



Mastering the Dairy Business Conference Call Learning Series

Managing for Droughty Corn

CENTER FOR
Dairy EXCELLENCE

COPING WITH DROUGHT

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Penn State **Extension**

Drought Survival Guide

<http://www.das.psu.edu/dairy-alliance/resources/drought-survival-guide>

- Spreadsheet pricing CS

Microsoft Excel - Updated Pricing Standing Corn for Silage Revised 8-16-2011

1	Price per bushel at local elevator	\$	7.00	\$/bu														
2	Potential Grain Yield (bu/acre)		110	bu/A														
3	Dry Matter of Harvested Silage		35.00	%														
4	Market price for corn silage from silo	\$	65.00	\$/ton														
5	Cost of P2O5	\$	0.72	\$/lb														
6	Cost of K2O	\$	0.53	\$/lb														
7	Corn Silage Quality - % of Normal		90	%														
8	Corn Grain Discount (\$ per bushel)	\$	0.30	\$/bu														

Grain Grower's Perspective			Buyer's Perspective			Grain Grower's Perspective:	
(to Net the same amount from selling Standing Corn as if harvesting Shelled Corn)			(to Pay the same as buying corn silage from a silo)			Corn Price	Chopped Corn
	Per Acre	Per Bushel		Per Ton		\$/bushel	\$/Ton
13	Grower's Gross Income (bu x price)	\$ 770.00	\$ 7.00	Price of corn silage from silo*	\$ 65.00	\$3.50	\$18.05
14	Harvest cost per acre	- \$ 40.00	\$ 0.36	Harvest cost	- \$ 10.00	\$4.00	\$21.72
15	Grain Hauling (field to mill)	- \$ 27.50	\$ 0.25	Storage Cost	- \$ 2.00	\$4.25	\$23.55
16	Drying Charge	- \$ 66.00	\$ 0.60	Dry Matter Loss	- \$ 8.45	\$4.50	\$25.38
17	Cost of additional P & K removal w/ silage harvest	+ \$ 52.23	\$ 0.47	Subtotal	= \$ 44.55	\$4.75	\$27.22
18	Corn Grain Discount (\$/bushel)	- \$ 33.00	\$ 0.30	Corn Silage Quality Discount	- \$ 4.46	\$5.00	\$29.05
19	Chopped corn price, breakeven with shelled corn	= \$ 655.73	\$ 5.96			\$5.25	\$30.88
20	Potential chopped corn yield (Tons/acre) ¹	15.0				\$5.50	\$32.72
22	Price per Ton of Unfermented Chopped Corn needed to Equal Shelled Corn Net	= \$ 43.72		Price per Ton of Unfermented Chopped Corn needed to equal Corn silage price delivered from silo	= \$ 40.10	\$5.75	\$34.55
						\$6.00	\$36.38
						\$6.25	\$38.22
						\$6.50	\$40.05
						\$7.00	\$43.72
						\$7.25	\$45.55
						\$7.50	\$47.38
						\$7.75	\$49.22
						\$8.00	\$51.05

Your Farm:		2011 Machinery Custom Rates:	
29	Grain Hauling	\$ 0.25	\$/bushel
30	Drying Charge	\$ 0.60	\$/bushel
31	Corn Combining	\$ 40.00	\$/acre
32	Chop/Haul/Fill	\$ 10.00	\$/Ton
33	Silage Delivery Charge	\$ 5.00	\$/Ton
34	Dry Matter Loss ²	13	%
35	Storage Cost Silage	\$ 2.00	\$/Ton

37	1 Man 1 Truck \$64.90/hour	\$ 64.90	/hour
38		\$ 4.06	/Ton for 16 Ton Load - 1 Load per Hour

¹The Relationship between Corn Grain Yield and Forage Yield:
Often the grain yield equivalent of corn harvested for silage (at 65% moisture) is about 7.5 bu/ton, but can vary depending on conditions from 0 in earless corn to 10 bu/ton for short corn with very good ear development. Crops with lower yields and pollination

²Typical dry matter losses:
70% moisture and over 13%
61-69% moisture 6%
60% moisture and under 6%

Source: "Harvesting and Utilizing Silage"

	Yield	P2O5
	lb/bu	lb/bu
Nutrient (P2O5 and K2O) removal (grain)	110.00	0
Nutrient(P2O5 and K2O) removal (silage)	15.00	3
Difference		

Drought Survival Guide

<http://www.das.psu.edu/dairy-alliance/resources/drought-survival-guide>

- Articles dealing with drought CS
 - Nutrient content
 - Estimating yields
 - Nitrates
 - Molds and mycotoxins
 - Preservatives – Limin Kung Jr. – U of Delaware

Some of this area received rain recently, so the plants are showing some recovery, but they will not likely increase much in height or ear development.

Some of these fields as they advance in maturity without much grain will accumulate sugars and turn red, similar to deer damaged corn where the ears have been removed.

Some of these fields could potentially accumulate high levels of nitrates in the short term after drought ending rains, which could contribute an increased risk of nitrates in the forage or silo gas.

Other fields under more moderate drought stress that were just at silking are recovering, but will have some pollination issues.



Silage Additives for Drought Stressed Corn

Recommended:

- ◆ Homolactic acid bacteria (microbial inoculants): Severely drought stressed corn forage may contain lower numbers of naturally occurring lactic acid bacteria and may need some help during fermentation. If forage is in the normal range for DM, consider using a research proven homolactic acid bacteria.

For consideration:

- ◆ Heterolactic acid bacteria – *Lactobacillus buchneri*: Drought stressed corn silage often has a high sugar content and can be highly prone to spoilage when exposed to air. *Lactobacillus buchneri* is an organism that safely produces acetic acid, which reduces aerobic spoilage organisms and improves bunk life. However, I suggest not using this additive if whole plant DM is less than 32%.
- ◆ Buffered propionic acid-based preservatives: Silage additives based on buffered propionic acid may be an acceptable additive for drought stressed forage especially if the DM% of the whole plant is high: greater than 40%. Addition of 2-4 lb/wet ton of forage can improve aerobic stability of the silage and reduce DM losses in the silo and during feedout. Higher application rates will increase the probability of effectiveness especially in drier forages.

Source: Limin Kung, Jr. U of Delaware

- ◆ Water: Water can be added to increase the moisture level of overly dry forage, but the amounts needed to have a substantial impact are large. For example, to decrease the dry matter of forage at 50% to 45%, one would have to add 200 lb of water per ton of forage. In addition, added water can cause run off problems, as it is not absorbed efficiently in the forage mass.
- ◆ Sugars/molasses: Drought stressed corn forages usually contains moderately high concentrations of fermentable sugars. Thus, the addition of molasses or other fermentable substrates is usually not warranted if the forage is harvested at the proper DM content.

Not recommended:

- ◆ Non-protein nitrogen additives: Non-protein nitrogen (NPN) additives (urea and anhydrous ammonia) should not be used on very dry, drought stressed forages.

Source: Limin Kung, Jr. U of Delaware

Plan NOW

- Estimate yields
 - General rules of thumb may not apply.
- Measure feed inventories
 - Consider cover crops?
- Estimate feed needs for ALL animal groups
 - Dealing with feed shortages.....
- Talk with your consultants now to determine alternatives.

Plan NOW

- Monitor income over feed costs
 - Are feed costs in line with milk production?
 - Is it more economical to feed less and lose a pound or two of milk? (if both forage and grains are purchased).
- Cash Flow Planning – What is your milk margin?
 - Can the cash flow handle \$70-\$100/ton CS?
 - What are the alternatives?
 - Are there other expenses that can be reduced?

Resources:

- <http://www.das.psu.edu/dairy-alliance/resources/drought-survival-guide>
- <http://www.das.psu.edu/research-extension/dairy/nutrition/forages>
- <http://extension.psu.edu/field-crop-news>
- <http://www.das.psu.edu/dairy-alliance/>
 - Cash Flow Planning
 - IOFC

Management Considerations for Drought Stricken Corn Silage

A. Pre Harvest

B. Harvest

C. Post Harvest

Management Considerations for Drought Stricken Corn Silage

A. Pre Harvest

1. Evaluate

- Potential Yield**
- Potential Quality/Fungal infestations**
- Field Variations**

2. Plan

- How to segregate or properly blend silage of various qualities**
- Purchasing of forage to meet herd needs**

Management Considerations for Drought Stricken Corn Silage

A. Pre Harvest

3. Prepare

- Equipment is ready
- Storage structure is ready
- Preservatives/Stabilizers are ready

Management Considerations for Drought Stricken Corn Silage

B. Harvest

1. Proper Timing of Harvest

- Moisture content is only acceptable trigger
- Droughty corn tends to be wetter than it looks

Storage Structure	Ideal Moisture
Tower Silo \leq 16 ft	65-68%
Tower Silo \geq 18 ft	60-64% (<60 for 24 ft +)
Bunker/Trench	68-70%
Silage Bag	65-68%

Management Considerations for Drought Stricken Corn Silage

B. Harvest

2. Execute harvest plan to minimize variations
 - Harvest different qualities of silage as groups
 - Blend various silages properly
3. Chop at proper TLC
 - 1/2 to 3/4 TLC

Management Considerations for Drought Stricken Corn Silage

B. Harvest

4. Consider cutting height

Effect of Cutting Height and Yield on Nitrate Content (ppm) of drought silage*

	Height of cut		
	4"	8"	12"
Nitrate (NO ₃ N), ppm	1,500	1,000	600
Yield, tons/acre	5.0	4.4	3.8

*From Northeast Research and Extension Center, Concord, NE

Management Considerations for Drought Stricken Corn Silage

B. Harvest

5. **Apply preservative/stabilizer**
 - Goal is reducing fermentation DM losses
 - Inoculants if all harvest aspects are ideal
 - Organic acids if corn silage gets too dry or if fields are infested with fungal organisms
 - Follow manufacturers recommendations/err to the heavy side

Management Considerations for Drought Stricken Corn Silage

B. Harvest

6. Compaction is CRITICAL!!

- Tower silos need adequate moisture for good pack
- Ag Bags need to be properly set and monitored during filling
- Trenches need proper combination of weight and time



**Minimum
14 lbs/cu.ft.**

http://cornandsoybeans.psu.edu/pdfs/bunker_silo_study.pdf

Management Considerations for Drought Stricken Corn Silage

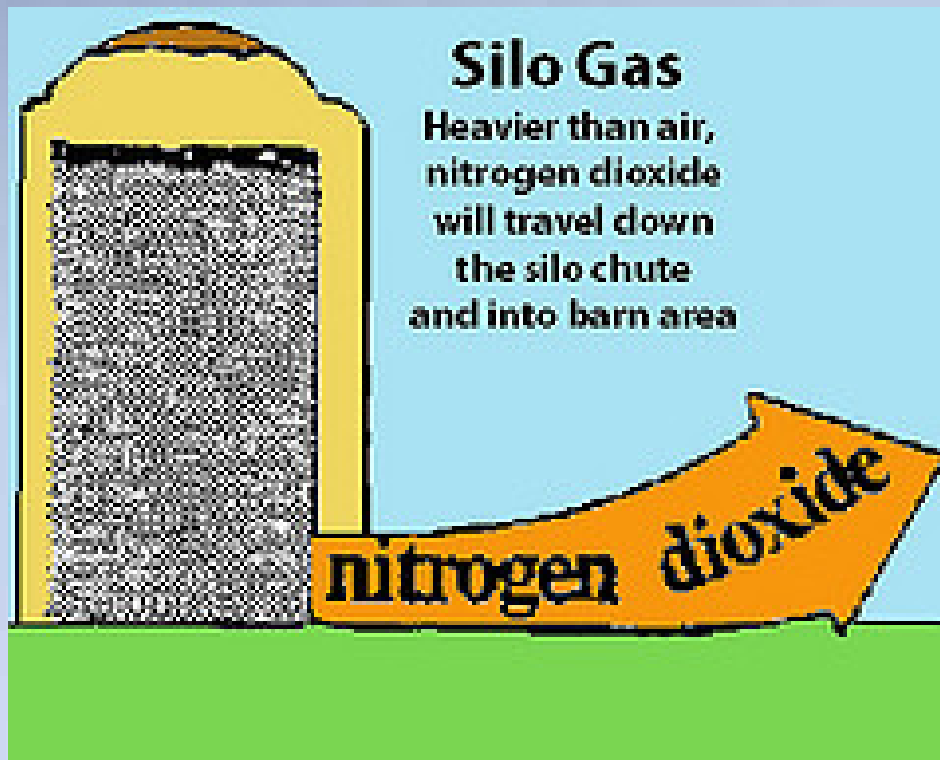
B. Harvest

- 7. Seal storage structure adequately**
- 8. Resist temptation to feed immediately**

Management Considerations for Drought Stricken Corn Silage

B. Harvest

9. Practice safety. **BEWARE OF SILO GAS!**



Management Considerations for Drought Stricken Corn Silage

C. Post Harvest

- 1. Evaluate crop quality quickly and often**
 - Moisture content weekly**
 - Nutrient content monthly or when change occurs**
 - NDF Digestibility**
 - Fermentation profile**
 - Mold/yeast contamination**
 - Mycotoxins?**
- 2. Nitrates**
 - Typically found when droughty corn is harvested several days after soaking rain and ground fertility is high**
 - will dissipate over time**

Management Considerations for Drought Stricken Corn Silage

C. Post Harvest

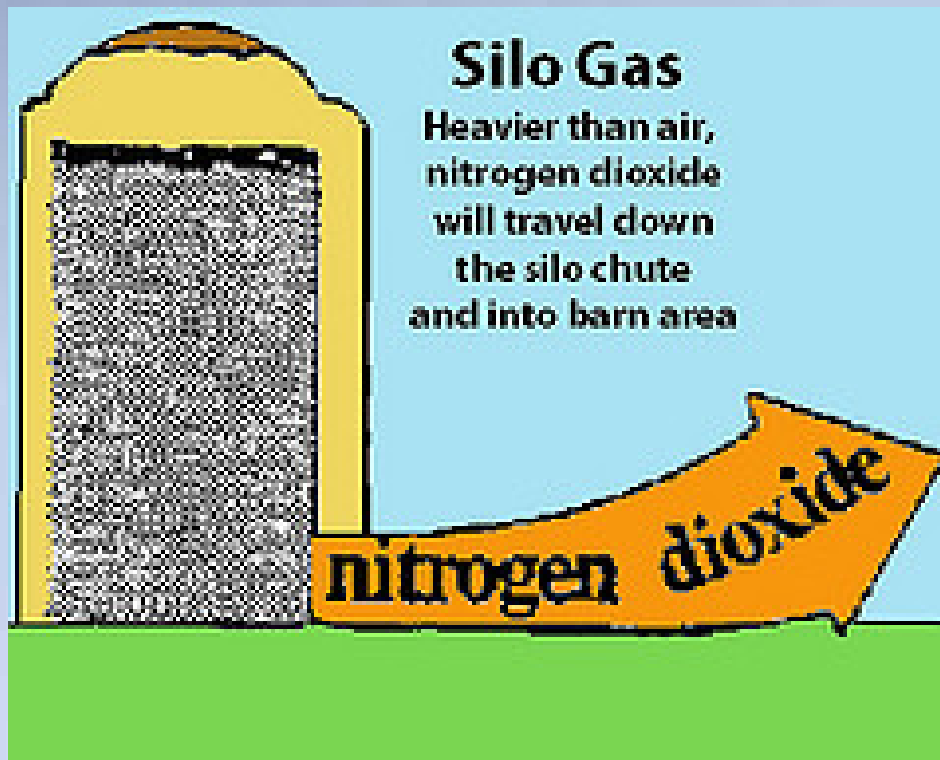
- 3. Use open fields for another crop**
 - limited choices this fall (Oats 3-4 bushels per acre)**
 - other small grain options may provide a little feed this fall but will provide a lot of feed next spring (don't wait!)**
 - eliminate old corn stalks!**

- 4. Shop for feed bargains**
 - Crop farmers looking to salvage what they have**

Management Considerations for Drought Stricken Corn Silage

C. Post Harvest

5. Practice safety. **BEWARE OF SILO GAS!**



CORN SILAGE - WHAT WE ARE EXPECTING

- Reduced yield
- Variable quality (even within a field)
- “Fluffy” silage – few ears, more stalk, poorer packing
- Low starch/NFC content
- Increased NDF
- Improved NDF digestibility (?)
- Some short corn with good ears will be excellent quality (low quantity)
- Increased risk of mycotoxins
- High Nitrates (?)







CORN SILAGE - WHAT WE ARE SEEING SO FAR

- Only a few results, so far (I will update as we get closer to webinar)
- Dry Matter = 30.9% (range = 26.6 – 38.6%)
- Protein = 8.4% (range = 7.8 – 9.5%)
- NDF = 48.5% (range = 44.8 – 57.6%)
- Lignin = 3.7% (range = 3.4 – 4.7%)
- Starch = 20.6% (range = 13.3 – 26.1%)
- NFC = 37.7% (range = 27.7 – 41.2%)
- NE_1 – 0.70 Mcal/lb (range = 0.62 – 0.74Mcal/lb.)

REPLACING CORN SILAGE

- Increase haylage and hay if available
 - Will increase need for supplemental energy
- Use non-forage fiber sources to substitute for fiber
 - Soybean hulls
 - Wheat middlings
 - Corn gluten feed
 - Citrus pulp
 - Beet pulp
 - Whole, fuzzy cottonseed (?)
 - Cottonseed hulls
 - Brewers grains
- Small Grain Forage alternatives
 - Oats as fall forage crop
 - Barley, rye, wheat, triticale as spring forage crop

REPLACING ON-FARM GRAIN

- Corn planted for on-farm grain will need to be chopped for silage
- Purchased corn is expensive
 - Maintain minimum 20% starch (DM basis)
 - Greater ruminal starch availability with processing
- Corn alternatives
 - Barley
 - Bakery by-product
 - Wheat middlings
 - Soybean hulls
 - Corn gluten feed
 - Distillers grains w/solubles
 - Citrus pulp
 - Molasses/syrup
 - Chocolate/candy by-product

MINIMIZE SHRINK

- Corn silage and grains are more valuable than ever
- Remove 4" per day in tower silos; 6" per day in bunker and bag silos
- Keep bunker silo face "clean"
- Keep bunkers and bags well-covered
- Remove only silage that will be fed
- Avoid pest and weather losses of stored grains and grain alternatives
- Limit feed refusals to 2%

MYCOTOXINS?

- Poisons produced by growing molds during periods of stress (heat & cold; dry & wet), before and after harvest
- Heat and chemically-stable
- Affect animal performance:
 - 1) Alter nutrient content, absorption, and metabolism
 - 2) Change hormone function
 - 3) Suppress immune function
- Heat Stress/Storage molds
 - Aspergillus can produce aflatoxins
 - Penicillium can produce Patulin, PR Toxin, and Ochratoxin (most common mold in corn silage)
- Include “Flow Agents”

NITRATE TOXICITY(?)

- Late-season rains likely limit the risk of nitrate toxicity this year.
- Nitrate toxicity can result in impaired performance, abortion, and even death.
- Ensiling reduces nitrate content up to 50%
- Silage containing nitrate-N levels exceeding 1000 ppm (2000 ppm in fresh forage) should not be fed at more than 50% of ration dry matter.
- Silage containing more than 4000 ppm nitrate-N should not be fed at all.
- Dilution is the solution

SHOULD YOU CONTRACT FEED?

