Forage Options for Drought Stressed Corn

Options

- Silage
  - Reduced nitrates (30-70%)
  - Improved feeding
  - Increased harvested material
  - Moisture level and cost
- Bale Dry Stover
  - Drying time (2-3 wks)
  - Equipment issues
  - No reduction in nitrate level
  - Less water to haul
- Grazing
  - Low dry matter recovery (less than 50%)
  - Low cost
  - Possible nitrate issues
    - Do not force cattle to eat the bottom 10-12 inches of the stalk

Estimating the yield

- **Based on grain yield**
  - < 100 bu/acre
    - 1 ton 30% dm silage/5 bu of grain
      - 20 bu corn yield = 4 ton of silage
  - >100 bu/acre
    - 1 ton 30% dm silage/6-7 bu of grain
      - 150 bu corn yield = 21.4 to 25 ton of silage
- **Based on Plant Height – No grain**
  - 1 ton of 30% dm silage/ft of plant height excluding tassel
    - 5 ft of plant height = 5 ton/acre of silage

Actual Yield Estimate

- 8.7ft of row (30 inch row spacing) = 1/2000 acre
- Cut 8.7ft of row in 15-20 spots in the field
  - Start measurement between two plants
- Cut at cutter height
- Weight total weight and multiply by 2000
- Divide by 2000lb/ton = tons/acre
  - Whole plants from 8.7ft of row weighs 10 lbs
    - 10 x 2000 = 20,000lb/acre / 2000lb/ton = 10 ton/acre

Conversion of Silage to Hay Yield

- 10 ton/acre @ 30%DM
  - 10 ton x 0.30 = 3 ton/acre of DM
- 3 ton/acre DM
  - 3 ton / 0.85 (85% dm hay) = 3.53 ton @ 85% DM

Actual Yields

- Hybrid
- Weather conditions
- Harvest height
- Harvest loss
- Forage moisture

Nutrient Content

Item	Normal Corn Silage*	Stressed Corn Plants**	Stalkage*	Brome Hay**	Wheat Straw**
DM, %	33.7	32.0	68.0	89.1	89.7
CP, %	8.3	11.82	6.1	10.17	5.32
ADF, %	25.9	29.89	47.1	35.95	49.49
NDF, %	43.8	50.71	70.7	57.87	71.43
NE_L, Mcal/lb	0.73	0.70	0.34	0.55	0.41
NE_M, Mcal/lb	0.73	0.73	0.39	0.52	0.28
NE_G, Mcal/lb	0.46	0.43	0.14	0.26	0.13
TDN, %	70.7	67.9	49.9	54.4	41.8

* Data from Dairy One Forage Lab **Data from SDK Labs, Hutchinson

Value of Normal Corn Silage

- 8 – 10 x bu price of corn (price of whole plant material)
  - 8 for a standing crop
  - 10 for ready to feed silage
  - Corn at $7.50/bu
    - $60/ton @35% DM standing in the field
    - $75/ton @35% DM harvested and packed in silo

- What the market will allow

Feeding Value Stressed Corn

Estimate Grain Yield	% of Normal Corn Silage
20 – 40 bu/acre	90 – 100%
0 – 20 bu/acre	80 – 90%
Short barren stalks	70 – 80%

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$60/ton = $42.00 - $54.00/ton standing in the field
$75/ton = $52.5 - $67.5/ton packed in the silo

Value Based on TDN or Energy

	Utility Alfalfa	Straw	Brome	Corn
$/ton	180	65	120	270
DM, %	87	90	88	88
TDN, %	52	41.8	54.4	88.1
NE_M, Mcal/lb	0.58	0.28	0.52	1.0
*$/pt of TDN	**0.199**	**0.086**	**0.125**	**0.174**
*$/Mcal of NE_M	**0.178**	**0.129**	**0.131**	**0.153**

35% DM Stressed corn with 67.9% TDN = $41 - $95/ton less harvest cost

35% DM Stressed corn with 0.73 Mcal, NEM = $66 – $91/ton less harvest cost

Other Factors in Pricing

- Silage
  - Buyer suffers the storage loss
    - 15-50% of the dry matter
    - Losses of comparison crops is 2-5%
    - For value comparisons, need to adjust for storage loss
- Alfalfa may be overpriced compared to other forages

Helping Producers Price Forage

- Win, win for both parties
- Crop producers need to work with crop insurance companies first!!!
- Silage pricing spreadsheet can be helpful if grain is present
- Alternate pricing methods if dealing with barren stalks
- Local markets will result in significant price variation

Harvest Moisture

- Critical factor for good silage
  - 30-35% DM is the target
  - 40% DM is getting pretty dry
    - Increased storage and feeding losses

- Handful of finely cut material squeezed tightly for 90 seconds and then grip is released
  - Juice between fingers or running – 15-25% DM
  - Ball holds shape when pressure is released and the hand is moist – 25-30% DM
  - Ball expands slowly and no dampness on hand – 30-40% DM
  - Ball springs out when hand is open - >40% DM

- Actual testing with microwave or Koster tester is the best

Nitrate Toxicity

- Nitrite (NO_2) not Nitrate (NO_3) Toxicity
  - Rumen bacteria reduce NO_3 to NO_2
  - Normally NO_2 converted to ammonia
  - Excessive NO_2 overloads the system
  - Nitrite absorbed into blood
  - Nitrite converts hemoglobin to methemoglobin
  - Loss of oxygen carrying ability of hemoglobin
  - Animal dies of asphxsiation
  - Sick, hungry, lactating or pregnant most susceptible

Symptoms of Toxicity

- Factors of toxicity
  - Amount consumed
  - Length of time for consumption
- Symptoms
  - Bluish color of mucus membranes
  - Labored breathing
  - Muscular tremors
  - Collapse and death within 2-3 hours

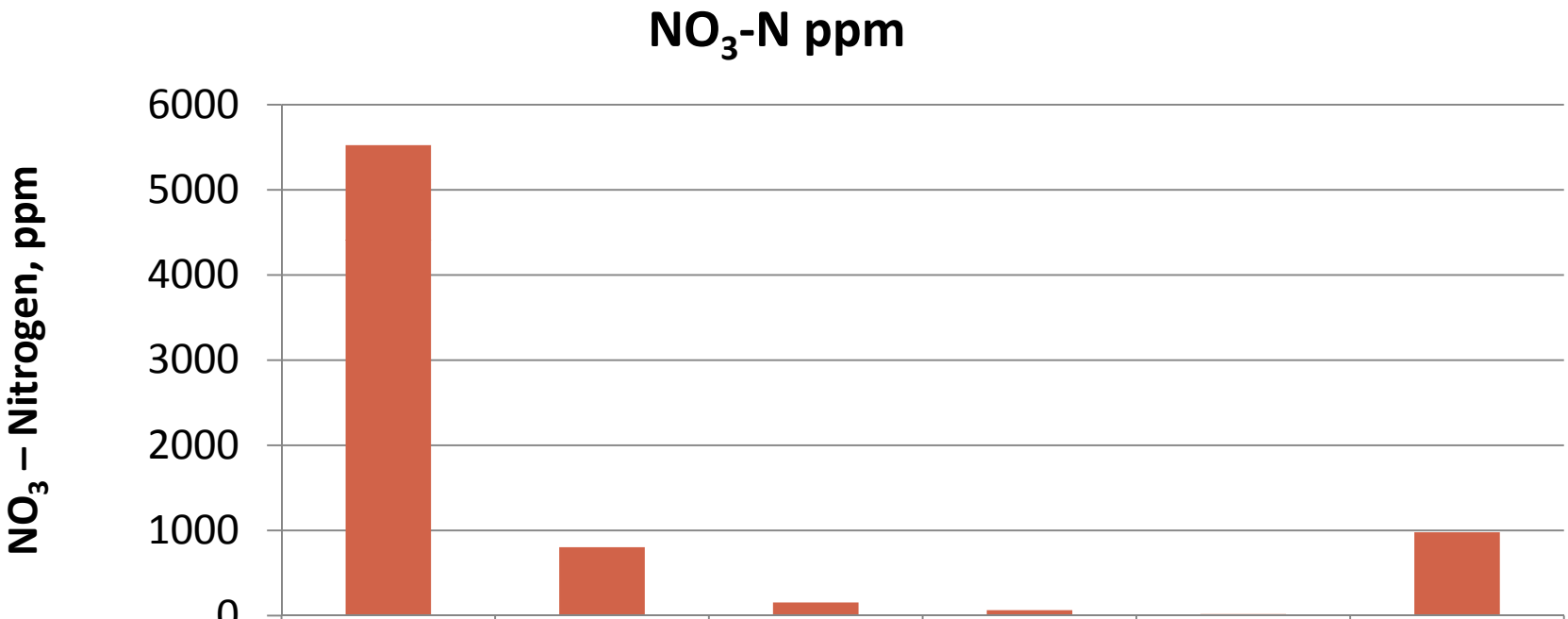
Qualitative Nitrate Test

- **Reagent A**
  - 500 mg of diphenylamine dissolved in 20 ml of water and brought to a final volume of 100 ml with concentrated sulfuric acid (amber storage bottle and storage in dark place)
- **Reagent B**
  - 20 ml of water to which 80 ml of concentrated sulfuric acid is carefully added.
- **Field Test**
  - Mix equal parts of reagents A and B and apply mixture to cut portion of plant, if it turns blue, nitrates are present
  - If nitrates are detected, a quantative analysis is needed

What to sample

- Most stressed plants in the field
  - Field edges next to trees
  - Slopes of the field
- Bottom 1/3 of the stalk
  - Higher levels of nitrate in the lower portion of the stalk

Nitrate Levels in Corn Stalks



	Stalk, lower 1/3	Stalk, middle 1/3	Stalk, upper 1/3	Leaves	Ears	Whole Plant
NO3-N ppm	5524	803	153	64	17	978

Nitrate Levels

ppm Nitrate (NO_3)	Effect on animals
0 – 3,000	Virtually safe
3,000 – 6,000	Moderately safe in most situations; limit use for stressed animals to 50% of the total ration
6,000 – 9,000	Potentially toxic to cattle depending on the situation; do not use as the only source of feed
9,000 and above	Dangerous to cattle and will often cause death

Nitrate Toxicity – MF3029

Conversion Factors for Nitrate Reports

Potassium Nitrate x 0.61 = Nitrate (ppm NO_3)

Nitrate-Nitrogen x 4.42 = Nitrate (ppm NO_3)

% Nitrate x 10,000 = Nitrate (ppm NO_3)

Special Nitrate Considerations

- If nitrates are present
  - Cut plants at 10-12 inches from the ground
- Rain can cause nitrates to accumulate quickly
  - Wait 7-14 days before chopping to allow nitrates levels to be reduced
- Certain plants accumulate nitrates
  - Lambsquarters, pigweed, Johnsongrass

Summary

- Drought stressed corn can be a useful feed source
- Silage offers advantages of
  - Increased quality
  - Opportunity to reduce nitrates
  - TMR feeding
  - Increased yields
- Watch for nitrates – commercial lab recommended
- Pricing needs to be a win, win for both parties
- Adapt to high nitrate forages slowly