Cornell University Cooperative Extension
SCNY DAIRY & FIELD CROPS TEAM
BROOME - CHEMUNG - CORTLAND - ONONDAGA - TIOGA - TOMPKINS
Dairy Digest
October 2017

Cornell CALS PRO-DAIRY & Cornell Cooperative Extension

Feeder School

2 Days of On-Farm Training for Feeders on Dairy Farms

10 AM to 3 PM, Registration 9:30 AM

Who Should Attend:

- Those who are currently feeding dairy cows and want to learn more about the how and why of what they're doing.
- Those who are interested in becoming a cow feeder and want to increase their knowledge of cow feeding.
- Anyone interested in learning more about how to improve the feeding process on their farm.

Topics Covered During the Two Day School:

- Feeder's impact on the bottom line.
- Rumen physiology - What every feeder should know.
- Nutrition - Impact of feeders on the ration.
- Dry matter monitoring.
- Basic bunk silo management.
- Packing density and preservation.
- Feed bunk management.
- TMR audits.
- Troubleshooting mixer wagons.
- Safety considerations for feeders.

Presenters:

- Dr. Bill Stone, DVM,/PhD, Director, Technical Services, Diamond V.
- Betsy Hicks, Dave Balbian, and Kelsey O'Shea: Area Dairy Specialists with Cornell Cooperative Extension, Cornell University.
  Kathy Barrett, Dairy Education, Cornell PRO-DAIRY.

- **Registration is $75.00 and includes 2 day school, lunches and all materials.**
- **Register for the Lansing/Whitney Point Site at: https://scnydfc.cce.cornell.edu/event.php?id=598**

Dates and Locations:

*****This Feeder School will be two days, held one week apart.*****

Day 1

Thursday, October 26th, 2017

Walnut Ridge Dairy LLC
31 Holden Rd
Lansing, NY 14882

Day 2

Thursday, November 2nd, 2017

Whittaker Farms LLC
4585 State Route 26
Whitney Point, NY 13862

For more information contact:

Betsy Hicks, Area Dairy Specialist
SCNY Dairy & Field Crops Team
607.391.2673 or bjh246@cornell.edu

Register online for this site at https://scnydfc.cce.cornell.edu/event.php?id=59

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Cropping Notes—Harvest is At Hand

Janice Degni, Area Extension Field Crops Specialist

The wet summer has been difficult at best, causing season long crop stress. The soybean disease, white mold is troublesome this year. Surprisingly Northern Corn Leaf Blight has been spotty and light. Lesions tended to appear very late in the season, well into ear development. Light symptoms of grey leaf spot have been more widespread this year, with heavier infestations in the typical trouble spots, like river valleys.

For many, crop inventories have been restored but much of the hay crop will have less than ideal quality. The jury is still out on the digestibility of our pending corn silage crop.

Blessed by delayed summer weather

In mid-September we were very fortunate with warmer than normal temperatures and a dry spell that helped make up needed maturity of corn and a last chance for making dry hay. This year has been the lowest for Growing Degree Day (GDDs) accumulation in the last 9 years.

It takes a mid-season hybrid about 1200 GDDs to reach maturity or blacklayer from the silking stage. It takes about 900 to 1/2 milk line or so for silage harvest. According to data from the Freeville Station we accumulated 1400 from May 1-Mid August when all but the late planted corn was tasseling. From Mid-August through Sept. 4 we accumulated only 213 GDDs (Base 50). We headed into a 3 wk run of above normal temperatures beginning about Sept. 12 – Oct. 9. During that time we accumulated an additional 397 GDDs bringing us to 610 GDDs, still short of the expected GDDs needed to mature the corn but enough to bring us into silage harvest with corn at the desired dry matter in the mid 30's.

On Sept. 13 if corn was dented it was just starting showing on a few kernels and that was in the valley on gravel soil. Forget about it on long season varieties. There were reports of dented corn with a milk line but that was rare.

Monthly Total GDD for FREEVILLE 1 NE, NY

Each column contains monthly value and monthly number of missing days

Click column heading to sort ascending, click again to sort descending.

Year	May		Jun		Jul		Aug		Sep		Oct		Season
2009	M	31	384	0	470	0	586	0	246	0	30	0	M
2010	310	0	451	0	637	0	554	0	314	0	50	0	2316
2011	270	0	457	0	646	0	514	0	373	0	82	0	2342
2012	329	0	403	0	624	0	536	0	275	0	87	0	2254
2013	247	0	404	0	636	0	451	0	233	0	136	0	2107
2014	210	0	451	0	523	0	425	0	290	0	125	0	2024
2015	364	0	399	0	516	0	509	0	449	0	54	0	2291
2016	197	0	411	0	632	0	655	0	365	0	126	0	2386
2017	176	0	405	0	563	0	459	0	329	0	M	22	M
Mean	263		418		583		521		319		86		2246
Max	364 2015		457 2011		646 2011		655 2016		449 2015		136 2013		2386 2016
Min	176 2017		384 2009		470 2009		425 2014		233 2013		30 2009		2024 2014

Note: through Oct. 9, 2017, using base 50 method

The heat wave helped dry corn at a 1% per day. The warm nights were an added benefit. Now that we are in the thick of harvest I thought I would review Silage Fermentation and Grain Drydown with Bob Nielsen's article, *Field Drydown of Mature Corn Grain.* ✸

Silage Fermentation: How Does It Happen?

By: J. W. Schroeder, North Dakota State University Extension Dairy Specialist

Efficient fermentation is designed to create a more palatable and digestible feed which encourages dry matter intake and improves performance. Six phases occur during the silage fermentation process.

Phase I As the forage is harvested, aerobic organisms predominate on the forage surface. During the initial ensiling process, the freshly cut plant material, and, more importantly, the aerobic bacteria, continue to respire in the silo structure. The oxygen utilized in the respiration processes is contained within and between the forage particles at the time of ensiling. This phase is undesirable because the aerobic bacteria consume soluble carbohydrates that might otherwise be available for the beneficial lactic acid bacteria or the animal consuming the forage. Although this phase

aerobic phase	anaerobic phase				stable phase
day 1	day 2	day 3	days 4-7	days 8-21	after day 21
Cell respiration produces CO_2, heat and water.	Fermentation begins, producing acetic acid. Heating process slows.	Lactic acid production begins. Acetic acid production continues.	Lactic acid produced. Temperature drops.	Lactic acid produced. Silage pH drops and becomes stable.	Bacterial fermentation stops. Silage preserved until re-exposed to oxygen.
temp 70 F	95 F		80 to 85 F		Silage cools to ambient temperature.
pH 6.0	5.0	4.0			4.0

reduces the oxygen to create the desired anaerobic conditions, the respiration process produces water and heat in the silage mass. Excessive heat buildup can greatly reduce the digestibility of nutrients. Another important chemical change that occurs during this early phase is the breakdown of up to 50% of the total plant protein. The extent of protein breakdown (proteolysis) is dependent on the rate of pH decline in the silage. The acid environment of the silage eventually reduces the activity of the enzymes that break down proteins. Phase I ends once the oxygen has been eliminated from the silage mass. Under ideal crop and storage conditions, this phase will last only a few hours.

Phase II After the oxygen in the ensiled forage has been utilized by the aerobic bacteria, Phase II begins. This is an anaerobic fermentation in which the growth and development of acetic acid-producing bacteria occurs. These bacteria ferment soluble carbohydrates and produce acetic acid. Acetic acid production is desirable because it can be utilized by ruminants and additionally initiates the pH drop necessary to set up the subsequent fermentation phases. As the pH of the ensiled mass falls below 5, the acetic bacteria decline in numbers as this pH level inhibits their growth. This signals the end of Phase II.

Phase III The increasing acid inhibits acetic bacteria and brings Phase II to an end. The lower pH enhances the growth and development of another anaerobic group of bacteria, those producing lactic acid.

Phase IV This is a continuation of Phase III as the lactic acid bacteria begin to increase, ferment soluble carbohydrates and produce lactic acid. Lactic acid is the most desirable of the fermentation acids and, for efficient preservation, should consist of greater than 60% of the total silage organic acids produced. Phase IV is the longest phase in the ensiling process because it continues until the pH of the forage is sufficiently low enough to inhibit the growth of all bacteria. When this pH is reached, the forage is in a preserved state. No further destructive processes will occur as long as oxygen is kept from the silage.

Phase V The final pH of the ensiled forage depends largely on the type of forage being ensiled and the condition at the time of ensiling. Haylage should reach a final pH of around 4.5 and corn silage a final pH near 4. The pH of the forage alone is not a good indicator of the quality of the silage or the type of fermentation that has occurred. Phase VI This phase refers to the silage as it is being fed out from the storage structure. This phase is important because research shows that nearly 50% of the silage dry-matter losses occur from secondary aerobic decomposition.

Phase VI occurs on any surface of the silage that is exposed to oxygen while in storage and in the feed bunk. High populations of yeast and mold, or the mishandling of stressed crops, can lead to significant losses due to aerobic deterioration of the silage to reduce these losses and improve the bunk life of the silage. ✸

Topics covered in 3 Sessions

December 12 & 13, 2017 - Colgate Inn, Hamilton
January 23 & 24, 2018 - Hilton Garden Inn, Auburn
February 20 & 21, 2018 - Holiday Inn, Oneonta

- **Family Business Management & Communication**
- **Financial Assessment**
- **Budgeting and Decision Making**
- **Building Effective Employee Teams**
- **Business Risk Management**
- **Strategic Planning And more . . .**

Cornell University

PRO-DAIRY

For an application & information:
https://prodairy.cals.cornell.edu/conferences/academy

Caroline Potter at cjh42@cornell.edu or 315-683-9268 or Betsy Hicks or Janice Degni

Field Drydown of Mature Corn Grain

By: R. L. Nielsen, Agronomy Dept., Purdue University

- Weather conditions strongly influence in-field grain drydown.
- Plant characteristics can also influence in-field grain drydown.
- Early grain maturation usually means faster in-field grain drydown.
- Later grain maturation usually means slower in-field grain drydown.

Delayed maturity of corn due to late planting or simply cool growing seasons often translates into delayed or slow drydown of mature corn grain prior to harvest and, consequently, higher than desired grain moisture contents at harvest. Wetter grain at harvest increases the need for artificially drying the grain after harvest which, in turn, increases the growers' production costs and can delay the progress of harvest itself. Conversely, an early or rapid drydown of the crop decreases growers' costs and facilitates early or at least timely harvest of the crop prior to the colder and, often, wetter conditions of late fall.

Kernel moisture content decreases as the kernels develop through the blister stage (~ 85% moisture), milk stage (~ 80% moisture), dough stage (~ 70% moisture), dent stage (~ 55% moisture), and finally physiological maturity (~ 30% moisture). Prior to physiological maturity, decreases in kernel moisture occur from a combination of actual water loss (evaporation) from the kernel plus the continued accumulation of kernel dry matter via the grain filling process. After physiological maturity (identified by presence of the kernel black layer), percent kernel moisture continues to decrease primarily due to water loss from the kernel.

Weather & Timing of Grain Maturation

Grain moisture loss in the field occurs at a fairly linear rate within a range of grain moisture content from about 40 percent down to 15 to 20 percent, and then tapers off to little or no additional moisture loss after that. The exact rate of field drying varies among hybrids and years. Figure 1 illustrates changes in grain moisture content over time for an adapted medium maturity hybrid in two years with different temperature patterns following physiological maturity.

Field drying of mature corn grain is influenced primarily by weather factors, especially temperature and humidity/rainfall. Simply put, warmer temperatures and lower humidity encourage rapid field drying of corn grain. Figure 2 illustrates the relationship between the average daily temperature over the entire drydown period and the average daily rate of field drying over the entire drydown period.

Because grain drydown rates are greater when the drydown period is warmer, it stands to reason that a corn crop that matures in late August will dry down faster than one that matures in mid-September. In fact, there is a close relationship between the date when the grain nears physiological maturity (half-milkline or 2 to 3 weeks prior to kernel blacklayer) and the subsequent average daily drydown rate. Average daily drydown rates will range from about 0.8 percentage point per day for grain that nears maturity in late August to about 0.4 percentage point per day for grain that nears maturity in mid- to late September (Fig 3).

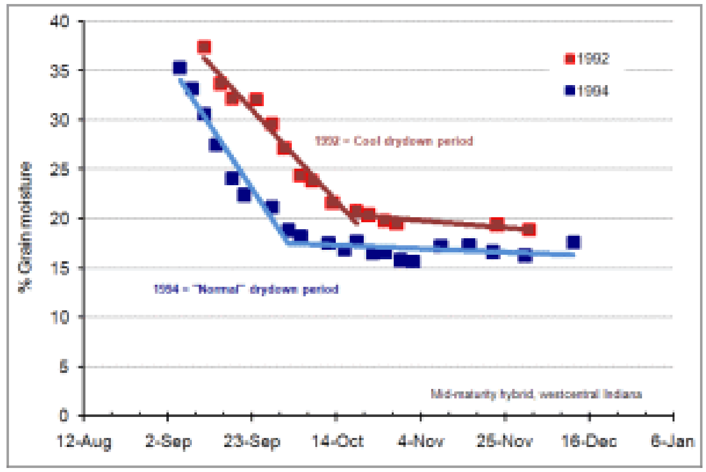

Fig. 1. Example of field drying progress of a mid-maturity corn hybrid in 2 years with different temperature patterns.

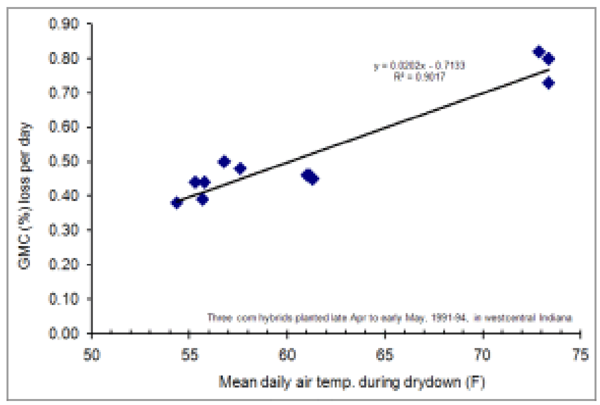

Fig. 2. Average daily grain moisture loss (percentage points/day) relative to average daily air temperature during the drydown period for three corn hybrids planted late April to early May, 1991-1994, west central Indiana.

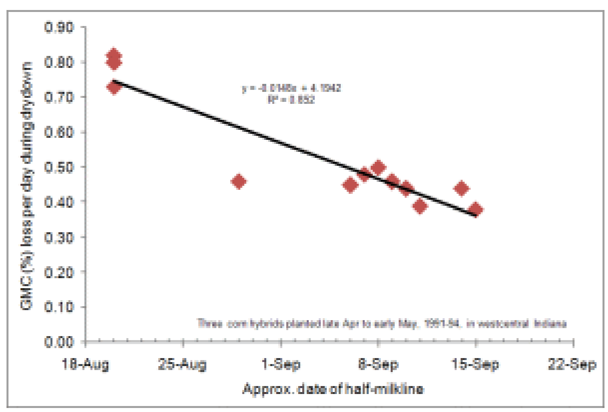

Fig. 3. Relationship between field drying rate and the date at which the grain nears maturity (half-milkline) for three corn hybrids planted late April to early May, 1991-1994, west central Indiana.

Bear in mind that grain moisture loss for any particular day may be quite high or low depending on the exact temperature, humidity, sunshine, or rain conditions that day. It is not unheard of for grain moisture to decline more than one percentage point per day for a period of days when conditions are warm, sunny, windy and dry. In contrast, there may be zero drydown of grain on cool, cloudy, rainy days.

Weather-Related Crop Stress and Field Drydown of Grain

Farmers often question whether field drydown will occur "normally" after some severe weather-related stress damages the crop prior to physiological maturity or causes premature death of the plants. Examples of such weather stress include damage caused by severe drought plus heat, late-season hail storms, and frost or killing freeze events prior to physiological maturity.

The answer in all cases to whether grain drydown will occur "normally" is essentially "yes", but this requires a bit of explanation.

Lingering severe stress such as drought or foliar disease (e.g., gray leaf spot) that occurs during the latter stages of the grain filling period typically causes premature death of the plants, smaller than normal kernels, AND premature formation of kernel black layer. The latter two factors usually result in earlier than expected drydown of the grain to the extent that grain moisture content in severely affected areas of a field is usually drier at harvest than lesser affected areas. The fact that grain drydown of the "prematurely mature" grain begins earlier usually means it occurs in relatively warmer time periods and so grain drydown rates per day are higher than would be expected if the grain had matured "normally" at a later date. However, the rate of grain drydown is "normal" for the time period during which the grain is drying.

NOTE: When areas of fields die prematurely due to stresses like drought, spatial variability for grain moisture at harvest can be dramatic and often creates challenges with the management of the grain dryer operation. This is especially true early in the harvest season when grain moistures of healthier areas of the field are in the low 20's. The spatial variability for grain moisture decreases later in the harvest season as grain moistures throughout the field settle to an equilibrium level (15% or less).

The effects of a sudden single stress event like hail or lethal cold temperatures prior to physiological maturity often create an optical illusion of sorts relative to subsequent field drying of the grain. Because leaf or plant death of an immature crop may occur quite rapidly in response to severe hail damage or lethal frost / freeze events, the moisture content of the yet immature grain will "appear" to be quite high given that the appearance of the now dead plants would seem to suggest the crop was "mature". In fact, subsequent field drydown of the affected grain will occur fairly normally relative to their immature stage of development (Hicks, 2004). The appearance of the dead plant tissue gives the illusion that field drydown was slowed by the damage from the hail or frost/freeze.

Corny Trivia: Grain in fields severely damaged or killed by severe stresses during the grain filling period will always reach physiological maturity (kernel black layer). The significant reduction or complete cessation of photosynthate availability due to damaged or dead plants will eventually lead to the death and collapse of the placental tissue at the tips of kernels that then develops into the so-called "black layer."

Hybrid Variability for Field Drydown

Hybrid variability for the rate of grain moisture loss during post-maturity drydown and the eventual grain moisture content at harvest are of great interest to grower and seed industry alike. Growers desire hybrids with superior yielding ability (maximum gross income) that also dry very quickly in the fall (minimum drying or grain shrinkage costs).

The seed industry uses grain moisture content data to assign relative hybrid maturity ratings on the basis of relative moisture differences among hybrids at harvest (Nielsen, 2012). Two hybrids that differ by one "day" of relative maturity will typically vary by about one half percentage point of grain moisture content (an average daily loss of moisture) if planted and harvested on the same days. Recognize that relative hybrid maturity ratings are most consistent within, not among, seed companies.

When weather conditions are great for rapid grain drydown, hybrids tend to dry at fairly similar rates. When weather conditions are not favorable for rapid drydown, then hybrid characteristics that influence the rate of grain drying become more important.

Researchers have identified the following traits or characteristics as ones most likely to influence grain drying in the field. The relative importance of each trait varies throughout the duration of the field drydown process and, as mentioned earlier, is most influential when weather conditions are not conducive for rapid grain drying.

- **Kernel Pericarp Characteristics.** The pericarp is the outermost layer of a corn kernel (botanically; the ovary wall). Thinner or simply more permeable pericarp layers have been associated with faster drying rates in the field.
- **Husk Leaf Number.** The fewer the number of husk leaves, the more rapid the grain moisture loss. In fact, modern hybrids have fewer husk leaves than those commonly grown years ago.
- **Husk Leaf Thickness.** The thinner the husk leaves, the more rapid the grain moisture loss.
- **Husk Leaf Senescence.** The sooner the husk leaves senesce (die), the more rapid the grain moisture loss.
- **Husk Coverage of the Ear.** The less the husk covers the tip of the ear, the more rapid the grain moisture loss.
- **Husk Tightness.** The looser the husk covers the ear, the more rapid the grain moisture loss.

Ear Declination. The sooner the ears drop from an upright position after grain maturation to a downward position, the more rapid the grain moisture loss. In particular, husks of upright ears can "capture" rainfall. ✸

Marestail Control in Wheat

Mark Loux, Professor Weed Science, C.O.R.N. Newsletter, The Ohio State University

There are several methods for management of marestail in wheat, and following any of these will take care of most winter annual weeds as well. Keep in mind that where wheat will be planted following soybeans, the large marestail that may be present in soybeans are not a concern since they are finishing their life cycle anyway.

The plants of concern are the seedlings that emerge in late summer into fall, which can overwinter. A few options to consider follow. This is not an all-inclusive list of herbicide options, but some that make the most sense to us. It's possible that some of the newer broadleaf products for wheat also have a fit, although none have residual activity.

- **Tillage.** Does not guarantee the complete absence of marestail but usually takes care of the problem for the season. Tillage should thoroughly and uniformly mix the upper few inches of soil to uproot existing plants and bury any new seed. Scout in spring to make sure control is adequate.
- **Preemergence burndown + residual.** The combination of glyphosate + Sharpen + MSO will control existing marestail and also provide residual control into fall. We suggest Sharpen rates of 1.5 to 2 oz/A. Spray volume of 15 to 20 gpa is required.
- **Late fall POST.** We have generally applied these in early November, and wheat should have 1 to 2 leaves depending upon the product. Options include Huskie, and combinations of dicamba (4 oz) with tribenuron (Express) or similar product. Do not apply products or mixes containing 2,4-D POST to wheat in fall.

Spring POST. In our research, spring herbicide plus the competition from an adequate wheat stand has been effective, even though 2,4-D can be weak on overwintered marestail plants. Options include Huskie, 2,4-D, 2,4-D + dicamba, or combinations of 2,4-D with an ALS-inhibiting products, such as thifensulfuron/ tribenuron (Harmony Xtra etc). The rate of dicamba that can be used in spring is too low to control marestail on its own. Most marestail populations are ALS-resistant, so in the ALS mixtures indicated above, the partner herbicide is carrying the load for marestail control. ✸

Marestail in Fallow Field

Seed Pod Shattering and Harvest Moisture

Laura Lindsey, Asst. Professor Soybean & Small Grain Management, C.O.R.N. Newsletter, The Ohio

Pre-harvest and harvest loss of grain can result in significant yield reductions. Pre-harvest pod shatter (breaking of pods resulting in soybeans on the ground) can occur when dry pods are re-wetted.

At grain moisture content less than 13%, shatter loss at harvest can also occur. As soybean moisture decreases, shatter and harvest loss increase. In some of our trials, we've seen approximately 8% loss when harvesting at 9% moisture content. At 13% moisture content, we still see some loss, but at a much lower level (1-2%). Four soybean seeds per square foot equals one bushel per acre in loss (see picture). The seeds are often covered by soybean residue and chaff which need to be brushed away to look for seed losses. ✸

Soybean Pod Shattering and Harvest Moisture

Soybean s Turning—mid September

Mature Soybeans early October

Soybean Dry Down Rate Before Harvest

I. Ciampitti, S. Tamagno, D. Hansel, KSUCROPS Production, and M. Knapp.
E-Update, Kansas State Research & Extension

The weather conditions expected for mid-September to mid-October will be critical for soybean as related to the seed filling and determining final seed weight.

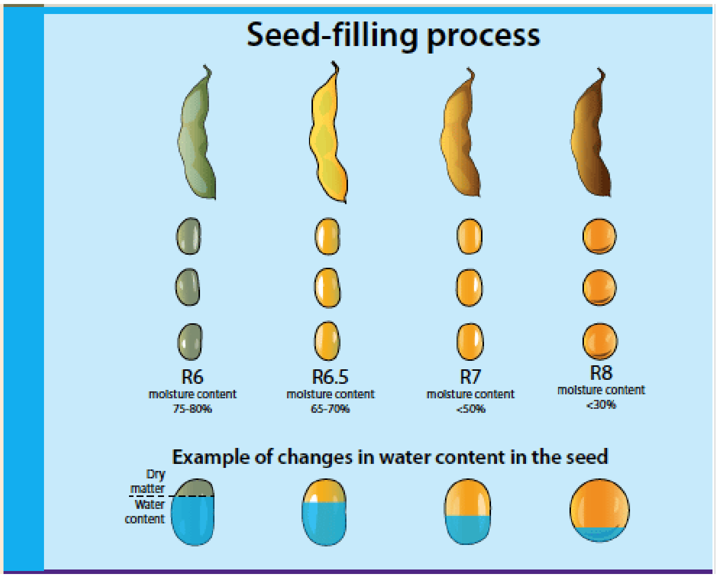

Figure 1. Soybean seed filling process from full seed to full maturity.
Photo and infographic prepared by Ignacio Ciampitti, K-State Research and Extension.

Soybean will reach final maturity with high seed water content, moving from 90% to around 60% from seed filling until final maturity. Final maturity is defined as the formation of the black layer in the seeds. According to a recent Extension article from Iowa State, "How fast do soybeans dry down in the field?", the average seed dry down rate was 3.2% per day. Still, the dry down rate will depend on the maturity group selection (affecting the length of the season), planting date, and weather conditions experienced during the latter part of the reproductive phase.

Changes in the water content during the seed-filling process (Figure 1) were previously described in our "Soybean Growth and Development" poster. As described for corn, seed water loss for soybeans can also divided in two phases: 1) before "black layer" or maturity, and 2) after black layer.

In order to properly address the question related to the dry down rate for soybeans, a study was conducted to investigate the changes in water content from black layer formation (maturity) until harvest time (Figure 2). During the last days of September and mid-October 2016, the overall dry down rate was around 3% per day (from 58% to 12% seed moisture) – taking an overall period of 15 days.

*Note: It is desired to reach harvest with 13% seed moisture to maximize the final seed volume to be sold, thus the importance of timing harvest with the right seed moisture content.

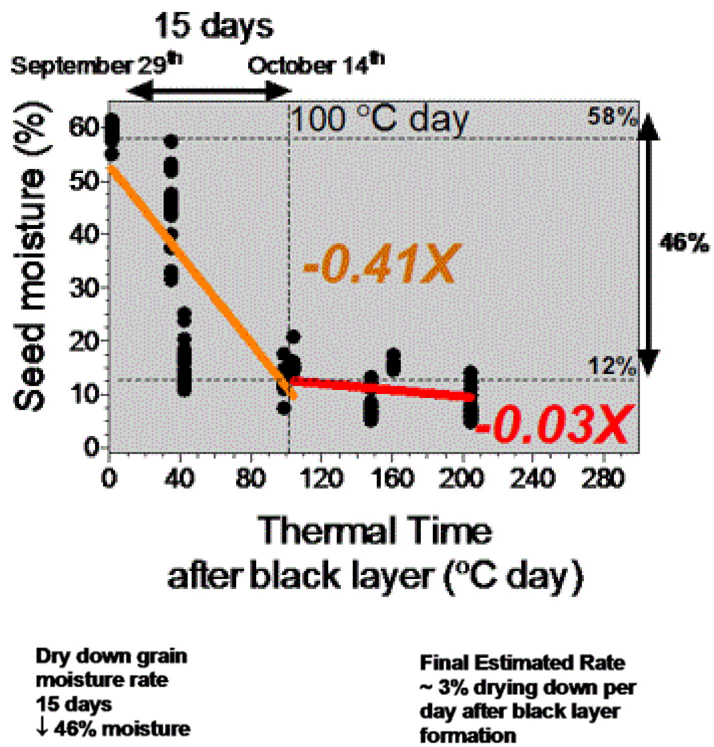

Figure 2. Grain moisture dry down (orange line) across three hybrids and different N rates near Manhattan, KS. Horizontal dashed lines marked the 58% seed moisture at black layer formation.* Graph prepared by Ignacio Ciampitti, K-State Research and Extension.

Soybean dry down rate was three-time faster, 3% per day, relative to corn at 1% per day. These dry down rates for corn and soybeans are primarily affected by temperature, humidity, and overall water content at the point of black layer formation (maturity). These main factors should be considered when the time comes to schedule soybean harvest. ✸

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CALENDAR OF EVENTS

Oct 20	**Application Deadline for the Academy for Dairy Executives**	More Information p 3.
Oct. 26/ Nov 2	**Feeder School: 2 days on farm training** 9:30 am registration 10 am – 3 pm See Cover for More Information	
Nov 8	**Northeast Cover Crop Council Annual Meeting** Cost: $75 Students-$50 8 am– 8 pm Statler Hotel, Cornell Presentations will focus on soil health, cover crop practices for no-till, pest management, cover crop mixtures, harvesting cover crops for forage, and more. Information & Registration at: http://www.cvent.com/events/northeast-cover-crops-council-annual-meeting/fees-926c9a4a2f2b49d7903750daea51249d.aspx	
Nov 30	**Annual Feed Dealer's Seminar** Location TBA-Cortland	6– 9pm

We are pleased to provide you with this information as part of the Cooperative Extension Dairy and Field Crops Program serving Broome, Cortland, Chemung, Onondaga, Tioga and Tompkins Counties. **Anytime we may be of assistance to you, please do not hesitate to call or visit our office.** Visit our websites: http://scnydfc.cce.cornell.edu & http://blogs.cornell.edu/organicdairyinitiative/ and like us on Facebook: https://www.facebook.com/SCNYDairyandFieldCropsTeam.

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