Corn Silage Hybrid Selection

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Decisions made in the fall on hybrids to plant next spring will impact you for the entire year.

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Various University and Seed Company Plots Prove Genetic Differences Certainly Exist

Did you have to interpret the plot data using valid statistics?

Various in yield and other characteristics occur because of variations in current and previous conditions that have not been controlled. Statistical analysis makes it possible to determine, with almost 100% probability, whether a difference is real or whether it might have occurred by chance. Use the appropriate LSD (least significant differences) value at the bottom of the table to determine true differences.

<table>
<thead>
<tr>
<th>Number of Environments/Plots</th>
<th>2.0 T/A</th>
<th>1.0 T/A</th>
<th>0.5 T/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60%</td>
<td>52%</td>
<td>51%</td>
</tr>
<tr>
<td>10</td>
<td>90%</td>
<td>75%</td>
<td>65%</td>
</tr>
<tr>
<td>30</td>
<td>95%</td>
<td>90%</td>
<td>75%</td>
</tr>
<tr>
<td>200</td>
<td>98%</td>
<td>95%</td>
<td>93%</td>
</tr>
</tbody>
</table>

After hybrids have been screened for agronomic and technology traits, the UW Consortium recommends these corn silage selection priorities:

1st Grain Yield
2nd Whole Plant DM Yield
3rd Standability (in case want to take for HMC or even dry corn)
4th Relative Maturity
5th Quality (e.g. fiber digestibility)

Source: http://corn.agronomy.wisc.edu/AAdvice/1997/A015.html
Why does UW rank Grain Yield above Fiber Digestibility when most of the silage advertising seems to focus on NDFD

….Because University data shows there are minimal genetic differences (4-5% units) between conventional hybrids for fiber digestibility and small differences in starch content quickly overwhelm the increased energy from NDFD.

The huge range in NDFD seen in individual farm corn silage samples is primarily the result of non-genetic factors like:

- growing conditions,
- harvest timing,
- chop height,
- fermentation quality,
- feed-out management.

Heritability of NDFD is high, but the range (variation) among commercial, high-yielding germplasm is low. And remember, it doesn’t help to apply selection pressure to a trait with minimal genetic variation.

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Factors Impacting Corn Grain Yield

Dr. Fred Below – University of Illinois, Urbana-Champaign

The huge impact of growing environment explains why hybrids can perform so differently from location-to-location and from year-to-year. This applies to corn grain and corn silage.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Weather</td>
<td>70+</td>
</tr>
<tr>
<td>2</td>
<td>Nitrogen</td>
<td>70</td>
</tr>
<tr>
<td>3</td>
<td>Hybrid</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>Previous Crop</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>Plant Population</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>Tillage</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>Growth Regulators</td>
<td>10</td>
</tr>
</tbody>
</table>

Total = 260bu 100%

Nitrogen
Weather
Temperature
Lettuce now look at the impact of growing environment on silage hybrid data....


http://www.cropsci.illinois.edu/faculty/below/

Source:  Dann Bolinger, M.S. – Pioneer Dairy Specialist, Michigan

Which silage hybrid would you choose?

Source:  Dann Bolinger, M.S. – Pioneer Dairy Specialist, Michigan
**Starch Influencers**

- **Yield** is roughly 50% grain
- **% Starch** is ratio of grain to fodder
  - Early vegetative growth w/mid to late season grain fill
- **Maturity @ harvest**
  - Prior to black layer, starch is still being produced
  - Hybrids within a plot should be reasonably close in maturity
    - Look at harvest moisture as an indicator

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**Corn Silage Harvest Considerations**

- Note the date when your corn silked:
  - Tasseling/silking corn plants have ~900 GDUs to reach silage maturity
- Count ahead six weeks and that’s about when you should get serious about checking maturity status.
- You might have read that corn will reach “silage maturity” 35-45 days after silking, but usually that’s 30-35 DM and because of avoiding effluent and increased starch deposition, it is advisable to wait until the corn is a few percentage points dryer than 30%.
- Most of the difference between hybrids of different relative maturities is between emergence and silking, not from silking to the 33-35% dry matter that’s ideal for corn silage.

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**V6**
- Begins rapid growth stages
- Begins to determine yield potential
- Poor time to stress crop due to lack of water
- Ear Girth Oil

**VT (Tassel)**
- Water & fertility requirements are significant
- Ear size/length, and number of kernels per row is determined
- Ear Girth Oil

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**Stage of Maturity | Approximate days to silking**

| Silking | 35-45 |
| Silker | 35-35 |
| Late Silker | 30-35 |
| Early Dent | 20-25 |

It is not unusual for silage to dry down 0.5-1 points of moisture per day, depending upon drying conditions. It is also not unusual for corn silage to lay down 5-10 points of starch per day until kernel reaches physiological maturity at black layer (starch deposition significantly contributes to reducing moisture in whole plant samples as the plant matures).
Starch

½ ML

¾ ML

Germ

Harvesting too premature will cost you starch yields

D M or of Nutrient Composition and Digestion Changes with Silage DM

With the cost of grain today, increased starch content of silage compensates for relatively small decreases in NDF digestibility (and dilutes NDF)

Source: Dr. Fred Owens, Pioneer Senior Research Scientist. Journal of Animal Science and Journal of Dairy Science literature review summary

When selecting a silage hybrid, don’t get hung up on marketing hype or labels such as:

dual-purpose.....
silage-specific.......
grain hybrids....

Rather, rely on multi-year data for important traits such as yield and starch content, just like you rely on bull proof date, not the name of the bulls you are using in your herd....

University data shows high grain yielding hybrids do not have any lower NDFD

Fiber yield is not reduced in hybrids with higher grain yields

• To be a good silage hybrid, it must start out as a good grain hybrid because you can not overcome lack of starch (>90% digestible) with small increases in fiber digestibility (60-70% digestible)

• BUT...not every grain hybrid makes a good silage hybrid because they may be too short and not deliver the desired stover yields
NDFD Influencers

- Greatest during vegetative growth (pre-tassel)
- Early moisture stress = improved NDFD
  - Moisture availability
    - More water typically lower NDFD
    - Less water typically higher NDFD
- Heat Units
  - More heat, less NDFD
  - Less heat, more NDFD

Relationship of Growing Conditions to Corn Silage Nutritive Value

The weather before and after silking (R1) appears to affect final corn silage nutritive value
- Before silking, weather affects corn plant height and yield and fiber quality
  - Dry conditions ⇒ higher NDFD
  - Wet conditions ⇒ lower NDFD
- Heat units: less heat, more NDFD
- After silking weather affects corn grain yield, NDFD:NDF ratios and total DM digestibility

What is one point of forage NDFD worth?

Meta-analysis of published studies with a variety of forages and a large range of NDFD (24-87%) showed a 0.37 lb increase in DMI and a 0.55 lb increase in milk.

Don’t forget the impact of NDF Quantity

Obo and Allen (1999) compiled data from the published literature and concluded that a 0.01 unit increase in NDF digestibility (expressed as a fraction) increased DMI and milk production. Metcalf (2006) added two experiments to the database. Allowing an individual cow excess forage, the regression coefficients of forage NDFD on DMI and milk production were:

- DMI: 0.0070 (SE = 0.0012) * NDFD
- Milk: 0.011 (SE = 0.0012) * NDFD

For CS (at least 40% of the diet), the results showed a 0.25 lb increase in DMI and a 0.3 lb increase in milk.
We Do Have Harvest Management Options to Increase Fiber Digestibility (NDFD)

High-chopping corn silage allows producers the option of “dialing in” desired fiber digestibility for transition & high string rations

Table 1. Average nutrient content and production of corn silage harvested at low or high levels of height compared from 11 studies

<table>
<thead>
<tr>
<th>Item</th>
<th>Low Height</th>
<th>High Height</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM, %</td>
<td>38.1</td>
<td>40.3</td>
<td>6.0</td>
</tr>
<tr>
<td>CP, %</td>
<td>7.0</td>
<td>7.9</td>
<td>13.0</td>
</tr>
<tr>
<td>ADF, %</td>
<td>24.2</td>
<td>21.8</td>
<td>-10.2</td>
</tr>
<tr>
<td>NDF, %</td>
<td>43.6</td>
<td>38.9</td>
<td>-14.4</td>
</tr>
<tr>
<td>Starch, %</td>
<td>30.4</td>
<td>32.4</td>
<td>6.6</td>
</tr>
<tr>
<td>NDF, %</td>
<td>37.1</td>
<td>40.7</td>
<td>3.4</td>
</tr>
<tr>
<td>NDF Digestibility</td>
<td>80.8</td>
<td>81.0</td>
<td>1.5</td>
</tr>
<tr>
<td>(DM basis)</td>
<td>58.6</td>
<td>60.7</td>
<td>3.6</td>
</tr>
<tr>
<td>Yield, M/M/DM</td>
<td>81.1</td>
<td>75.0</td>
<td>-7.1</td>
</tr>
<tr>
<td>Milk equivalent</td>
<td>310.4</td>
<td>316.2</td>
<td>1.9</td>
</tr>
<tr>
<td>Bush</td>
<td>2890</td>
<td>2890</td>
<td>0.0</td>
</tr>
</tbody>
</table>


There appears to be a significant Genetic x Growing Season Interaction

Pioneer Chopping Height Field Trial Year 1 (New York, 2000)

Chop Height Influence on NDFD

- 9" cut: 34.2%
- 18" cut: 39.7%
- 27" cut: 51.7%

There appears to be a significant Genetic x Growing Season Interaction

Pioneer Chopping Height Field Trial Year 2 (New York, 2001)

Cutting Height Influence on NDFD

- 9" cut: 31.7%
- 18" cut: 31.7%
- 27" cut: 50.1%

You Do Give Up Some Yield When High-Chopping

- For each 4 inches (10 cm) of increased cutting height
  - expect yields to be reduced by 1 as fed silage ton (900kg, 30%DM) per acre
  - But what you leave in the field are stalks, not high-starch corn silage

You Can Vary Silage Chop Height Depending upon the Silage Growing Season and the Quality of the Haylage Already in Storage.....

- Hand-chop representative plants and analyze NDFD before chopping
- Then alter chop height based on desired NDFD and NDFD of other forages in storage (e.g. hay haylage)
- The growing season influence on NDFD requires pre-testing the crop to determine the exact NDFD impact from high chopping
**Field example of monitoring the growing season effect and influence of high-chopping**

5 representative plants hand-cut by sales rep Tom Hemesath on 8-15-05. Data from Pioneer lab reported back 8-17-05.

<table>
<thead>
<tr>
<th></th>
<th>34M93 10&quot;</th>
<th>34M93 22&quot;</th>
<th>33P62 10&quot;</th>
<th>33P62 22&quot;</th>
<th>Average Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Moisture</td>
<td>70.6</td>
<td>69.6</td>
<td>70.7</td>
<td>70.9</td>
<td>65-68</td>
</tr>
<tr>
<td>% starch</td>
<td>17.0</td>
<td>23.6</td>
<td>14.9</td>
<td>17.5</td>
<td>30-35</td>
</tr>
<tr>
<td>% Sugar</td>
<td>6.6</td>
<td>4.5</td>
<td>7.3</td>
<td>7.1</td>
<td>6-8</td>
</tr>
<tr>
<td>% Str + Su</td>
<td>23.6</td>
<td>28.1</td>
<td>22.2</td>
<td>24.6</td>
<td>??</td>
</tr>
<tr>
<td>% NDF</td>
<td>55.4</td>
<td>51.5</td>
<td>56.6</td>
<td>53.7</td>
<td>45-50</td>
</tr>
<tr>
<td>% NDFD (24 hrs)</td>
<td>42.2</td>
<td>42.2</td>
<td>43.7</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>% CP</td>
<td>6.3</td>
<td>6.6</td>
<td>7.4</td>
<td>8.0</td>
<td>7-8</td>
</tr>
<tr>
<td>% ash</td>
<td>4.6</td>
<td>3.8</td>
<td>5.3</td>
<td>4.9</td>
<td>4-5</td>
</tr>
</tbody>
</table>

Note the hybrid (control sampling) effect on that 33P62 did not show a very big improvement in NDFD with high chopping.

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**Inoculation: another approach to improving NDFD....**

- **PLUS**
  - Improves consistency
  - Reduces shrink (DM loss)

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**Pioneer has received official Canadian government approval to make the following claims for 11CFT:**

1. Improved dry matter intake
2. Improved NDF digestibility
3. Improved gain/tonne of silage fed
4. Improved feed efficiency
5. Reduced heating at feeding
6. Reduced dry matter loss at feeding

Registration received January 5, 2007

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**Lignin “bends up” cell wall constituents thus limiting the rate at which bacteria can access and digest the cell walls**

CFT breaks this ester bond with an enzyme produced in the bunker by our L. buchneri strain, allowing rumen bacteria to digest the cell wall much faster because it is separated from the lignin.

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**“Fiber and Lignin” are similar to “Concrete and Rebar”**

Before CFT

After CFT
Balancing Rations Around CFT-Silage

Here’s your key to more milk production

1. Assume slightly higher intakes (hence more starch intake)
2. Be sure ration has adequate effective fiber (peNDF, scratch)
3. Increase the energy density of CFT-silage by assuming a 4-percentage point increase in NDFD

These are all still valid, but #3 did not provide adequate direction for consulting nutritionists

Some nutritionists using more sophisticated ration-balancing software could actually modify the Kd’s of the nutrient pools

<table>
<thead>
<tr>
<th>Composition and digestion of carbohydrate Yacitons in CFT-dairy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>NDF</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

We use to think the B2 pool was the only one changed in CFT-silage

In this corn silage, a 4-point increase in NDFD translates to a 15% higher Kd

If nutritionists use Net Energy (NE-L), changing NDFD 4-points results in very minor changes in NE-L estimates. We do not think NE-L will be sensitive enough to the digestion rate changes we see with CFT.

CFT Field Experiences in North America

- Independent Research Substantiating Pioneer’s CFT Data

Some nutritionists use the increase in NDFD to adjust NDF (B,) digestion rates (kd’s) with a Cornell spreadsheet

The increase in NDFD results in a 15% higher Kd
Using the example lactating ration (and feed library corn silage) that comes loaded in CNCPS

Feed library corn silage parameters are 35% DM, 35.5% STR, 41% NDF, 2.87% lignin, 3.4%/hr B3, 30%/hr B1, 30%/hr B2.

Milk predicted from the metabolizable energy (ME) or metabolizable protein (MP) in the ration

The problem is that neither of these scenarios (with modifying only the B3 pool) agrees very well with CFT field experiences

Using CPM ration software to compare control vs. CFT in 7 side-by-side field trials with vacuum packed silage for which gas-production data was generated...

**BUT NOW**

Kd’s on all the pools (B1, B2, and B3) were modified based on the averages of the gas data shown below.

<table>
<thead>
<tr>
<th>Fast Pool</th>
<th>Slow Pool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kd rates based on average gas data for NDF(B3) by 35%, B1 by 50% and B2 by 30%</td>
<td></td>
</tr>
</tbody>
</table>

CFT increased the predicted ME milk by .87 lbs and MP milk by 1.1 lbs

Same ration with CS modified to account for CFT by changing B3 rate using VanAmburgh calculator (4 pts NDFD) from 3.4% to 3.9%/hr

Next Level of Sophistication to Feeding CFT-silage

Using CPM ration software to compare control vs. CFT in 7 side-by-side field trials with vacuum packed silage for which gas-production data was generated...

Kd’s on all the pools (B1, B2, and B3) were modified based on the averages of the gas data shown below.

CFT-Silage

<table>
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<tr>
<td>Kd rates based on average gas data for NDF(B3) by 35%, B1 by 50% and B2 by 30%</td>
<td></td>
</tr>
</tbody>
</table>

CFT-silage now predicted to increase ME by 1 lb (.45 kg) and MP by 4.3 lbs (1.9 kg) compared to control CS

Another approach is to take some grain out of the ration due to the extra energy in CFT-silage

- To produce the same ME and MP milk as the non-CFT silage ration, you can remove .37 lbs of corn meal when feeding CFT-silage
- With corn @ $3.50/bu corn this resulted in a savings of 2.3 cents/cid

Back to original case study....but now B1 Increased by 35%, B2 by 65% and B3 by 30% (typical of values seen in RFS Lab), rather than only adjusting B3 by 15% (per VanAmburgh calculator)

Compared to ME milk, 87 lb (.39 kg) and MP by 1.1 lb (.5 kg) when adjusting B3 rates alone

Biological reality is probably somewhere in the middle!
Protein savings, from more rumen microbial growth on CFT-silage, contributes more to decreasing ration costs than the effect of reducing corn meal in the ration.

What about protein?

Fate of Proteins in Ruminants

In this ration, soybean meal was reduced from 2.23 lbs to 1.70 lbs (did not change anything else, so DM intake will be lowered accordingly). Now the predicted ME and MP milk is similar to what was predicted with the original base ration (50.12 and 56.51). Reducing soybean meal by .53 lbs (25.6% of MP milk) = 11 cents/c/d savings. Note this reduced the CP level to 15.9%.

Back to the Base Ration using Feeds From the CNCPS Feed Library

(35% DM, 35.5% STR, 41% NDF, 2.87% lignin, 3.4%/hr B3, 30%/hr B1, 30%/hr B2)

Milk predicted from the metabolizable energy (ME) or metabolizable protein (MP) in the ration

Note the production of microbial protein from this "base" ration is 1326 grams

Notice relatively low CP level of this ration predicted to generate 43.87 kg of MP milk….this is consistent with where Cornell is recommending nutritionists balance protein…remember, this is the example ration that comes loaded with the CNCPS program

Now with changing the digestion rates of B1, B2, and B3, the production of microbial protein was increased by 93 grams over the basal diet and 76 grams over the CFT ration with only B3 rates increased (from 3.4 to 3.9%/hour)

All ration ingredients kept constant

These field experiences are what led to our CFT Feeding Considerations

A 4% point increase in 48-hour NDFD (over baseline estimates) is a reasonable starting point to factor in the effect of CFT. Changes in digestion rates (k’s) of the B3 pool (available NDF) resulting from the improvement in NDFD can be modeled in formulation models, such as CPM or CNCPS, by employing the VanAmburgh Rate Calculator (VARC) available from Cornell professor, Dr. VanAmburgh (mev1@cornell.edu) or from Pioneer. However, field experience suggests that increasing B3 rates by 15-20%, (which VARC predicts from a 4-point increase in NDFD), will not fully account for the effect of CFT and adjustments will likely be required in the rates of B1 (starch) and B2 (soluble fiber) pools to prevent over-feeding of concentrates (e.g. hemicellulose) to digest at rates more commonly observed among "fast pool" (B2) nutrients.

Key points are that CFT appears to:

1. Increase the rate of B3 (“slow pool”) digestion by upwards of 35%; causing B3 nutrients (e.g. hemicellulose in grain) to rates more commonly observed among "fast pool" (B2) nutrients
2. Achieve maximum B3 slow pool digestion rates
3. Increase the digestion rates of both B1 and B3 pools by upwards of 30-50%.
4. Feeding CFT silage typically above 40% of nutrition in "fast pool" nutrients (e.g. starch) in practice, the increase in B3 rumen available protein in the TMR to offset increased availability of hemicellulose and the shifting of "fast pool" nutrients into the "slow pool" (e.g. starches) pool makes it difficult to properly account for the effect of CFT on milk production, even with changes in B3 digestion rate. Key points are that CFT appears to:

2. Reduce the time required to achieve maximum B3 (slow pool) digestion rates
3. Increase the digestion rates of both the B1 and B2 pools by upwards of 30-50%.
4. Feeding CFT silage typically allows for reduction in "fast pool" nutrients (e.g. starch).

In practice, this means reducing concentrate (grain) in the TMR to offset increased availability of hemicellulose and the shifting of "slow pool" nutrients into the "fast pool" (B2) nutrients (e.g. soluble fiber)

5. Field experience with herds who experienced milkfat depression problems when starting to feed CFT-silage, were typically borderline for effective fiber and/or acidosis issues and quickly resolved the problems by reducing grain (especially HM corn), increasing corn silage inclusion rates (and effective fiber) and/or adding co-products such as soyhulls (additional source of soluble fiber)

6. CFT silage-based rations may require attention to protein formulation; allowing for the reduction of rumen degradable and/or undegradable protein due to increased microbial protein. The effect of this reduced protein on MP milk production when NDF digestion rates are modeled in CPM or CNCPS.
Starch in corn silage gets more digestible over time in storage...

CS data from France...some of the first published research showing this effect.

AMAT = % Soluble Protein

A2 = % Starch

Source: Dr. Jacques Eouzan. ESSAI ENSILAGE DE MAÏS 2001/2002 - CENTRALYS

Higher ensiling moistures increases in situ digestibility

Results from 2005 HMC (27%) moisture processed through tub-grinder analyzed for 12-hr in vitro STRD comparing a (saved-frozen) 60-day (fall) sample against a 200-day (spring) sample (both samples incubated in the same in vitro run)

30% increase in 3-hr STRD in corn silage stored for 2 months vs. 10 months in study reported at 2006 Dairy Science meetings

Isolate (fall) vs. (spring) vs. (combined 2005-2006)

Higher ensiling moistures increases in situ digestibility

1.6% units per month increase in 12-hr STRD in corn silage study reported at 2008 Dairy Science meetings

Key Words: Degrubility, Starch, Corn silage

Effect of length of time resulted in dry matter, starch and fiber digestibility in whole plant corn silage. C. M. Hollins*, O. A. Segura*, and T. S. Trimble, The Pro Corporation, Madison, WI. 1Environmental Analytics, LLC, Homer, IL. 2Dairy Laboratories Inc., Arcadia, WI.

To test the hypothesis that starch and fiber digestibility in whole plant corn silage change with time sealed, two separate hybrids from two commercial dairy farms were sampled. All samples were taken from one incubating load of corn silage chopped with a commercial barn silage at each farm. For each hybrid, the sample was divided and 70% of each hybrid was used for 90 days of storage. After 90 days, the samples were analyzed for DM, NDF, ADF, N, STRD, and 12-hr for determining 12-hr digestibility and 12-hr STRD. Each month the same 10% of each hybrid was used for 90 days of storage. After 90 days, the samples were analyzed for DM, NDF, ADF, N, STRD, and 12-hr for determining 12-hr digestibility and 12-hr STRD. Each month the same 10% of each hybrid was used for 90 days of storage.

A factor contributing to "spring acidosis", besides increasing STRD in CS, is the loss of buffering capacity when cows excrete CO2 from panting during heat stress, increased drooling which reduces saliva flow to rumen and increased urinary bicarbonate excretions.

Hoof trimmers are the busiest in September...the result of acidosis in spring and summer!

Key Words: Corn Silage, Degrubility, Starch

ENSDM (%)

30% increase in 3-hr STRD in corn silage stored for 2 months vs. 10 months in study reported at 2006 Dairy Science meetings

30% increase in 3-hr STRD in corn silage stored for 2 months vs. 10 months in study reported at 2006 Dairy Science meetings

Higher ensiling moistures increases in situ digestibility

Ruminal Starch Digestibility Report

If a cow was receiving 10 lbs DM from this HMC, her rumen would theoretically be exposed to:

- 4.6 lbs of starch in the Fall
- Increasing to 5.7 lbs by Spring

Effect of length of time resulted in dry matter, starch and fiber digestibility in whole plant corn silage. C. M. Hollins*, O. A. Segura*, and T. S. Trimble, The Pro Corporation, Madison, WI. 1Environmental Analytics, LLC, Homer, IL. 2Dairy Laboratories Inc., Arcadia, WI.

To test the hypothesis that starch and fiber digestibility in whole plant corn silage change with time sealed, two separate hybrids from two commercial dairy farms were sampled. All samples were taken from one incubating load of corn silage chopped with a commercial barn silage at each farm. For each hybrid, the sample was divided and 70% of each hybrid was used for 90 days of storage. After 90 days, the samples were analyzed for DM, NDF, ADF, N, STRD, and 12-hr for determining 12-hr digestibility and 12-hr STRD. Each month the same 10% of each hybrid was used for 90 days of storage. After 90 days, the samples were analyzed for DM, NDF, ADF, N, STRD, and 12-hr for determining 12-hr digestibility and 12-hr STRD. Each month the same 10% of each hybrid was used for 90 days of storage.

A factor contributing to "spring acidosis", besides increasing STRD in CS, is the loss of buffering capacity when cows excrete CO2 from panting during heat stress, increased drooling which reduces saliva flow to rumen and increased urinary bicarbonate excretions.

Hoof trimmers are the busiest in September...the result of acidosis in spring and summer!