

What's Cropping Up?

A NEWSLETTER FOR NEW YORK FIELD CROPS & SOILS

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Many agriculturists consider 65% as the optimum moisture for corn silage harvest. A horizontal or bunker silo allows dairy farmers to safely store corn silage at harvest moistures at just below 70%. Consequently, many dairy producers with bunker silos begin corn silage harvest when silage moisture is just below 70%. We

evaluated two corn silage hybrids, 34B23 and TMF108, in 2002 and 2003 to determine if silage yields or quality are compromised when harvesting corn silage at just below 70 vs. 65% moisture. The 2002 growing season was extremely dry in July and August and the 2003 growing season was dry only during the latter part of August.

Despite differences in weather conditions between growing seasons, most silage quality measurements were consistent across years (Table 1). Starch consistently increased by 3 to 4 percentage units and crude protein decreased by 0.3 to 0.4 percentage units as silage moisture decreased from about 70 to 65% moisture. The NDF concentrations decreased in the dry 2002 growing season and the IVTD concentrations decreased in 2003 as silage moisture decreased from 69-70% to 65%. Harvest moisture did not affect NDF digestibility in either year of the study.

Likewise, harvest moisture did not affect silage yield in either year of the study (Table 2). In 2002, milk per ton, a forage quality index that combines NDF, NDF digestibility, starch, crude protein, and ash into a single term, showed a hybrid x harvest moisture index. TMF108, which had a 4 percentage unit increase in starch with no real change in NDF digestibility and crude protein concentrations, had a

WHEN TO BEGIN CORN SILAGE HARVEST FOR BUNKER SILOS?

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242 lb/ton increase as harvest moisture decrease from 69.4 to 64.5%. 34B23, which had a 5 percentage unit increase in starch but a 3 percentage unit decrease in NDF digestibility and a 0.6 percentage unit decrease in crude protein, had similar milk/ton values at both harvest moistures. In 2003, however, harvest moisture did not

affect milk/ton and there was no hybrid x harvest moisture interaction. Harvest moisture did not affect milk/acre in either year of the study mostly because of no significant change in silage yields.

Conclusion

Dairy producers do not compromise corn silage yield or quality in most years by harvesting corn silage at just below 70 instead of 65% moisture. In years with dry July and August conditions when starch concentrations are inherently low, some hybrids may have higher corn silage quality at 65% harvest moisture because of the increase in starch concentrations. Nevertheless, we recommend that dairy producers who use bunker silos begin corn silage harvest at just below 70% harvest moisture, especially in years when drought did not occur, because silage yields and quality do not change much and an earlier harvest usually results in less soil compaction. In years with dry July and August conditions, dairy producers may wish to delay harvest to about 65% moisture because of the potential for improved quality. In a year with dry August and September conditions, silage moisture can decrease by 1 percentage unit or more per day. A delay in harvest until 65% moisture can increase the potential of harvesting the silage at too low a moisture if more than one field is at 65% moisture or if harvest equipment malfunctions.

Table 1. Percent moisture, neutral detergent fiber (NDF), NDF digestibility, in vitro true digestibility (IVTD), starch, and crude protein (CP) concentrations of 34B23 and TMF108 at two harvest times in the 2002 and 2003 growing seasons at Aurora, NY.

Harvest Time	2002			2003		
	34B23	TMF108	Avg.	34B23	TMF108	Avg.
<u>% Moisture</u>						
Early	69.9	69.4	69.7	69.5	68.5	69.0
Optimum	66.1	64.5	65.3	65.9	64.2	65.0
<u>NDF</u>						
Early	43.7	44.8	44.3	42.2	47.2	44.7
Optimum	40.1	43.2	41.7	42.9	48.4	45.6
LSD 0.05			1.2			NS
<u>NDF Digestibility</u>						
Early	62.2	59.4	60.8	56.9	57.1	57.0
Optimum	59.0	60.0	59.5	53.7	55.4	54.6
LSD 0.05			NS			NS
<u>IVTD</u>						
Early	83.5	81.8	82.7	81.8	79.8	80.8
Optimum	83.5	82.7	83.1	80.2	78.4	79.3
LSD 0.05			NS			1.2
<u>Starch</u>						
Early	20.6	21.6	21.1	26.7	27.5	27.1
Optimum	25.8	25.9	25.9	28.8	31.2	30.0
LSD 0.05			1.9			2.0
<u>CP</u>						
Early	7.8	7.5	7.6	7.2	6.5	6.9
Optimum	7.2	7.3	7.3	6.6	6.4	6.5
LSD 0.05			0.3			0.2

Table 2. Corn silage yield (65% moisture), milk per ton, and milk per acre of 34B23 and TMF108 at two harvest times in the 2002 and 2003 growing seasons at Aurora, NY.

Harvest Time	2002			2003		
	34B23	TMF108	Avg.	34B23	TMF108	Avg.
<u>Tons/acre (65% moisture)</u>						
Early	14.4	15.7	15.1	25.8	23.9	24.9
Optimum	14.6	16.3	15.5	25.9	23.7	24.8
LSD 0.05			NS			NS
<u>Milk/Ton (lbs/ton)</u>						
Early	3201	3185	3193	3312	3411	3362
Optimum	3235	3427	3331	3328	3357	3343
LSD 0.05	NS	201				NS
<u>Milk/Acre (lbs/acre)</u>						
Early	16197	17551	16874	29982	28515	29249
Optimum	16526	19502	18014	30086	27845	28966
LSD 0.05			NS			NS



New York Corn Grain and Silage Contest

Bill Cox, Dept. of Crop & Soil Sciences, Cornell University

NEW YORK CORN GRAIN AND SILAGE CONTEST

The Cornell Crop and Soil Management Work Team and the New York Corn Growers Association are initiating a New York Corn Grain and Corn Silage contest in 2004. We are initiating the contest to recognize top New York corn growers, to have the top growers share with others their management strategies that resulted in high yields, and to provide more visibility on the importance of grain corn and corn silage in New York agriculture. Winners with the top grain yields and calculated milk yields (from silage yield and quality measurements) will be awarded from the 12 districts originally delineated by the New York Corn Growers Assn. in 1995. The 24 winners will be invited (free admittance) to and recognized at the 5th annual Field Crop Symposium Day in Waterloo on March 9th, 2005. Below is a list of some of the most important rules.

- 1) **All entries must be received by August 15th.** Entry forms will be found in Country Folks as well as in county extension offices or newsletters. Individuals can also request forms from their local extension office, Anne Peck of the New York Corn Growers Assn., or from Pam Kline of Cornell University. Also, forms will be available at the New York Corn Growers Assn.'s display at the Empire Farm Days in August. **The entry form with the check(s) for the application fee should be sent to Pam Kline (Cornell Univ., Dep. of Crop and Soil Sciences, Ithaca, NY, 14853).** The entry fee will be \$30 for the grain contest and \$60 for the silage contest (higher cost for the quality analyses by Dairy One).
- 2) The entrant must identify a field(s) of 5 acres or more in size on the entry form. The entrant can enter up to two entries. The entrant must identify the hybrid (along with any traits such as YG, RR, BT, etc.) that has been planted to the field(s) at the time of entry. For each entry, you will be required to designate the field(s) from which you will harvest. The designated field(s) must be at least five acres in size with 1.25 continuous acres to be harvested from the field(s). This designation must be made by filling out the bottom of the contest entry form with your field location(s). Once the entry form is submitted, the entrant will receive harvest forms.
- 3) From an entered field, a continuous area of at least 1.25 acres must be harvested and accurately weighed in the presence of an approved unbiased supervisor (extension agent, private consultant, Cornell staff, industry rep, etc.) of the harvesting operation. The field(s) must be weighed by calibrated and approved weigh wagons (grain) or certified scales (grain or silage). **If no scales or weigh wagons are available in the area, you can contact Bill Cox (Cornell University, Department of Crop and Soil Sciences, Ithaca, NY, 14850) who will provide or contact individuals who can bring a weigh wagon or field scales for weighing.** Any plots that yield more than 200 bu/acre or 25 tons/acre (70% moisture) must have a contiguous 1.25 acres weighed again by a different unbiased supervisor.
- 4) The unbiased supervisor will also take grain or silage samples to accurately get a moisture sample and in the case of silage to also submit it to Dairy One for quality analyses.
- 5) The applicant must fill out the Harvest Form, attach the weigh ticket to the Harvest Form, and attach the moisture percent or moisture ticket. The unbiased supervisor of the harvesting operation must sign off on the Harvest Form. **The applicant will send the Harvest form to Pam Kline at Cornell University.**
- 6) Bill Cox and Jerry Cherney will take the silage yield and quality data (from Dairy One) and will estimate the calculated milk yield of each entered field. They will identify the 12 silage winners based on the calculated milk yield data. Bill Cox will also ultimately receive all the grain yield data and will identify the winners in each of the 12 districts.
- 7) The individuals will be notified in February and will receive recognition at the Field Crop Symposium Day on March 9th in Waterloo.

NEW YORK CORN GRAIN AND SILAGE CONTEST ENTRY FORM AND FIELD DESIGNATION

Name: _____

Farm Name: _____

Address: _____

Town: _____ State: _____ Zip: _____

Home Phone: _____ Work or Cell Phone: _____

Number of grain corn entries (limit 2) X \$30.00/entry Total: _____

Number of corn silage entries (limit 2) X \$60.00/entry Total: _____

Grand Total: _____

Fill out completely and send with the appropriate entry fees to: Pam Kline, Cornell University, Department of Crop and Soil Sciences, Ithaca, NY 14853. Entries must be **RECEIVED** and **PAID** by August 15, 2004.

Entry Field Designation:

(Designate field by field number and location)

Entry #1:	Field 1: _____	Grain Silage
	Hybrid: _____	(Circle One)
	Traits: _____ (YG, RR, BT, etc)	
	Field 2: _____	Grain Silage
	Hybrid: _____	(Circle One)
	Traits: _____ (YG, RR, BT, etc)	
Entry #2:	Field 1: _____	Grain Silage
	Hybrid: _____	(Circle One)
	Traits: _____ (YG, RR, BT, etc)	
	Field 2: _____	Grain Silage
	Hybrid: _____	(Circle One)
	Traits: _____ (YG, RR, BT, etc)	

Computational Agriculture

Computational Agriculture Initiative: A partnership between the Cornell Theory Center and College of Agriculture and Life Sciences

A new partnership between the Cornell Theory Center (CTC) and Cornell's College of Agriculture and Life Sciences (CALS) focuses on using CTC's computational infrastructure to address agricultural and environmental problems. Specifically, it will advance research on data-intensive agricultural problems with applications to high-performance computing (HPC), and develop and advance management tools and databases in support of services to the agricultural community.

"CTC is committed to serving the computational needs of Cornell's researchers," said Executive Director Linda Callahan. "Our commitment is based on a belief that researchers should be able to devote their time and talents to achieving scientific goals, rather than allocating resources to writing code and manipulating computer systems." CALS faculty will work with CTC personnel to develop applications that will take advantage of HPC. The partnership, which is funded by the United States Department of Agriculture, will develop expertise among current and future scientists in computational agriculture and advance the sophistication of research and outreach in this area.

"Historically, agricultural science research has consisted primarily of experimental work combined with targeted modeling efforts," said Harold van Es, Cornell University professor and organizer of the partnership. "Today, however, agricultural science research is poised at the edge of a major paradigm shift. Agriculture is a very complex system with many interacting components that make their management very challenging. Computing technologies become more effective with increasing complexity and recent advances in areas such as precision agriculture have shown the potential to favorably affect production efficiency and environmental impact."

Research in agriculture has become increasingly quantitative and computational, and the generation of data is no longer a limiting factor, as long as researchers have the necessary hardware and software tools. "In the near future for many agricultural services, HPC will be a requirement for many problems in the agricultural sciences" said van Es.

The partnership has identified six initial projects (more information is available at <http://www.tc.cornell.edu/Research/compagriculture/>):

- **High-Resolution Climate Data:** to develop a methodology for spatial interpolation of daily precipitation and temperature to a sufficiently fine spatial resolution to be used as input to operational crop and hydrological models, led by Dan Wilks and Art DeGaetano.

- **Hyperspectral Sensing of Soil:** to determine the feasibility and develop procedures for the use of hyperspectral sensing for rapid assessment of a wide range of soil characteristics, and to develop an infrastructure for data analysis and warehousing of such information, led by Steve DeGloria.
- **Climate Change:** to apply real option theory to determine the optimal timing of investments to reduce the cost of climate change in agriculture in the Northeastern United States, led by Jon Conrad.
- **Data Mining of agro-environmental information,** led by Martin Wells and Patrick Sullivan.
- **Real-Time N Management Recommendations:** to develop a server-based tool for precise nitrogen management under maize production using real-time climate information and a dynamic simulation model, led by Jeff Melkonian and Harold van Es.
- **Development of Robust Experimental Designs for Field Experiments:** to use HPC to design standard experimental designs that are robust to field trends, autocorrelation, and periodicity, led by Harold van Es and Carla Gomes.

"Several project components of this partnership are based on stakeholder demands for improved technology and tools," said van Es. For example, the lack of high-resolution weather data severely limits precise management of irrigation and nitrogen in a variety of cropping systems. These are significant production expenses to land managers and involve materials that are also of environmental concern. We are also looking for better methods for management and mining of data. CTC's emphasis on developing HPC tools in a Windows-based environment will facilitate this access."

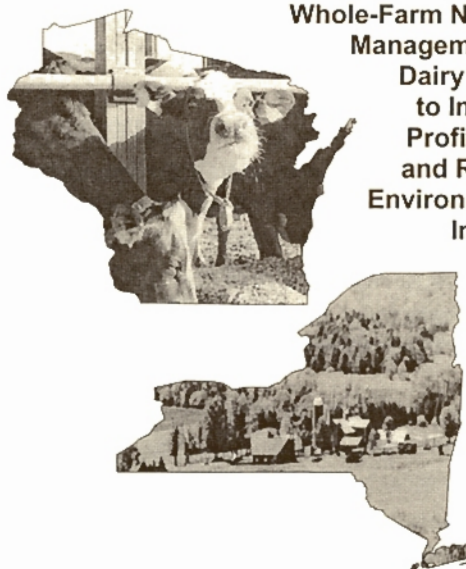
About Cornell Theory Center

CTC is a high-performance computing and interdisciplinary research center located on the Ithaca campus of Cornell University with additional offices in Manhattan. CTC currently operates an Intel/Windows cluster complex consisting of more than 1,500 processors, in addition to Unisys ES7000 Servers. Scientific and engineering projects supported by CTC represent a vast variety of disciplines, including bioinformatics and computational biology, behavioral and social sciences, computer science, engineering, finance, geosciences, mathematics, physical sciences, and business. CTC offers assistance to institutions that are considering implementing Windows-based HPC systems and provides online and hands-on training in all aspects of Windows HPC, from systems management to code porting. For more information, visit <http://www.tc.cornell.edu>.

Comparative Review of Nutrient Management Software Tools Now Available

Nutrient Management

Whole-Farm Nutrient Management on Dairy Farms to Improve Profitability and Reduce Environmental Impacts



Cornell University
University of Wisconsin-Madison
USDA-Agricultural Research Service, Dairy Forage Research Center

April 30, 2004

Final Report to the National Center for Manure and Animal Waste Management

CORNELL UNIVERSITY CROP AND SOIL SCIENCES RESEARCH SERIES R04-1
UNIVERSITY OF WISCONSIN EXTENSION PUBLICATION A3794

Cornell University, the University of Wisconsin, and the USDA-ARS Dairy Forage Research Center, funded by the National Center for Manure and Animal Waste Management, initiated a joint project in January 2002 to study nutrient management tools, research applications, and educational efforts for dairy farms in New York and Wisconsin.

At each location, interdisciplinary teams are working on research, extension and educational programs to improve farm profitability while protecting the environment but prior to this project, there was little exchange of information and experiences. Through a video-linked seminar series in which software tools were presented and discussed, and follow-up with the developers after the seminars, tool assessments were done.

This document is the final report of the project. It contains outlines of nine nutrient management tools used in New York or Wisconsin and provides readers with comparative reviews of the tools to aid in tool selection. Model developers and agricultural educators can use this information to improve their nutrient management research and teaching efforts.

In addition to software evaluations, this project report describes the dairy production systems and state regulatory environments and gives an overview of three university courses developed to address nutrient management issues in New York and Wisconsin. The primary audiences for this project are researchers, extension personnel and other professionals that generate knowledge and provide assistance to dairy farmers in issues related to feed, fertilizer and manure management.

The final report is available in a color hardcopy format (\$ 15.00 U.S.) from Pam Kline, 234 Emerson Hall, Cornell University, Ithaca NY 14853 (pak1@cornell.edu).

The final report is available for digitally for downloading and printing at:
<http://www.inmpwt.cce.cornell.edu/documents/National%20Center%20Final%20Report.pdf>

Streaming video seminar presentations and Power Point™ files are available at:
<http://www.dfrc.ars.usda.gov/powell/wholefarm.html>.

Calendar of Events

July 29, 2004	Aurora Farm Field Day, Musgrave Research Farm, Aurora, NY
July 31-Aug 4, 2004	American Phytopathological Society Annual Meeting, Anaheim, CA
October 6-8, 2004	Northeastern Division APS Meeting, State College, PA
October 26, 2004	Field Crop Dealer Meeting, Comfort Suites, 7 Northside Drive, Clifton Park, NY
October 27, 2004	Field Crop Dealer Meeting, Ramada Inn, 141 New Hartford St., New Hartford, NY
October 28, 2004	Field Crop Dealer Meeting, Batavia Party House, 5762 E. Main Rd., Batavia, NY
October 29, 2004	Field Crop Dealer Meeting, Auburn Holiday Inn, 75 North St., Auburn, NY
Nov 1-4, 2004	ASA-CSSA-SSSA Annual Meeting, Seattle, WA
Nov 30-Dec 2, 2004	Northeast Region Certified Crop Advisor Conference

What's Cropping Up? is a bimonthly newsletter distributed by the Crop and Soil Sciences Department at Cornell University. The purpose of the newsletter is to provide timely information on field crop production and environmental issues as it relates to New York agriculture. Articles are regularly contributed by the following Departments at Cornell University: Crop and Soil Sciences, Plant Breeding, Plant Pathology, and Entomology. **To get on the mailing list, send your name and address to Pam Kline, 234 Emerson Hall, Cornell University, Ithaca, NY 14853.**



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*Helping You
Put Knowledge
to Work*