Key Considerations
Feeding 2021 Corn Silage and Planning for 2022

Joe Lawrence, Cornell PRO-DAIRY

NY/VT Corn Silage Hybrid Evaluation

Collaboration of:

Cornell University CALS

- PRO-DAIRY, Department of Animal Science
- Department of Plant Breeding & Genetics

University of Vermont Extension

(formal agreement with UVM)

A Special Thank You

Tom Overton	Allison Kerwin
Margaret Smith	Sherrie Norman
Heather Darby	Keith Payne
Mike Van Amburgh	Dan Fisher
Mike Davis	Paul Stackowski
Jerry Cherney	Sara Ziegler

With support from:

- Dairy Producers
- Seed Corn Industry
- Cornell Cooperative Extension
- Cornell University Agricultural Experiment Station
- Miner Institute

NY & VT Corn Silage Evaluation Program

Locations

- 80-95 Day Relative Maturity
  - Oakfield, NY
  - Willsboro, NY
  - Alburgh, VT
- 96-110 Day Relative Maturity
  - Aurora, NY
  - Madrid, NY
  - Alburgh, VT

Thank you to host
- Greenwood Dairy
- Lamb Farms

NY & VT Corn Silage Evaluation Program

2021 Program

61 entries from 12 brands

2021 NY VT Corn Silage Hybrid Evaluation Report
Link: https://blogs.cornell.edu/varietytrials/corn-silage/

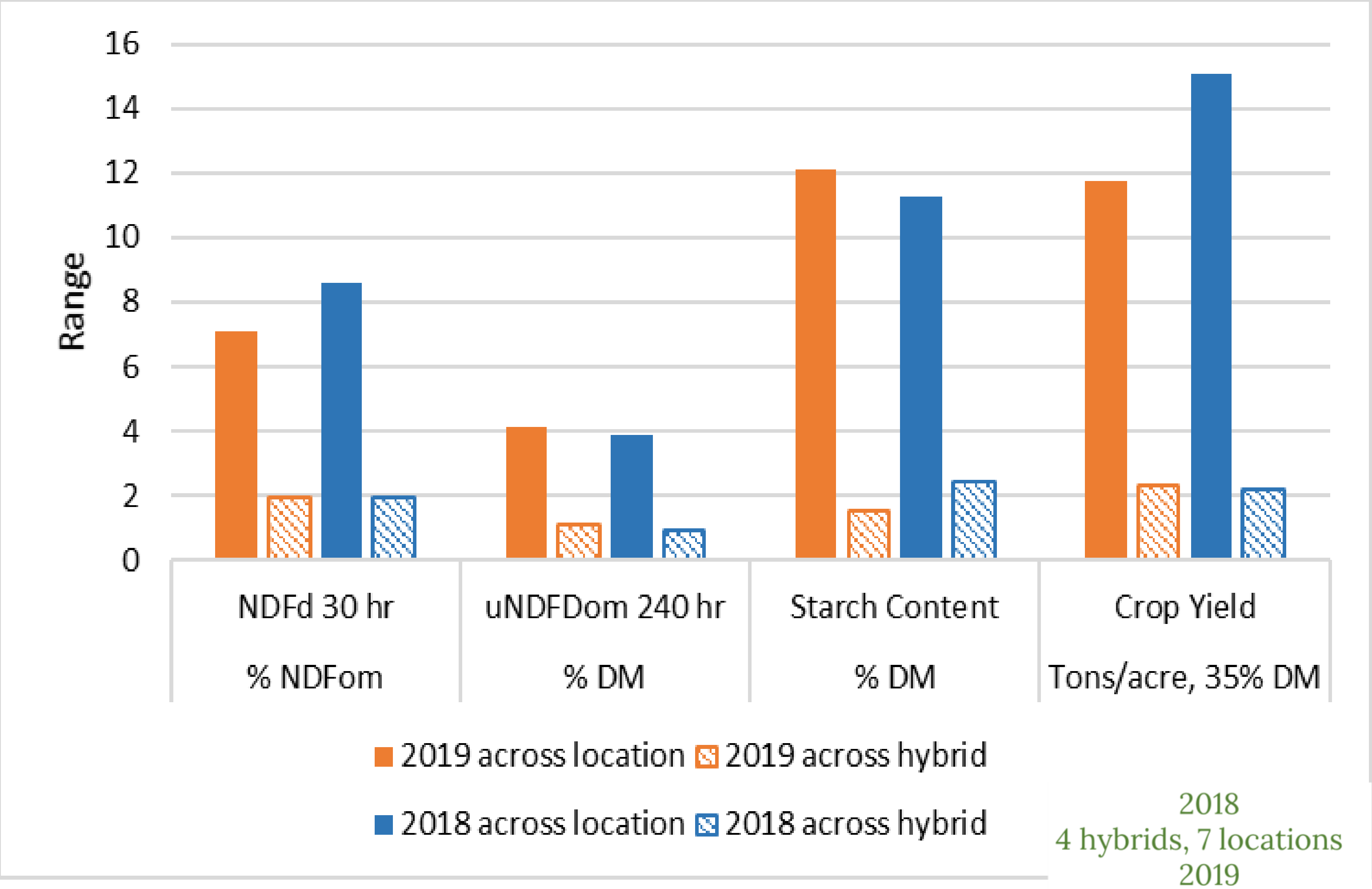
Growing Environment vs Genetics

Impact on Crop Performance

Same genetics at different locations

>

Different genetics at the same location [a,b]

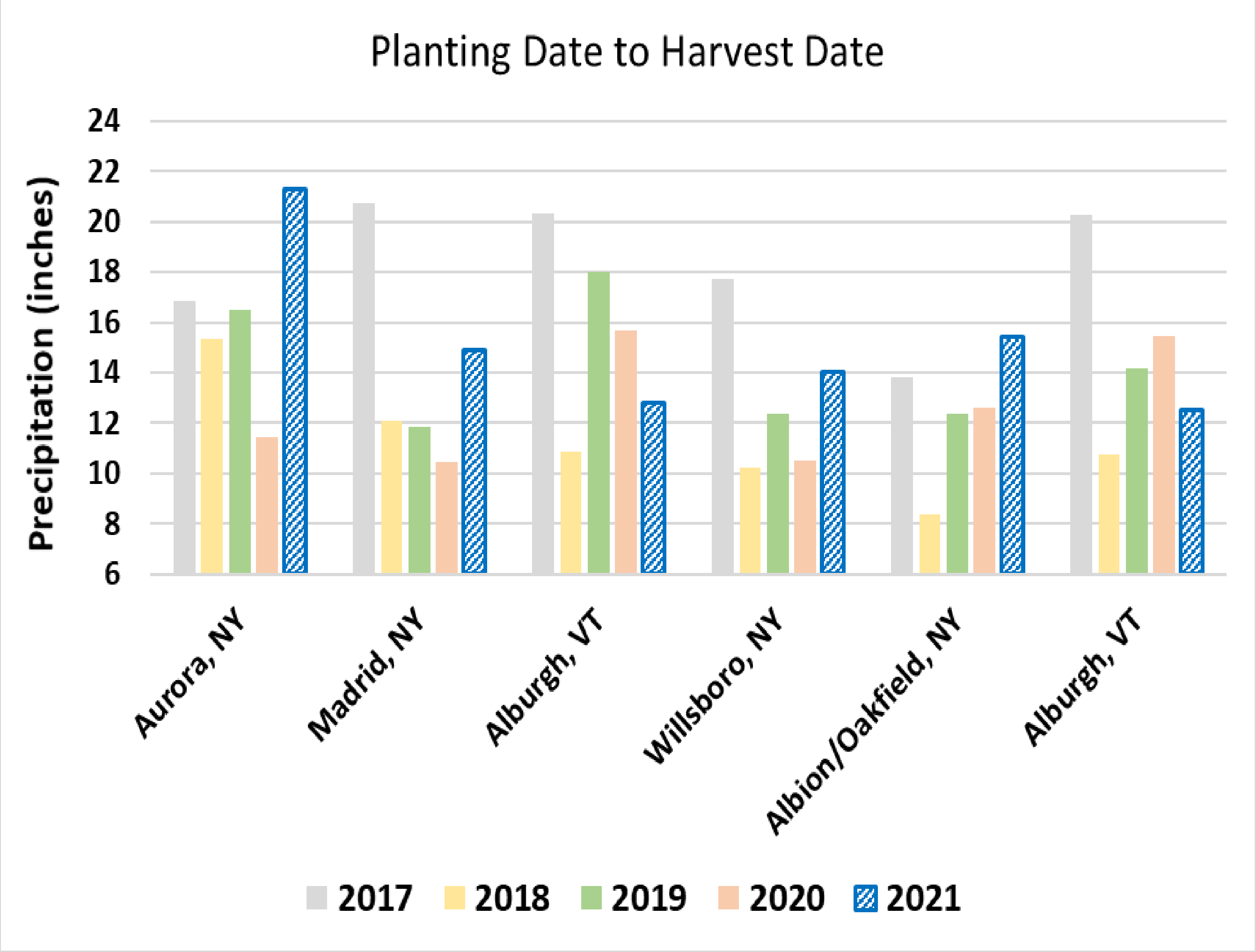


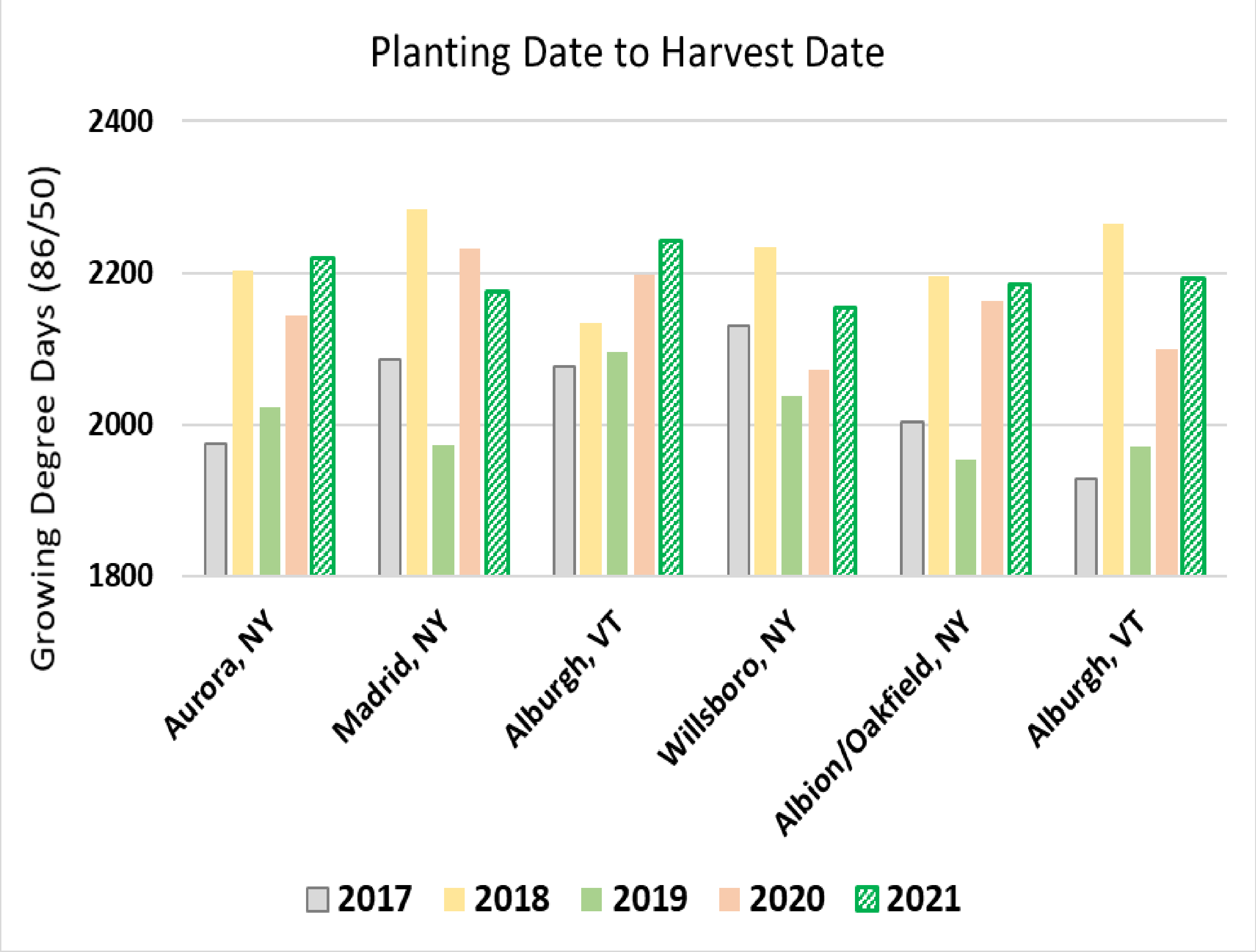
2018
4 hybrids, 7 locations
2019
3 hybrids, 8 locations
NY, VT, PA

[a] *there are exceptions such as BMR*

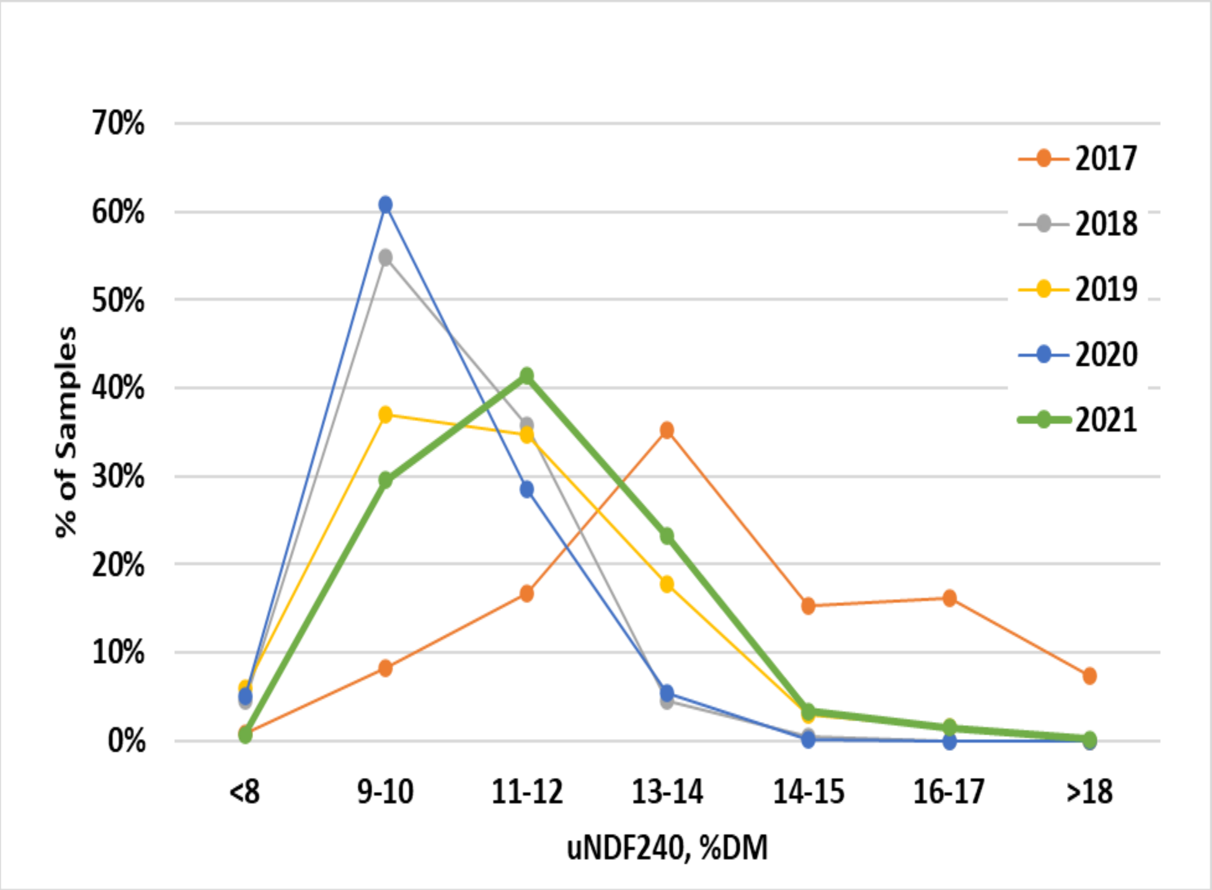
[b] *when DM is consistent at harvest*

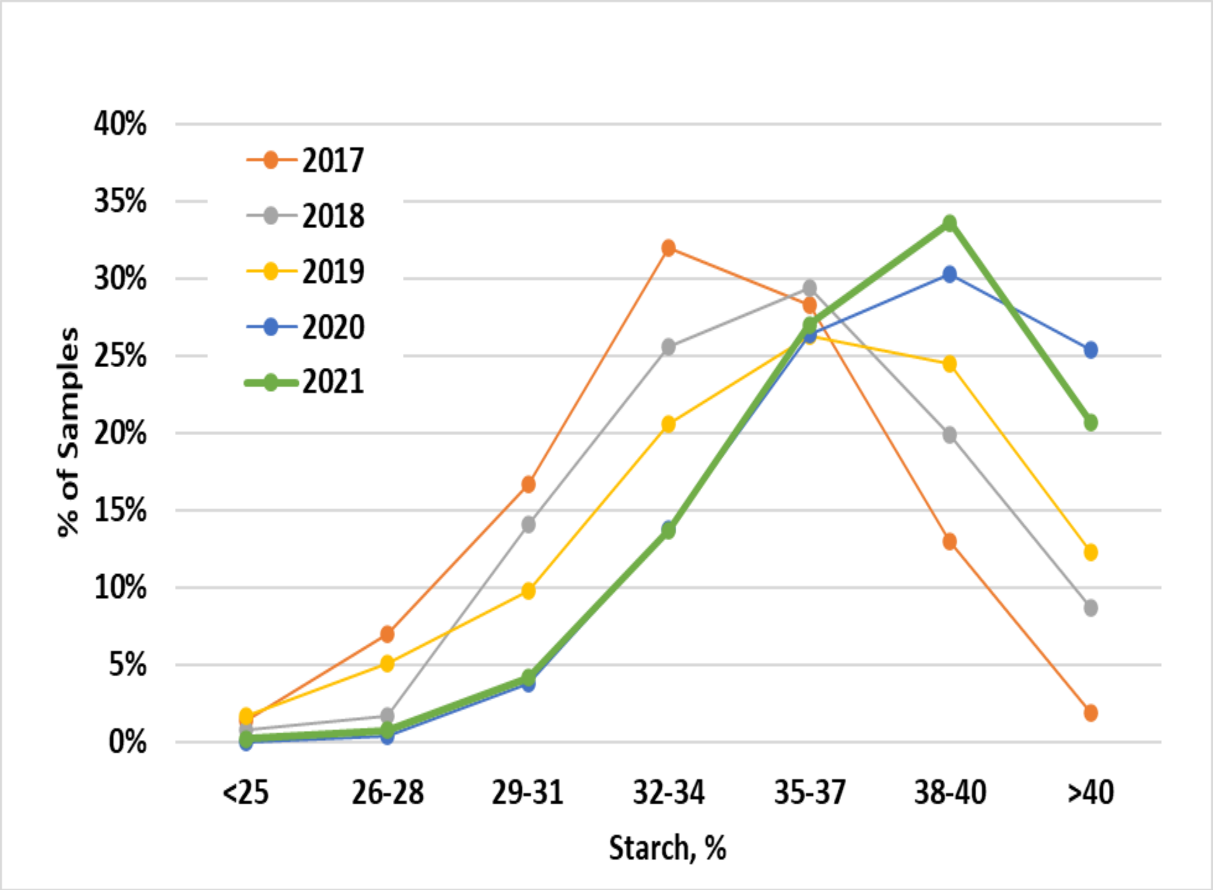
2021 Growing Season Summary





Sample Distribution 2017 - 2021



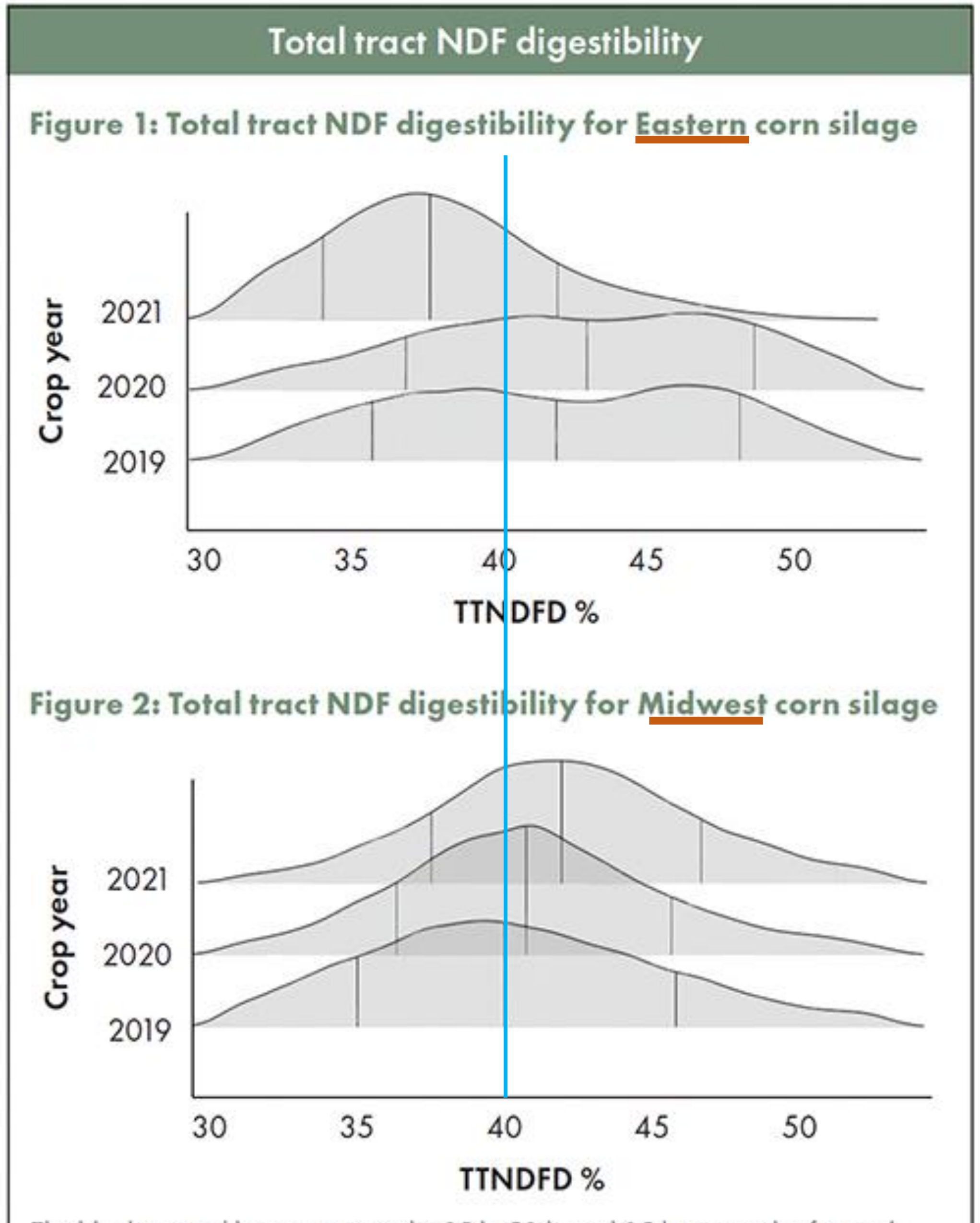


2021 Corn silage overview

https://ecommons.cornell.edu/bitstream/handle/1813/110265/2021%20Corn%20Silage%20Harvest.pdf?sequence=2&isAllowed=y

Regional Differences

- 2021 Crop Year
  - East
    - variable but generally higher rainfall
      - Mid to late season
  - Midwest
    - Much drier
    - Similarities to Northeast in 2020



The black vertical lines represent the 15th, 50th, and 85th percentiles for each crop year distribution in results, respectively. Samples analyzed by Rock River Laboratory 2019 through 2021.

A corn crop with multiple personalities, John Goeser
Hay & Forage Grower Magazine
https://hayandforage.com/article-3770-A-corn-crop-with-multiple-personalities.html

NY & VT Corn Silage Evaluation Program

Using Public data as comparison

- **Average digestibility numbers will vary by hybrid *and growing environment***
- **Public trials provide the range in expected values for a given growing season**

Relative Maturity Group	Growing Season	Location	Yield, 35% DM tons/acre	Dry Matter %	Starch % DM	Crude Protein % DM	aNDFom % DM	30 hr NDFD % NDFom	120 hr NDFD %NDFom	240 hr uNDFom % DM
80-95 day RM	**2021**	**Oakfield, NY**	**29.1**	**37.7**	**40.3**	**7.9**	**33.0**	**57.7**	**65.1**	**10.6**
		Willsboro, NY	**23.6**	**32.1**	**39.0**	**8.0**	**34.6**	**56.3**	**67.4**	**10.3**
		Alburgh, VT	**19.9**	**36.3**	**37.9**	**8.4**	**36.1**	**52.8**	**64.1**	**12.0**
	2020	Albion, NY	19.3	36.6	41.7	8.0	32.5	60.2	68.9	9.2
		Willsboro, NY	16.5	30.6	34.7	7.4	37.7	60.4	71.9	9.5
		Alburgh, VT	19.8	32.4	37.8	8.3	35.9	56.0	65.6	11.4
	2019	Albion, NY	26.0	31.9	35.1	7.4	36.5	59.1	66.3	11.3
		Willsboro, NY	19.2	32.6	36.9	6.9	35.8	60.5	67.6	10.6
		Alburgh, VT	23.4	33.7	36.5	7.3	37.8	61.6	67.6	11.2
	2018	Albion, NY	19.2	36.2	39.2	8.3	34.2	56.1	69.4	10.0
		Willsboro, NY	18.5	35.0	34.9	8.2	35.7	62.0	70.0	9.7
		Alburgh, VT	18.3	33.3	31.0	7.8	39.0	56.2	67.4	11.8
	2017	Albion, NY	25.2	30.8	32.3	8.3	37.2	59.1	69.8	10.1
		Willsboro, NY	19.2	31.3	38.1	7.7	39.5	56.3	66.8	12.1
		Alburgh, VT	27.5	31.8	34.4	7.5	38.9	53.2	62.7	13.4
96-110 day RM	**2021**	**Aurora, NY**	**29.3**	**35.2**	**37.8**	**6.3**	**38.5**	**54.1**	**62.7**	**13.3**
		Madrid, NY	**32.5**	**32.3**	**36.9**	**7.4**	**37.2**	**55.4**	**62.6**	**12.9**
		Alburgh, VT	**23.9**	**39.8**	**37.2**	**7.5**	**38.6**	**56.9**	**66.9**	**11.7**
	2020	Aurora, NY	17.1	36.0	38.2	7.5	36.0	61.1	68.3	10.4
		Madrid, NY	23.6	34.1	40.1	8.2	32.9	60.3	67.6	9.8
		Alburgh, VT	25.1	36.4	37.9	7.6	36.5	55.4	65.6	11.6
	2019	Aurora, NY	27.1	34.7	38.3	6.5	36.9	55.5	62.2	12.9
		Madrid, NY	27.4	28.6	30.7	7.5	38.0	58.4	65.5	12.1
		Alburgh, VT	24.3	35.4	39.3	7.6	35.5	61.6	71.1	9.2
	2018	Aurora, NY	21.7	38.2	38.8	7.3	35.3	59.9	67.7	10.4
		Madrid, NY	28.6	32.9	35.4	7.7	35.9	61.2	69.9	9.8
		Alburgh, VT	23.3	34.9	34.2	7.2	38.3	55.2	66.0	12.0
	2017	Aurora, NY	26.0	31.9	31.2	6.1	42.6	54.5	63.8	14.4
		Madrid, NY	31.9	35.2	34.8	7.4	41.3	50.6	59.4	15.9
		Alburgh, VT	28.5	32.7	35.3	7.2	39.8	52.7	61.4	14.3

2022: High Crop Input Cost

- Do the same – BETTER
  - Know what you are working with
    - Soil Test
    - Manure Nutrient Analysis
  - Target Nutrient Use
    - 4R's
      - Material, Rate, Time, Placement
    - Don't skimp of low fertility fields
      - Cover fixed cost
    - Don't over-fertilize high fertility fields
      - N Use Efficiency
      - Forage quality

- Forage waste *will cost you more*

2022: Forage waste will cost you more

CELLS TO EDIT		Diet Inclusion Rate per Day				Yield and Base Acreage		Storage Shrink Adjustment		Inventory (Carryover) Management Adjustment			
	Number of Animals	Pounds (Dry Matter)	%, DM	Pounds (As Fed)	Total Tons	Seasonal Yield Tons/Acre (AF)	Total Acres	% Shrink	Adjusted Acreage	Feeding Season (days)	Target Carryover (days)	Total Days	Acres Adjusted Shrink + Carryover
HEIFERS (age 2-12)	**0**												
Corn Silage		**0**	**35%**	0.0	0	**1**	0	**15%**	**0**	**365**	**120**	485	**0**
Haylage		**0**	**40%**	0.0	0	**1**	0	**20%**	**0**	**365**	**45**	410	**0**
Dry Hay		**0**	**90%**	0.0	0	**1**	0	**10%**	**0**	**365**	**45**	410	**0**
Other		**0**	**30%**	0.0	0	**1**	0	**10%**	**0**	**365**	**45**	410	**0**
HEIFERS (age 13-22)	**0**												
Corn Silage											**120**	485	**0**
Haylage											**45**	410	**0**
Dry Hay											**45**	410	**0**
Other											**45**	410	**0**
LACTATING 1	**100**												
Corn Silage											**120**	485	**111**
Haylage											**45**	410	**0**
Dry Hay											**45**	410	**0**
Other											**45**	410	**0**
LACTATING 2	**0**												
Corn Silage		**0**	**35%**	0.0	0	**1**	0	**15%**	**0**	**365**	**120**	485	**0**
Haylage		**0**	**40%**	0.0	0	**1**	0	**20%**	**0**	**365**	**45**	410	**0**
Dry Hay		**0**	**90%**	0.0	0	**1**	0	**10%**	**0**	**365**	**45**	410	**0**
Other		**0**	**30%**	0.0	0	**1**	0	**10%**	**0**	**365**	**45**	410	**0**
DRY COWS	**0**												
Corn Silage		**0**	**35%**	0.0	0	**1**	0	**15%**	**0**	**365**	**120**	485	**0**
Haylage		**0**	**40%**	0.0	0	**1**	0	**20%**	**0**	**365**	**45**	410	**0**
Dry Hay		**0**	**90%**	0.0	0	**1**	0	**10%**	**0**	**365**	**45**	410	**0**
Other		**0**	**30%**	0.0	0	**1**	0	**10%**	**0**	**365**	**45**	410	**0**

Total Acres - All Animal Groups

	No Adjustment	Adjusted for Shrink	Adjusted Shrink + Carryover
Corn Silage	72	83	**111**
Haylage	0	0	**0**
Dry Hay	0	0	**0**
Other	0	0	**0**

Cornell CALS
College of Agriculture and Life Sciences

PRO DAIRY
Education & Applied Research

Forage acreages needed for dairy herd calculator
https://cals.cornell.edu/pro-dairy/our-expertise/forage-systems

2022: Forage waste will cost you more

- Corn Silage
- 100 lactating cows
- Yield: 18 ton/acre, 35% DM
- 25 lbs DM / cow / day

Shrink: 10%
8 acres / 100 cows

Total Acres - All Animal Groups		
	No Adjustment	Adjusted for Shrink
Corn Silage	72	80
Haylage	0	0
Dry Hay	0	0
Other	0	0

Shrink: 25%
19 acres / 100 cows

Total Acres - All Animal Groups		
	No Adjustment	Adjusted for Shrink
Corn Silage	72	91
Haylage	0	0
Dry Hay	0	0
Other	0	0

Forage acreages needed for dairy herd calculator
https://cals.cornell.edu/pro-dairy/our-expertise/forage-systems

Corn N Use Efficiency

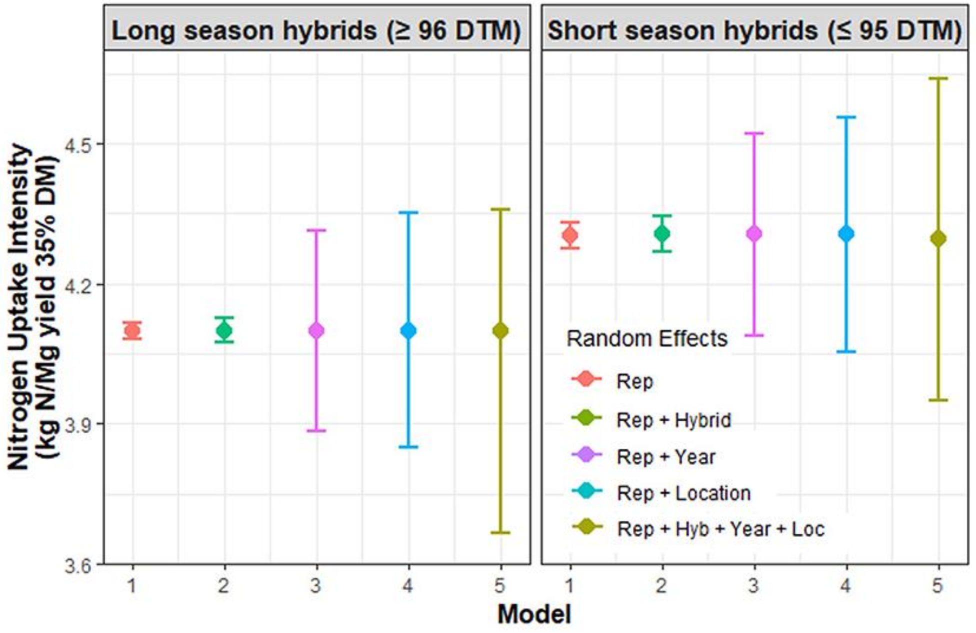
Mine data from CS Program (2017-2020)

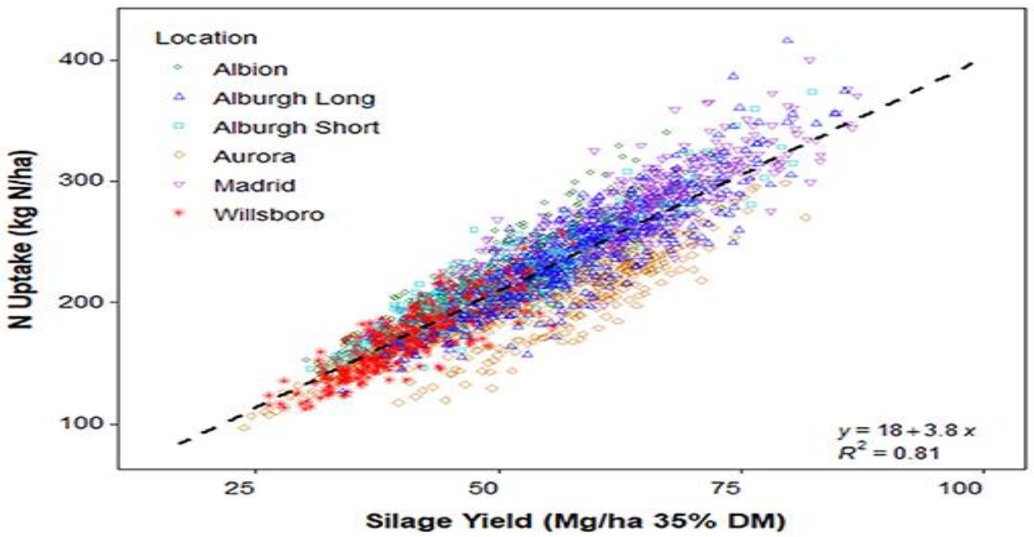
N Use Efficiency

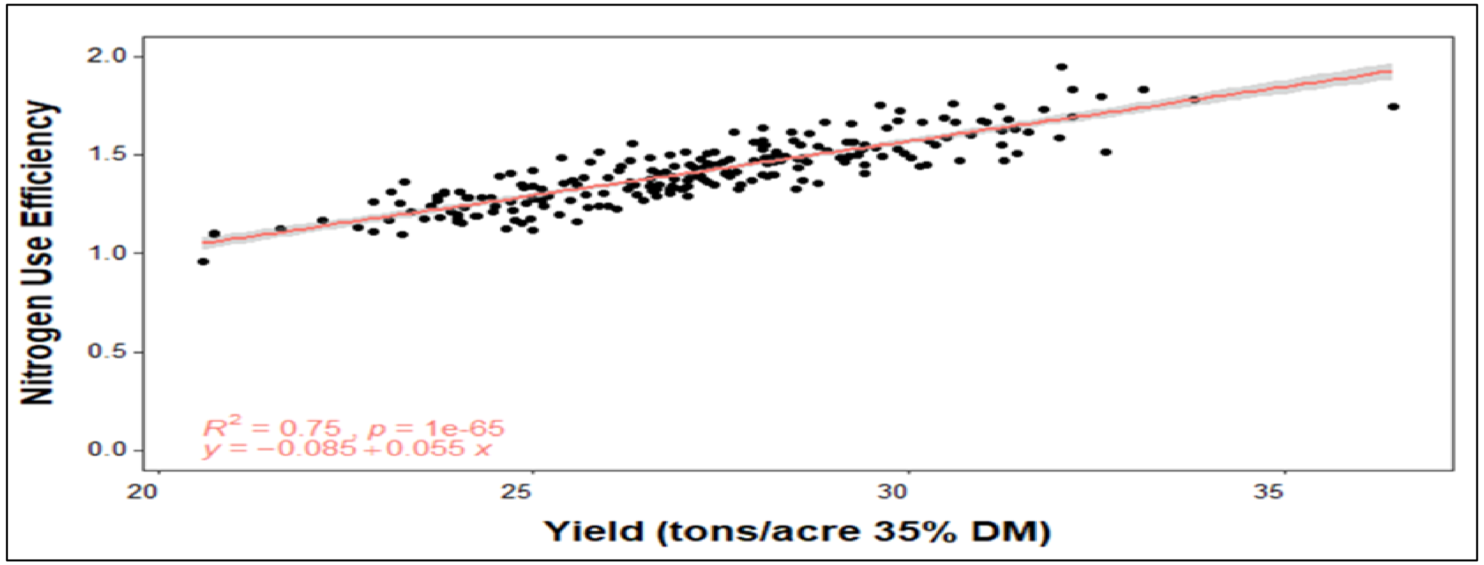
Hybrid Influence?

More N....More Yield ???

- Berlingeri JM, Lawrence JR, Sunoj S, Czymmek KJ and Ketterings QM (2021) **Nitrogen and Phosphorus Balances Vary at the Whole-Farm, Field, and Within-Field Scales**. *Front. Sustain.* 2:747883. doi: 10.3389/frsus.2021.747883







N Balances & Use Efficiency 2021 CS Program

NEW YORK CORN & SOYBEAN GROWERS ASSOCIATION

Relative Maturity Group	Growing Season	Location	Yield, 35% DM tons/acre	Dry Matter %
80-95 day RM	2021	Oakfield, NY	29.1	37.7
		Willsboro, NY	23.6	32.1
		Alburgh, VT	19.9	36.3
96-110 day RM	2021	Aurora, NY	29.3	35.2
		Madrid, NY	32.5	32.3
		Alburgh, VT	23.9	39.8

*Alburgh – season long drought stress

Table 3. NY & VT Corn Silage Trials, Field Information, 2021 Growing Season

	80 - 95 Day Relative Maturity			96 - 110 Day Relative Maturity		
	Alburgh, VT	Oakfield, NY	Willsboro, NY	Alburgh, VT	Aurora, NY	Madrid, NY
Planting Date	7-May	13-May	19-May	11-May	20-May	12-May
Harvest Date	10-Sep	3-Sep	8-Sep	16-Sep	17-Sep	14-Sep
Previous Crop	Corn	Corn	Sod	Corn	Soybeans	Corn
Starter N	5	32	15	5	25	32
Manure N	0	113	0	0	0	115
Sidedress N	96	95	90	96	101	0
Total Fertilizer N	101	240	105	101	126	147
Available N Balance[1]	-20	56	62	-24	23	-41
Soil Type	Amenia	Ontario	Kingsbury	Covington	Honeoye	Grenville

[1] Available N Balance = N Uptake by Crop - Available N Supply

A positive balance indicates there was excess N not utlized by the crop.

When N does not limit yield, a negative balance indicates more efficient N use or soil N supply compared to book values.

NY & VT Corn Silage Evaluation Program

Cornell CALS College of Agriculture and Life Sciences

PRODAIRY

2022: High Crop Input Cost Fertility and Forage Quality

Benefits

- Optimize production per acre
- Healthy Plants
- Proper maturation (dry down)

- Nitrogen (N) on Grass - Yield & Protein
    - Pays even at high N prices
    - Manure – partial substitute

Concerns

- Excess Potassium (K) - Dry Cows
- Excess N – Delayed Maturity (Dry Down)
- "K fertilization increased alfalfa yield, but decreased forage quality,"
  - Jacob Jungers, U. of Minnesota
- "While increasing yield, added K and N tend to reduce corn silage quality in all primary metrics including starch content, pre-ensiled starch digestibility, and fiber digestibility."
  - Corteva Pioneer Study Newsletter: Potassium & Nitrogen in Corn Silage Production
  www.pioneer.com/silagezone

2022: High Crop Input Cost
Optimizing Forages

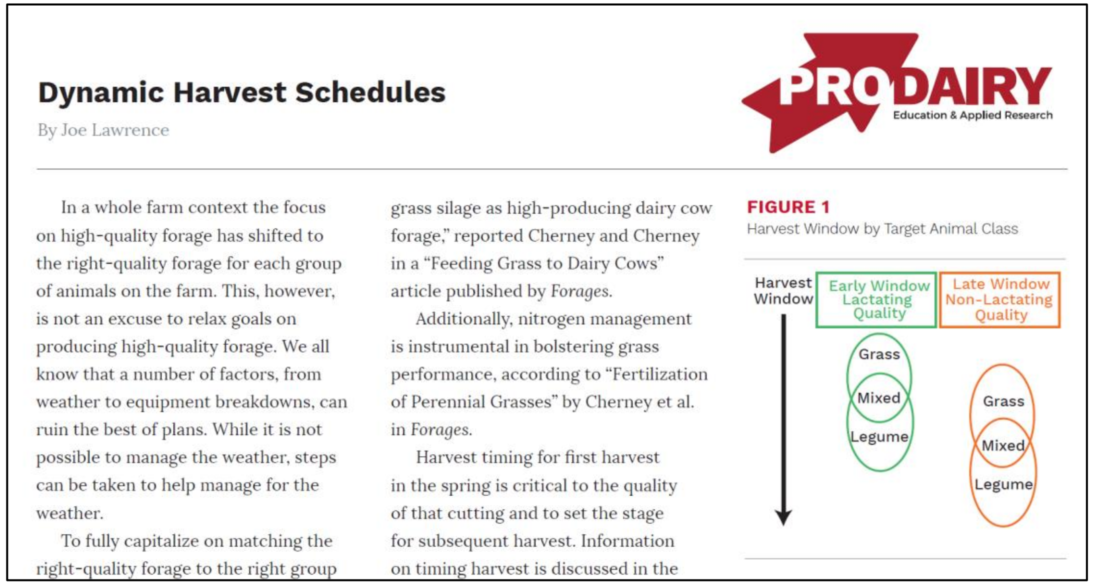
- Start Planning Now
  - Harvest & Storage Planning
  - Understand the forages you will be working with
- All the usual suspects
  - Harvest Timing
  - Proper Ensiling
  - Well Managed Storage
  - Well Managed Feedout

Penn State Study on Farm Profitability

- tracked several dairy farms to determine what factor(s) were associated with profitability.
- #1 – ability to manage forage quality and inventory.
  - harvest at optimal maturity regardless of weather
    - Back-up plans
  - Overall, feed costs as % of total income
    - ~9% lower.

Dynamic Harvest Scheduling

- Target high quality feed ***from every acre***
- Do not pre-determine what fields will be harvested at a lower quality
- Let unforeseen challenges (*weather*, *equipment breakdowns*) determine what feed will fit the needs of non-lactating animals



Dynamic Harvest Schedules

By Joe Lawrence

In a whole farm context the focus on high-quality forage has shifted to the right-quality forage for each group of animals on the farm. This, however, is not an excuse to relax goals on producing high-quality forage. We all know that a number of factors, from weather to equipment breakdowns, can ruin the best of plans. While it is not possible to manage the weather, steps can be taken to help manage for the weather.

To fully capitalize on matching the right-quality forage to the right group

grass silage as high-producing dairy cow forage," reported Cherney and Cherney in a "Feeding Grass to Dairy Cows" article published by *Forages*.

Additionally, nitrogen management is instrumental in bolstering grass performance, according to "Fertilization of Perennial Grasses" by Cherney et al. in *Forages*.

Harvest timing for first harvest in the spring is critical to the quality of that cutting and to set the stage for subsequent harvest. Information on timing harvest is discussed in the

FIGURE 1
Harvest Window by Target Animal Class

Dynamic Harvest Management
The Manager, March 2018
https://cals.cornell.edu/pro-dairy/publications/manager/manager-march-2018

Acres	Proposed Harvest Order	Species	Conditions when High Quality	Rigid Harvest Schedule – Planned: Harvest for Lactating Animals	Rigid Harvest Schedule – Planned: Delayed Harvest for Non-Lactating Animals	Rigid Harvest Schedule – Actual: Harvest for Lactating Animals	Rigid Harvest Schedule – Actual: Delayed Harvest for Non-Lactating Animals	Dynamic Harvest Schedule – Planned: Harvest for Lactating Animals	Dynamic Harvest Schedule – Planned: Delayed Harvest for Non-Lactating Animals	Dynamic Harvest Schedule – Actual: Harvest for Lactating Animals	Dynamic Harvest Schedule – Actual: Delayed Harvest for Non-Lactating Animals
12	1	100% Orchardgrass	Favorable for Harvest		*		*	*		*	
20	2	100% Tall Fescue	Rain Delay		*		*	*			*
16	3	70% Grass, 30% Alfalfa	Favorable for Harvest		*		*	*		*	
8	4	70% Grass, 30% Alfalfa	Favorable for Harvest		*		*	*		*	
9	5	50% Grass, 50% Alfalfa	Favorable for Harvest	*		*		*		*	
8	6	40% Grass, 60% Alfalfa	Rain Delay	*		x		*			*
25	7	30% Grass, 70% Alfalfa	Favorable for Harvest	*		*		*		*	
16	8	20% Grass, 80% Alfalfa	Rain Delay	*		x		*			*
21	9	100% Alfalfa	Favorable for Harvest	*		*		*		*	
12	10	100% Alfalfa	Equipment Breakdown	*		x		*			*

Growing Environment

Impact on Crop Performance

Weather prior to silking affects:

- corn plant height (and yield) and
- fiber quality

Weather after silking appears to exert more effect on:

- corn grain yield,
- neutral detergent solubles:NDF ratio,
- and total dry matter digestibility

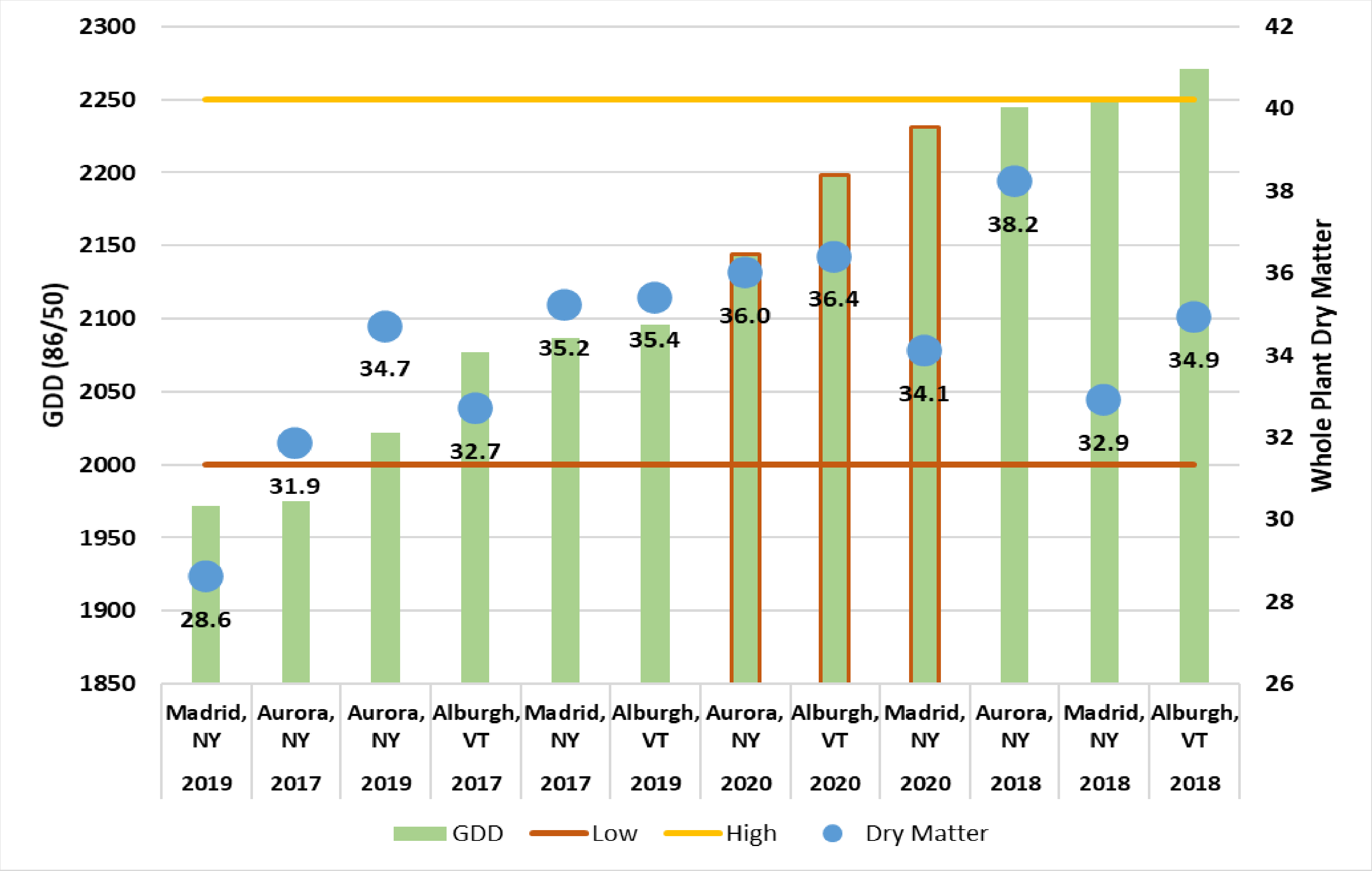
- Mertens (2002) summarized by Mahanna (2005)

Dynamic Harvest Scheduling
Corn Silage

- Tracking Weather for potential forage quality impacts
- Mapping out harvest sequence based on crop maturity
  - Whole Plant DM is still King
    - Need to pay attention to Ear AND Stover
- Pre-harvest sampling
  - DM
  - Quality
- Cutting height

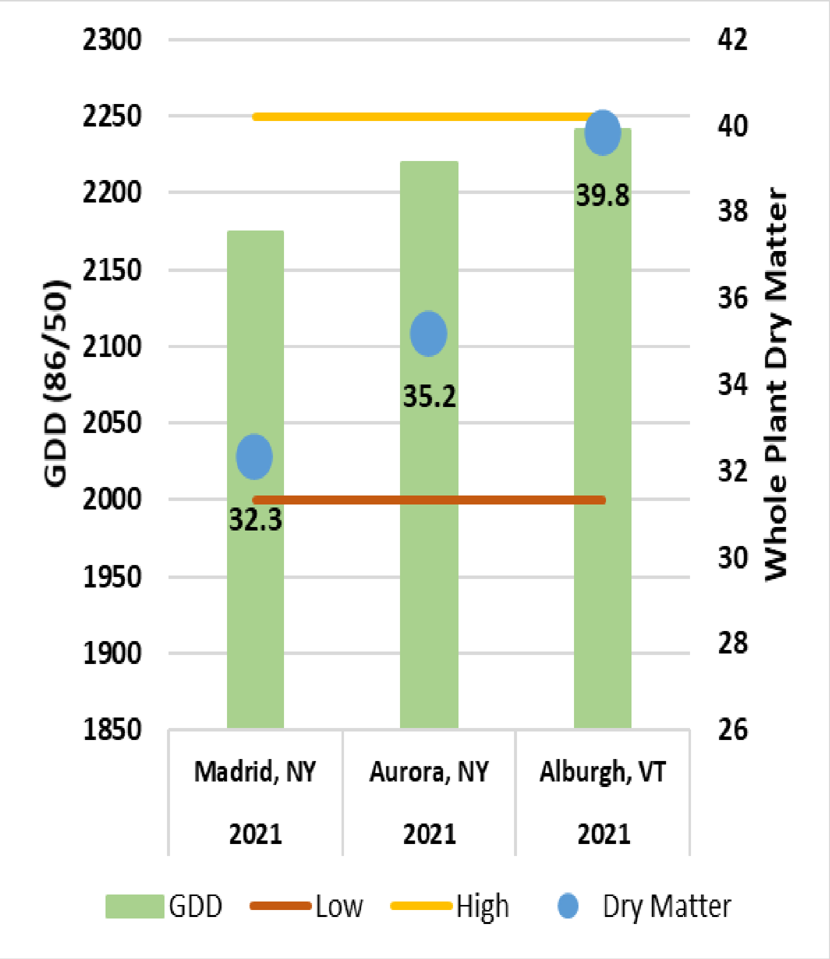
Weather, GDDs and Dry Down

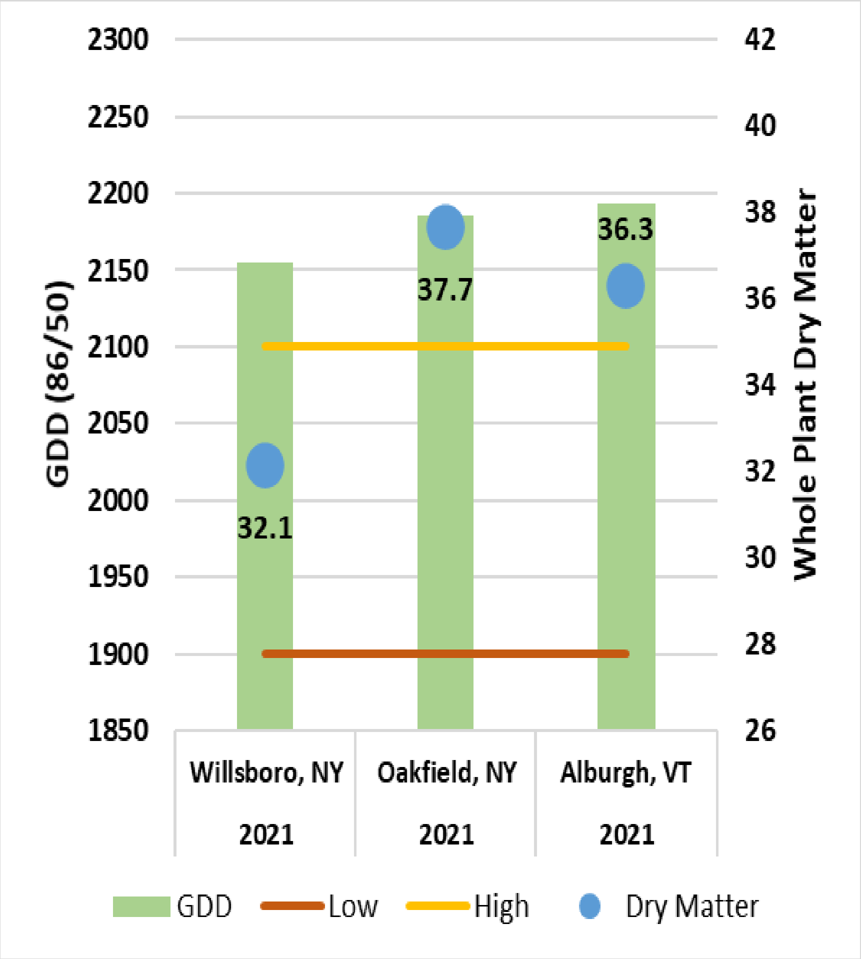
- Not every GDD is created equal
- The season makes a difference
- Madrid 2020
  - Relief (*modest*) of drought after pollination
  - Crop tried to "make up" for stagnation earlier in the season



2021 - Growing Degree Days

- Growing Degree Days offer estimate of maturity for harvest
- Environmental Factors impact the plants ability to utilize available GDD's
- Not suitable for final harvest decisions





Corn silage harvest timing: Not all growing degree days are created equal
https://cals.cornell.edu/pro-dairy/our-expertise/forage-systems

Ear and Stover DM Contribution to Whole Plant DM

Corn Harvester Performance Study 2018/2019

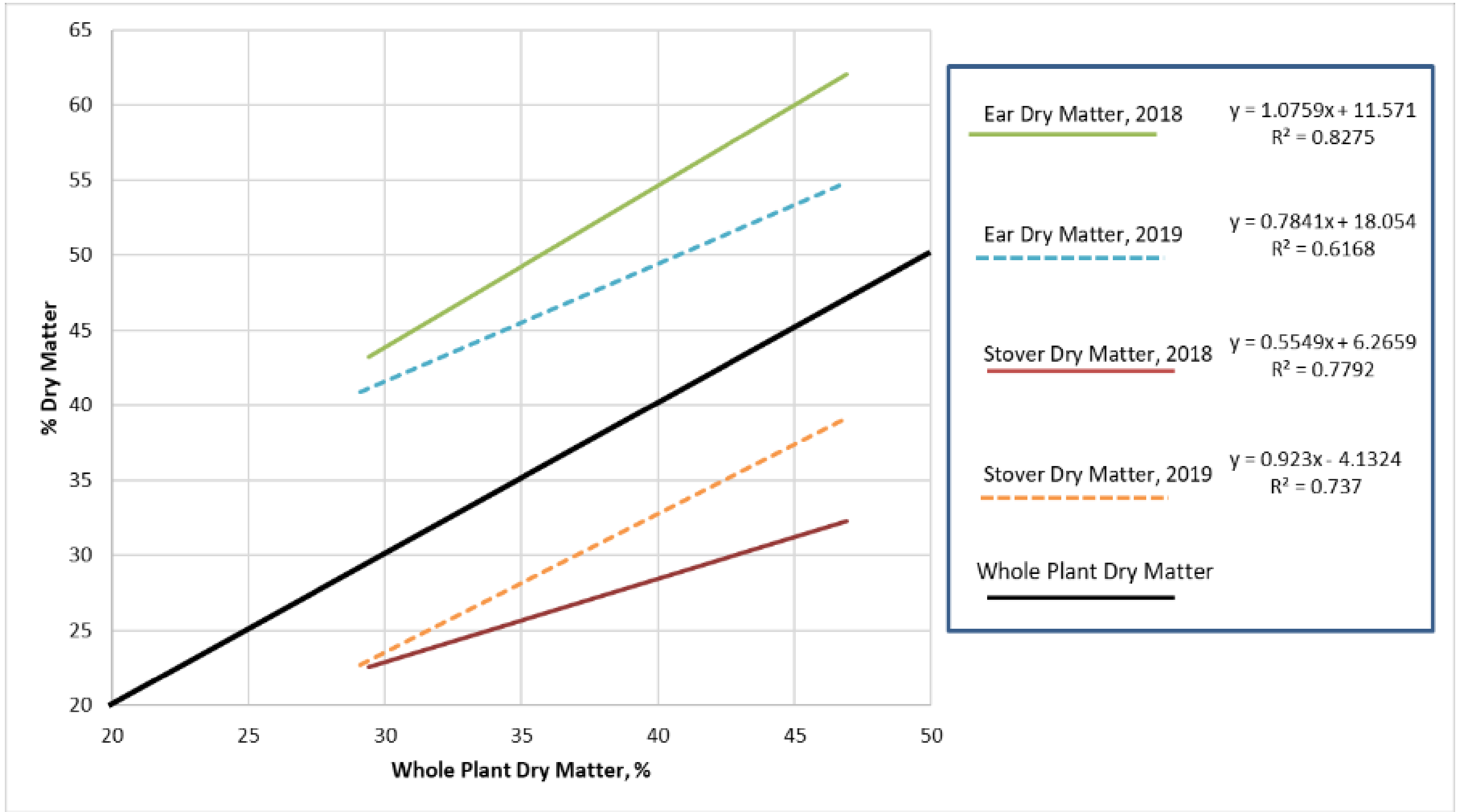
NY farm viability INSTITUTE

2018

- Season: warm
- Good conditions for dry down

2019

- Season: cool, late
- Dry down challenged



Cornell CALS College of Agriculture and Life Sciences

PRO DAIRY Education & Applied Research

Kernel Processing Information Series
https://cals.cornell.edu/pro-dairy/our-expertise/forage-systems

University of Wisconsin · Agronomy Department
1575 Linden Drive · Madison, WI · 53706 · (608) 262-1390

Agronomy Advice
http://corn.agronomy.wisc.edu

August 2019 Field Crops 28.5 - 132

The "Normal" Pattern of Corn Forage and Grain Development

Joe Lauer, *Corn Agronomist*

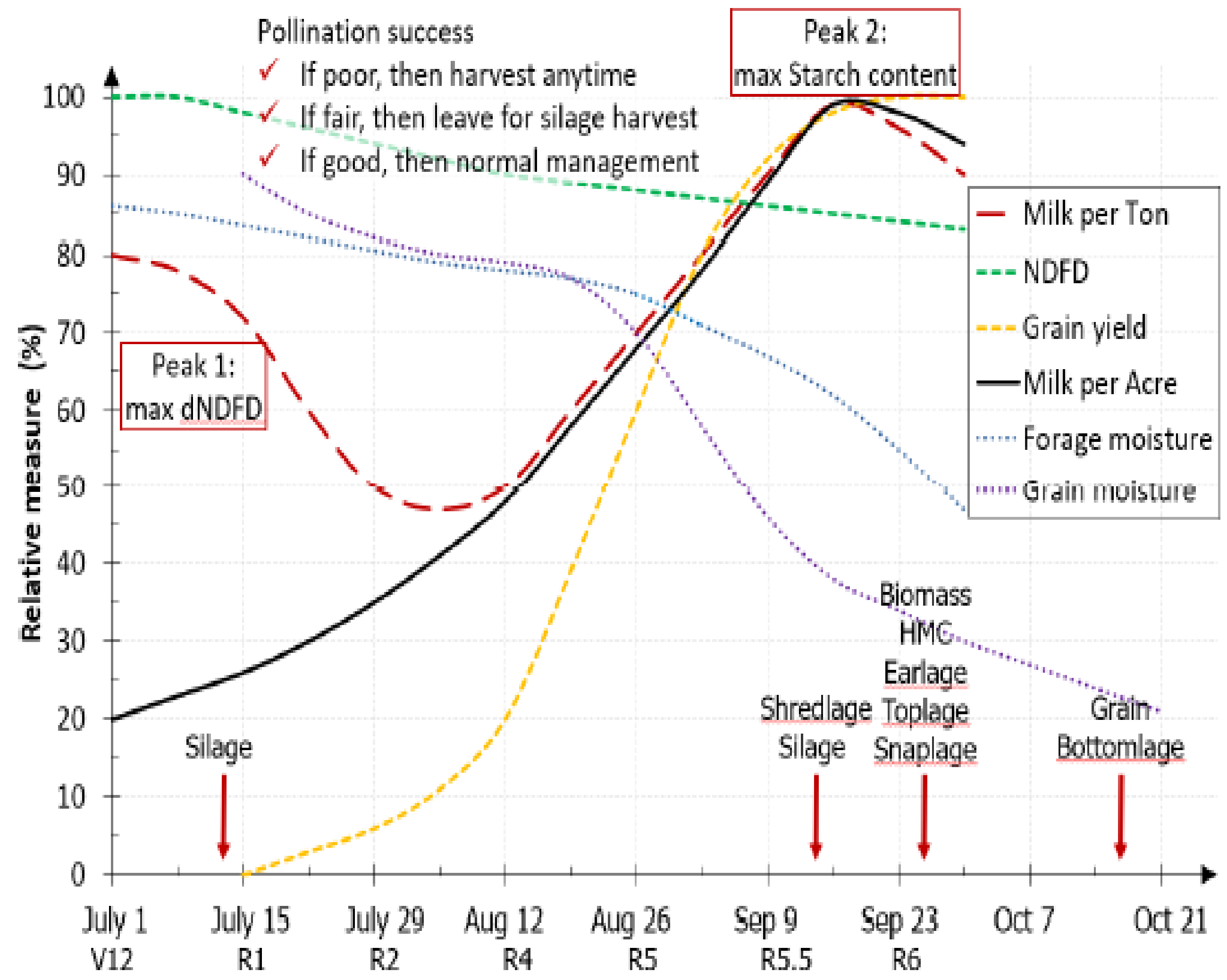


Figure 1. Normal Pattern of Corn Forage and Grain Development in Wisconsin.

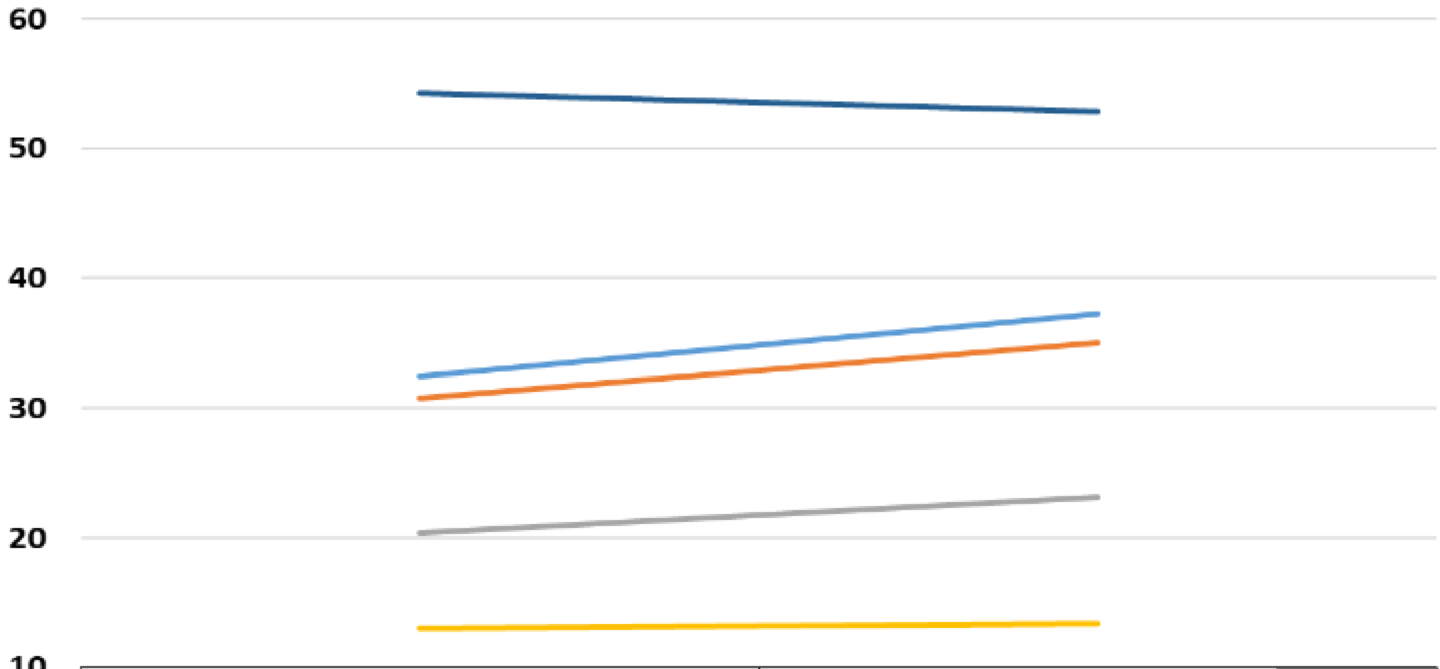
The relationship between kernel growth stage and development of corn for normal planting dates.

Stage	Percent of max yield		Moisture content (%)	
	Grain	Silage	Grain	Silage
R1: Silking	0	45-50	---	80-85
R2: Blister	0-10	55-60	85-95	80-85
R3: Milk	10-30	60-65	70-85	80-85
R4: Dough	30-60	65-75	60-70	75-80
R5: Dent	60-75	75-85	50-55	70-75
R5.5: 50% Kernel milk	90-95	100	35-40	65-70
R6: Black layer	100	95-100	30-35	55-65

Adapted From: Agronomy Advice University of Wisconsin, August 2013
http://corn.agronomy.wisc.edu/AA/pdfs/A102.pdf

Whole Plant DM: Yield & Quality

One week delay in harvest
2018 NY VT Corn Silage Hybrid Evaluation Program

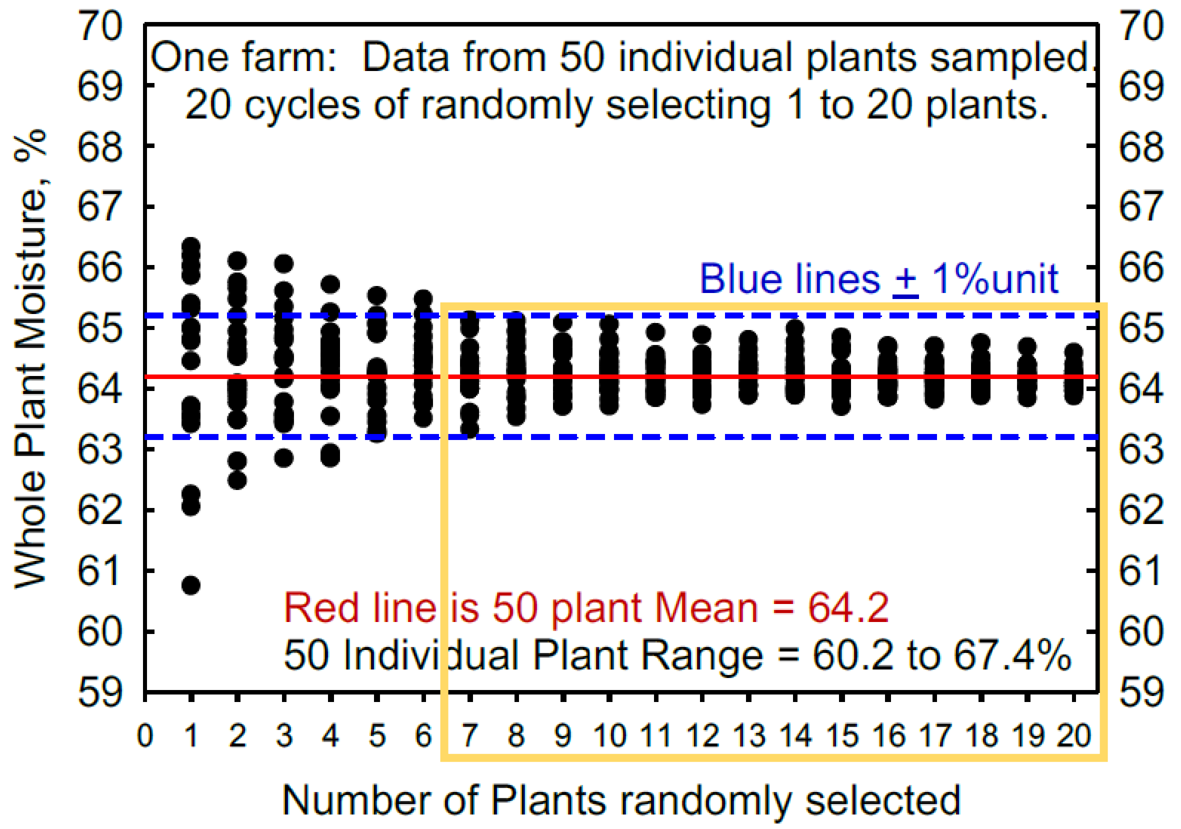


Same 4 hybrids
(3 reps/hybrid/date)

	Sept. 12	Sept. 19	*P-value*
Whole Plant Dry Matter (%)	32.4	37.2	<0.0001
uNDF240 (%DM)	13.0	13.4	0.3947
NDFD30_NDF	54.3	52.9	0.0783
Starch Content (%)	30.8	35.0	0.04
Yield (tons/acre, 35% DM)	20.4	23.1	0.0517

Whole Plant DM Sampling

- Uniform field
  - 7+ plants = +/- 1 % whole plant DM
  - Sample must be representative
- Non-uniform fields
  - Consider more samples and separate samples from different areas



Sampling for Moisture Content in Corn Silage Fields
Jerry Cherney
https://cals.cornell.edu/pro-dairy/our-expertise/forage-systems

Mapping fields *and* Storage

- Pre-harvest forage samples
  - Good indication for key forage quality parameters
  - Order of fields for harvest
  - Adjustments to cutting height
  - Storage location planning

Favoring Higher Cutting Height	Favoring Lower Cutting Height
• Weather Conditions known to reduce Fiber Digestibility • Abundant inventories • Expectation of high yields • Heavier Soil Types • Lower Quality Hay Crop Silage	• Low inventory • Low Yield • BMR Hybrids • High quality Hay Crop Silage • Fields intended for rotation

Considerations in Managing Cutting Height of Corn Silage
https://extension.psu.edu/considerations-in-managing-cutting-height-of-corn-silage

Green Samples at Harvest *(or before harvest)*

A very reasonable investment for understanding what you will have to feed in the coming year.

Changes to Corn Silage During Fermentation		
Dry Matter	↘	*Dependent on level of DM loss (shrink) during fermentation*
Starch Digestibility	↑	*Ferment minimum 3-4 months[1]*
Starch Content	-	*Could have slight changes in composition*
Processing Score	-	*Changes observed have not been consistent (Ferraretto[2], Lawrence & Kerwin[3])*
Fiber Digestibility	-	*No change[1]*
Mycotoxins	↗*	*Majority originate in the field, very few are storage related. Not alive – will not "grow". Any increases in storage predominately associated with increased concentration (DM loss)* ****Need to be present.***
Yeast and Molds	↗*	*Increased risk with poor fermentation, low density, poor face management.* ****Need to be present.***

Cornell CALS
College of Agriculture and Life Sciences

PRO-DAIRY
Education & Applied Research

[1]Influence of Ensiling on the Digestibility of Whole-Plant Corn Silage, Wisconsin Focus on Forage
https://fyi.extension.wisc.edu/forage/influence-of-ensiling-on-the-digestibility-of-whole-plant-corn-silage/
[2]Does fermentation change corn silage processing?
https://www.vitaplus.com/blog/articles/does-fermentation-change-corn-silage-processing#.Ya9oVdDMJaQ
[3]Kernel Processing Information Series, Lawrence & Kerwin
https://cals.cornell.edu/pro-dairy/our-expertise/forage-systems

Starch Digestibility & Ensiling Time

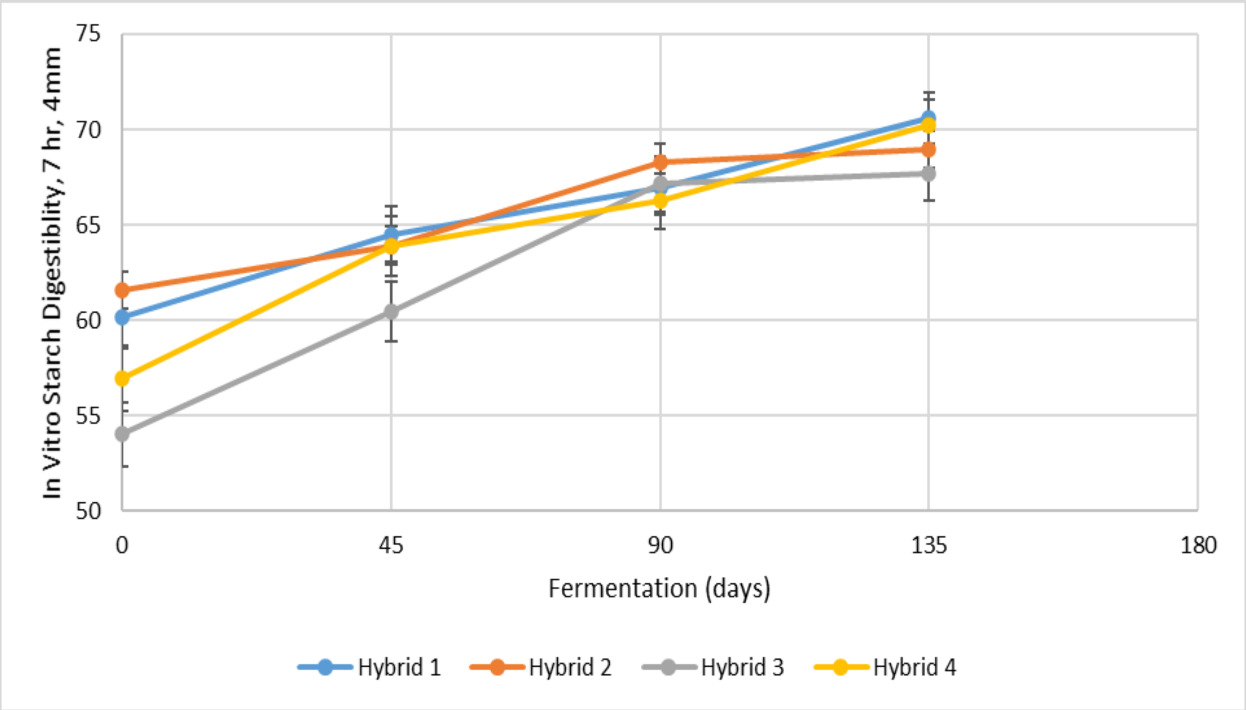
Table 1. Effect of ensiling on ruminal in vitro starch digestibility in whole-plant corn silage.

	Days Ensiled										
Experiment	0d	30d	45d	60d	90d	120d	150d	180d	240d	270d	*P* <
	% of Starch										
Der Bedrosian et al., 2012[1]	69	---	75	---	77	---	---	79	---	82	0.01
Ferraretto et al., 2014a[2]	62	72	---	---	---	79	---	---	84	---	0.001
Windle et al., 2014[1]	54	---	59	---	63	---	68	---	---	---	0.01
Young et al. 2012[1]	---	---	76	---	---	---	79	---	---	---	0.01

[1]Ruminal in vitro starch digestibility at 7 h on samples ground through a 3-mm Wiley Mill screen.
[2]Ruminal in vitro starch digestibility at 7 h on samples ground through a 4-mm Wiley Mill screen.

Influence of Ensiling on the Digestibility of Whole-Plant Corn Silage, Wisconsin Focus on Forage

https://fyi.extension.wisc.edu/forage/influence-of-ensiling-on-the-digestibility-of-whole-plant-corn-silage/



Corn Harvester Performance Study 2018/2019

Kernel Processing Information Series

https://cals.cornell.edu/pro-dairy/our-expertise/forage-systems

Fiber Digestibility & Ensiling Time

Table 2. Effect of ensiling on ruminal in vitro neutral detergent fiber (NDF) digestibility in whole-plant corn silage.

Experiment	Days Ensiled										$P <$
	0d	30d	45d	60d	90d	120d	150d	180d	240d	270d	
	% of NDF										
Cherney et al., 2007[1]	56	50	---	---	---	---	---	---	---	---	0.001
Der Bedrosian et al., 2012[2]	62	---	60	---	60	---	---	59	---	59	0.01
Ferraretto et al., 2014[3]	57	56	---	---	---	55	---	---	56	---	NS[5]
Hunt et al., 1993[4]	73	---	---	71	---	---	---	---	---	---	NS
Young et al. 2012[2]	---	---	61	---	---	---	60	---	---	---	0.02

[1]Ruminal in vitro NDF digestibility at 48 h on samples ground through a 1-mm Udy Mill screen.
[2]Ruminal in vitro NDF digestibility at 30 h on samples ground through a 2-mm Wiley Mill screen.
[3]Ruminal in vitro NDF digestibility at 30 h on samples ground through a 1-mm Wiley Mill screen.
[4]Ruminal in vitro NDF digestibility at 48 h on samples ground through a 2-mm Wiley Mill screen.
[5]Non-significant.

Influence of Ensiling on the Digestibility of Whole-Plant Corn Silage, Wisconsin Focus on Forage
https://fyi.extension.wisc.edu/forage/influence-of-ensiling-on-the-digestibility-of-whole-plant-corn-silage/

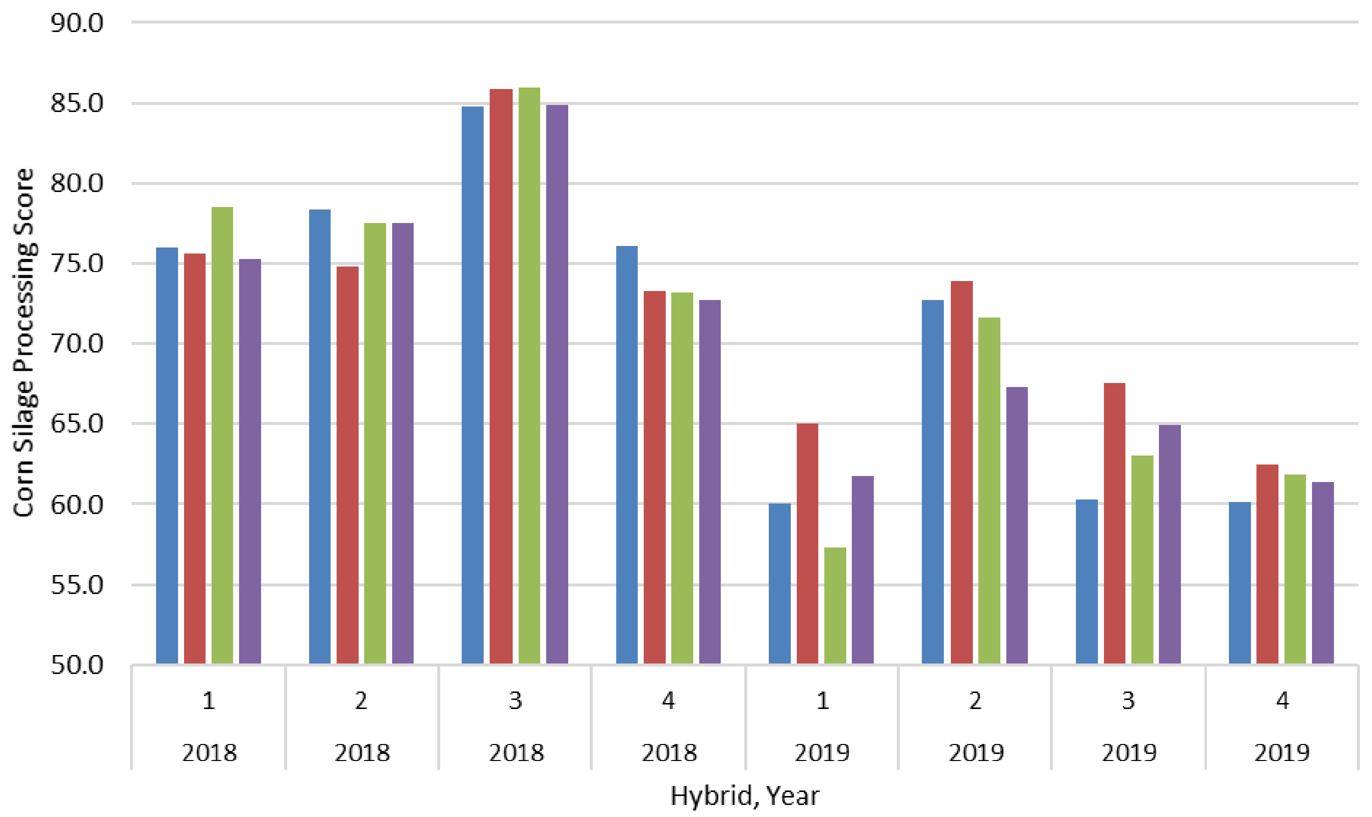
Does Processing Score Increase during Fermentation?

Time in the silo effect on corn silage processing score[1]

Storage length, days	0	30	120	240	P-value
Ferraretto et al., 2015 – trial 1	50.2	61.1	-	-	0.01
Ferraretto et al., 2015 – trial 2	60.3	63.6	67.2	68.4	0.08
Agarussi et al., 2020	28.8	-	28.8	-	0.97
Saylor et al., 2020	62.4	59.7	64.8	67.7	0.01

[1]Corn silage processing score - % of starch passing through the 4.75 mm sieve.

Table Courtesy: Luiz Ferraretto



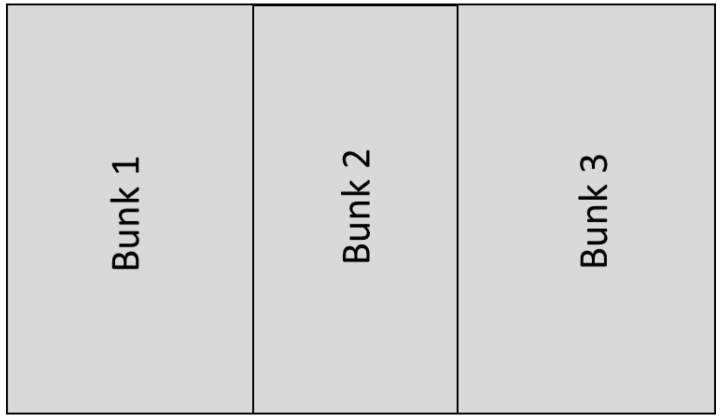
Kernel Processing Information Series
https://cals.cornell.edu/pro-dairy/our-expertise/forage-systems

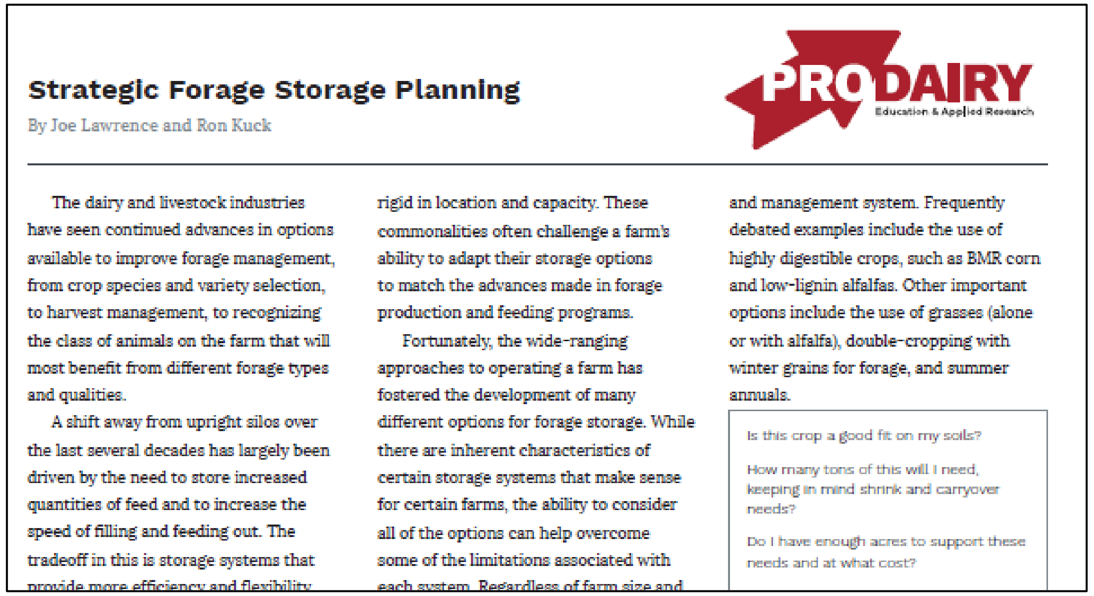
Corn Harvester Performance Study 2018/2019

Strategic Storage Planning

- Focus on Forage Storage areas
- Have a plan
  - Plan A
  - Plan B
  - Plan C
- What happens with a surplus of quality feed?
- What happens with a cutting of garbage?
- Don’t bury one feed behind another.

- Determine total tons of feed needed for each animal group
- Store feeds in separate (***and accessible***) locations to utilize each forage for the right group of animals.





Strategic Forage Storage Planning

By Joe Lawrence and Ron Kuck

PRO DAIRY Education & Applied Research

The dairy and livestock industries have seen continued advances in options available to improve forage management, from crop species and variety selection, to harvest management, to recognizing the class of animals on the farm that will most benefit from different forage types and qualities.

A shift away from upright silos over the last several decades has largely been driven by the need to store increased quantities of feed and to increase the speed of filling and feeding out. The tradeoff in this is storage systems that provide more efficiency and flexibility rigid in location and capacity. These commonalities often challenge a farm's ability to adapt their storage options to match the advances made in forage production and feeding programs.

Fortunately, the wide-ranging approaches to operating a farm has fostered the development of many different options for forage storage. While there are inherent characteristics of certain storage systems that make sense for certain farms, the ability to consider all of the options can help overcome some of the limitations associated with each system. Regardless of farm size and and management system. Frequently debated examples include the use of highly digestible crops, such as BMR corn and low-lignin alfalfas. Other important options include the use of grasses (alone or with alfalfa), double-cropping with winter grains for forage, and summer annuals.

Is this crop a good fit on my soils?

How many tons of this will I need, keeping in mind shrink and carryover needs?

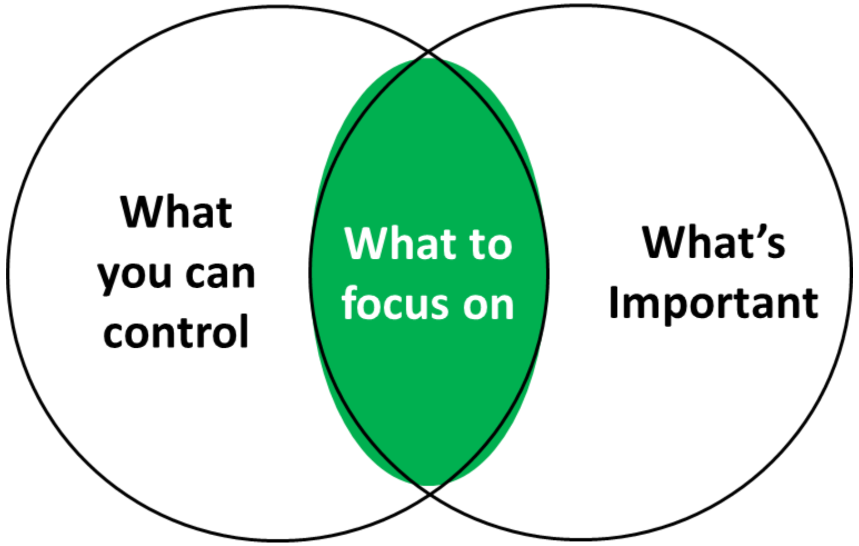
Do I have enough acres to support these needs and at what cost?

Strategic Forage Storage Planning
The Manager, March 2018
https://cals.cornell.edu/pro-dairy/publications/manager/manager-march-2018

Summary

- 2021 Corn Silage Quality (Northeast)*

	2021 vs. 2020
Fiber Digestibility	↓
Starch Content	↔
Starch Digestibility	↘
Starch Availability (CSPS)	↘



- 2022 is shaping up to be a crazy year for crop inputs
  - Control what you can
  - Make plans to optimize forage utilization in the diet

Thank You!

PRODAIRY
Education & Applied Research

Joe Lawrence, MS, CCA
Dairy Forage Systems Specialist

jrl65@cornell.edu
315-778-4814
http://prodairy.cals.cornell.edu/

Cornell CALS
College of Agriculture and Life Sciences