grower 
Copy to: Grower

Payment Enclosed 
Other

SAMPLE DESCRIPTION
1. Kind of Sample:  
2. Cutting 1st 2nd 3rd  
3. Date of Cutting:  
4. County 
5. Livestock to be fed:

SOIL DESCRIPTION
1. Crop to be grown and yield  
2. Previous crop  
3. Double crop  
4. Manure applied

Your Name, Address & Phone  
University Extension Center
<table>
<thead>
<tr>
<th>Test 1.</th>
<th><strong>Test 4.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test 17.</strong></td>
<td><strong>Cash</strong></td>
</tr>
<tr>
<td><strong>Test 3.</strong></td>
<td><strong>Test 17.</strong></td>
</tr>
<tr>
<td><strong>Hay Test</strong></td>
<td><strong>Test 8.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th><strong>Cash</strong></th>
<th><strong>Credit</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture, Crude Protein, Acid Detergent Fiber, T.D.N., Net Energy Lactation, Net Energy Gain, Net Energy Maintenance Calcium, Phosphorus, Magnesium, Potassium, Sodium, Iron, Copper, Manganese, Zinc, Qualitative Nitrate</td>
<td>$19.00</td>
<td>$20.50</td>
</tr>
<tr>
<td>Neutral Detergent Fiber with Test 1, 3 or 8 (RFV)</td>
<td>$4.50</td>
<td>$5.00</td>
</tr>
<tr>
<td>Moisture, Crude Protein, Acid Detergent Fiber, T.D.N. Net Energy Lactation, Net Energy Gain, Net Energy Maintenance, Calcium, Phosphorus, Qualitative Nitrate</td>
<td>$16.00</td>
<td>$17.00</td>
</tr>
<tr>
<td>Neutral Detergent Fiber with Test 1, 3, 8 (RFV)</td>
<td>$4.50</td>
<td>$5.00</td>
</tr>
<tr>
<td>Moisture, Crude Protein, Available Protein, Adjusted Crude Protein, Acid Detergent Fiber, Neutral Detergent Fiber, A.D.F.-N, T.D.N. Net Energy Lactation, Net Energy Gain, Net Energy Maintenance, Calcium, Phosphorus, Magnesium, Potassium, Sodium, Sulfur, Iron, Copper, Manganese, Zinc, Qualitative Nitrate, RFV</td>
<td>$27.00</td>
<td>$28.50</td>
</tr>
<tr>
<td>Moisture, Crude Protein, A.D. Fiber, T.D.N., Net Energy Lactation, Net Energy Gain, Net Energy Maintenance, Qualitative Nitrate</td>
<td>$14.00</td>
<td>$14.75</td>
</tr>
<tr>
<td>Neutral Detergent Fiber with Test 1, 3, or 8 (RFV)</td>
<td>$4.50</td>
<td>$5.00</td>
</tr>
</tbody>
</table>
Submit ½ lb. composite samples
Ensure that the entire sample is ground by the lab
If probe is too big or small to produce about ½ lb. sample in 20 cores, get a different one!
See www.foragetesting.org for a list of probes
Never split sample without grinding

- Double-check the performance of your lab by comparing with other labs
- Grind and split the sample if sending to multiple labs
  - Splitting un-ground samples yields different results
- Use several samples to test average potential bias between labs
- Ask for lab’s NFTA results on testing consistency
Choose an NFTA-certified lab

See www.foragetesting.org for a list of NFTA-certified labs
Use the “As Is” column to check moisture content or dry matter

- **Hay** = 10-13% MC
- **Hay >18-20%** = possible heating, mold, loss of feed value
- **Silage/baleage** = 40-60% MC

Use the “Dry” column to compare nutrient values with other feeds
**Crude Protein**
- Very mature = 4%
- Very immature = 26%
- “Available Protein” tests for heat damage

**Low ADF = high energy & high digestibility**
- Legumes = 20’s - mid 30’s
- Grasses = low 30’s - mid 40’s

**Low NDF = lower fiber & higher animal intake**
- Legumes = hi 30’s - hi 40’s
- Grasses = hi 50’s - hi 60’s
What numbers you want to see

TDN = energy value = digestible crude protein + carbs + fat

- Legumes = hi 50’s - mid 60’s
- Grasses = hi 50’s or better

RFV of 100 = “mature alfalfa hay”

- Legumes = 100 - 200
- Grass/Legumes = 100 +
- Grasses = 80 - 100

Below 80 won’t meet most animal energy requirements
Nitrates = negative
- 0.00 - 0.44 = safe
- 0.66 - 0.88 = limit to 50% DM
- 1.76 & up = do not feed

Contact your livestock or dairy specialist for ration-balancing advice
“Anyone who’s not soil testing or forage testing still doesn’t think fertilizer and hay prices are high enough yet.”

-- Justin Sexton, MU Extension state beef specialist
Robert A. (Bob) Schultheis
Natural Resource Engineering Specialist
Webster County Extension Center
800 S. Marshall St.
Marshfield, MO  65706
Voice:  417-859-2044
Fax:  417-468-2086
E-mail:  schultheisr@missouri.edu
Web:  extension.missouri.edu/webster