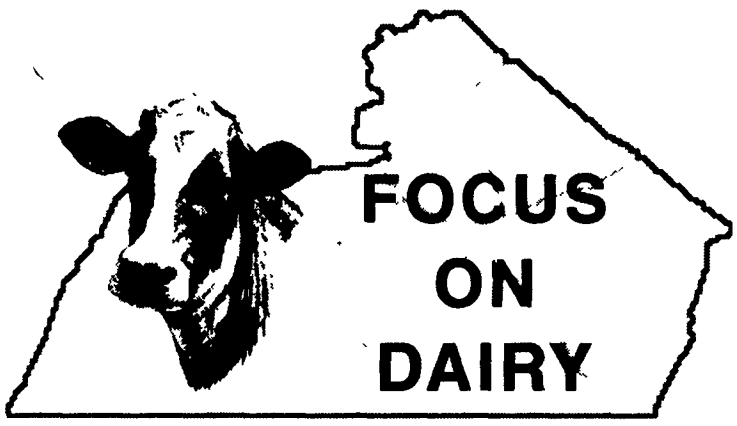

Penn State Cooperative Extension Capitol Region Dairy Team

CORN SILAGE — LESSONS LEARNED

Tim Beck
Capitol Region Extension Dairy Program Coordinator

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Feedout results have been analyzed on most of the samples included in this year's Capitol Region corn silage initiative, and several important silage management concepts were well-demonstrated.

Perhaps the most fundamental concept clearly shown was the importance of ensiling at appropriate dry matter to achieve high quality silage with high-energy value. A second concept also related to dry matter is its effect on the fermentation end-products produced in a silage sample. A third lesson is the differences in NDF digestibility that exist between corn silage hybrids and the effect this has on the potential energy value of the silage. Each of these issues will be discussed in more detail.

Producers must keep in mind the optimum dry matter for ensiling based on the storage structure, but ensiling corn silage outside the 30-39 percent optimum range can have clearly negative effects on silage quality. As kernel development advances, more starch is deposited in the ear, so sugar content declines while starch content increases. Silages ensiled below 30 percent dry matter in the study had 18.7 percent starch on average, while the optimum dry matter forages had 27 percent starch content.

But it's easy to miss optimum dry matter and risk undesirable silage fermentation without gaining significant energy value. The samples ensiled above 39 percent dry matter had slightly higher starch values at 30.5 percent, but milk per ton and net energy of lactation (NEL) were not significantly improved over the samples ensiled at optimum 30-39 percent dry matter. What was clear is these overly dry samples did not ferment as effectively as shown by a higher terminal pH, less titratable acidity in the sample, and lower levels of total volatile fatty acid (VFA).

It should be noted processing might improve the energy value of overly dry silages. The effect of processing is already considered in the Milk2000 calculation since different equations are used to calculate the predicted starch digestibility for processed vs. unprocessed corn silages.

For silage to be well-preserved and have good feed bunk stability, we need to achieve a good terminal pH between 3.5-4.0 that results in a high concentration of lactic acid compared to the other volatile fatty acids in the sample. Again, dry matter at ensiling is critically important. When silages are ensiled too wet, fermentation may be prolonged with excessive acetic acid and total volatile fatty acid production.

While this improves the bunk life of the silage because acetic acid prevents the growth of yeasts and molds in the bunk, it can also deplete the energy and protein content of the silage. Samples ensiled below 30 percent dry matter had higher acid production, more acetic acid, total VFA production, and higher ammonia levels. Ammonia decreases dry matter intake of silages significantly, as does acetic acid, and its presence indicates protein degradation has occurred during the prolonged fermentation that occurred.

Drier silages do not produce as much total acid during fermentation because packing is more difficult and sugar levels are lower in the crop. This was evident in the study samples, although all samples are within acceptable levels of lactic and acetic acid production.

Ensiling practices are like all management practices — we must strive for a balanced approach that optimizes as many desirable outcomes as possible. We need some acetic acid to have stable feeding characteristics, but prolonged fermentation depletes silage energy value and reduces dry matter intake.

Finally, the corn silage project clearly demonstrated the difference NDF digestibility could make on the energy value of corn silage. In the traditional approach to calculate net energy of lactation, neutral detergent fiber and acid detergent fiber values are used to calculate energy value. This method does not account for the differences that plant variety, growing conditions, and stage of maturity can create in the final energy value of corn silage.

We calculated the Milk2000 value of silages in the study and found that when looking at the neutral detergent fiber values of samples that were nearly identical, final Milk2000 values that use NDF digestibility in the calculation could differ by as much as 500-600 pounds of milk per ton of silage. This was especially true for silages that were ensiled too dry.

Traditional energy calculations alone did not adequately distinguish the energy value differences that existed between these silages. In one case, NEL for the silage was .73 by traditional methods, but the recalculated Schwab-Shaver NEL was .68 for the same sample when digestibility was considered. This difference would greatly influence the supplementation required to achieve similar milk production from this forage. It is important to note the Milk2000 calculation reflects both increased energy from improved digestibility and higher milk production potential from improved intake because the cow is able to consume more dry matter because NDF is not holding back intake.

To summarize, remember the major influence dry matter at ensiling has on final silage quality. This is a controllable variable that can be monitored and will result in consistently higher quality forages when properly managed. Second, when the dairy ration is not producing as much milk as anticipated, consider requesting some additional testing and recalculate the energy value of the corn silage using the Milk2000 approach. You may discover you've seriously overestimated your corn silage energy value and a new formulation of the ration may be needed.

More information about his topic may be found at the corn silage link at the Capitol Region Dairy Team Website at http://capitaldairy.cas.psu.edu or at the Wisconsin Website http://www.uwex.edu/ces/crops/uwforage/Silage.htm.

Corn Silage Initiative: Comparison of feed out sample results grouped by dry matter

Dry Matter, %	Average 27.9 25.9—29.9	Average 34.7 31.7—38.9	Average 42.5 40.1—43.8
Net Energy Lactation, mcal/lb	.68	.72	.73
NDF, % DM	51.72	46.08	44.47
Starch, % DM	18.68	27.09	30.50
Sugar, % DM	3.46	3.48	2.53
48 Hr IVNDFD, %	61.29	60.00	61.00
Milk 2000 Calculations			
Milk Per Ton, lbs/Ton	3163	3335	3299
Fermentation Characteristics			
pH	3.71	3.82	3.98
Titratable acidity, meq/gm	8.86	4.78	3.11
Lactic acid, % DM	6.38	4.40	3.97
Acetic acid, % DM	2.65	.68	.38
Total VFA, % DM	9.11	5.11	4.34
Ammonia % CP	8.41	6.41	5.33

In Celebration Of The Show

HARRISBURG (Dauphin Co.) — Dennis Grumbine, Farm Show executive director, reveals the several awards presented to the Farm Show by the International Association of Fairs and Expositions. The awards were showcased at a special event Wednesday at noon at the Farm Show Complex. The Farm Show hosted about 200 guests at the gala presentation. ***Photo by Andy Andrews, editor***

Drought Of '99 Never Ended In Parts of Pennsylvania

Groundwater Levels Still Suffer

UNIVERSITY PARK (Centre Co.) — Groundwater supplies under much of Pennsylvania that dwindled to alarmingly low levels during the drought of 1999 never fully recovered and have fallen again during this year's extremely dry weather, according to a water resources extension specialist in Penn State 's College of Agricultural Sciences.

If central Pennsylvania does not receive at least normal amounts of precipitation in late fall and winter, said Bryan Swistock, the region will face a critical situation with groundwater supplies come spring.

Fifty-five Pennsylvania counties are under either a drought watch or drought warning issued by the Pennsylvania Department of Environmental Protection. Dry conditions are most severe in the southcentral part of the state. Long-term weather forecasts by the National Weather Service are calling for no more than normal amounts of precipitation this winter.

"But we were supposed to get normal amounts of precipitation this fall, too, and we haven't," Swistock said. "If this keeps up through late fall and winter, we will be in trouble. Public surface water supplies have mostly held up rather well so far, but there are already problems with groundwater in places. Because we can't see groundwater, the public is mostly unaware."

Effects of the drought of 1999 were felt all over the state, but it was worst in the parched east.

"In the eastern part of the state — by any measure you care to use — the summer drought of 1999 was as bad as they get," Swistock said. "But ironically, in the fall of that year, the eastern part of the state received so much rain that there were flooding problems and the groundwater recovered. Here in central Pennsylvania, however, where rains were not nearly so heavy or frequent, the groundwater never completely recharged."

The worst-case scenario, warns Swistock, would be if we had a cold, dry winter, which would freeze the ground surface and not allow any recharging of the groundwater. "If that happened," he said, "the groundwater levels would continue to decline as they have all summer and they would reach critical levels come spring."

His biggest concern over the next few months is for people who depend on wells and springs. "We are not getting the fall rains we need and the groundwater levels continue to drop," he said.

"Wells are starting to go dry."

According to Swistock, there are two windows of opportunity during the year for recharging groundwater: spring and fall. The fall window is now closing. In the winter, when the ground is frozen and most precipitation falls as snow, and in the summer when trees and other plants are absorbing huge amounts of water, groundwater normally doesn't recharge.

"We have tended in the last 10 to 15 years to have short-term, extreme droughts — we had them in '88, '91, the mid-'90s and '99," says Swistock. "That's different than in the 1930s and 1960s when we had much longer-term droughts. We had six or seven years in a row of well-below-normal rainfall then. That's a big worry, because if we ever get into a cycle like that now with our higher water consumption, we'd really be hurting."

Swistock believes development and growing population, especially in the southeastern part of Pennsylvania, are putting increased pressure on groundwater resources. "There is more competition in this state for water every day from development," he says. "We are putting more pressure on the water resources."

Groundwater mining — taking more groundwater than the system can replenish — is happening in places like Arizona and California, threatening long-term communities. In water-rich Pennsylvania, it is uncommon.

"But in the southeastern part of our state, groundwater mining is occurring and they have started to document continually declining groundwater levels," says Swistock. "A groundwater protection area has been established. Our groundwater supplies are not unlimited. In central Pennsylvania, we should hope for lots of snow this winter."