

Drought Concerns for Cattle Producers

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Drought Effects

- **Water**
 - Quantity
 - Quality
- **Feed**
 - Quantity
 - Quality

Drought Effects: Water

- Reduced **quantity** and **quality**



Drought Effects

- Concentration of non-volatile toxins:
 - Salts
 - Nitrates/nitrites
 - Toxic runoff or point-source components

Total Dissolved Solids

- < 3000 ppm
- 3000-5000 ppm
- 5000-7000 ppm
- 7000-10,000 ppm
- Satisfactory
- Poor FE; loose stools
- Unsafe for pregnant or lactating animals
- May cause brain damage or death

Drought Effects

- Altered pH
 - Alters toxicity of contaminants
 - Alters bioaccumulation
 - Alters biodegradation

Remember

Water = first limiting nutrient

Water intake drives feed intake

Major Livestock Concerns

- Loss of performance due to lack of water
 - Decreased milk production
 - Decreased gain
 - Decreased BCS
- Increased urinary calculi







Drought Effects: Feed

- Reduced **quantity** and **quality**



Drought Effects

- Decreased rangeland productivity
- Decreased livestock productivity

Drought Effects

- Decreased crop productivity
- Increased plant toxin accumulation
 - Nitrates
 - Aflatoxins



Nitrate Toxicity



- Problem primarily in ruminants
- Rumen microflora convert nitrate (NO_3) to nitrite (NO_2)
- Reduces Fe in hemoglobin to form methemoglobin (chocolate brown blood)
- NO_2 shuts down O_2 -carrying capacity of hemoglobin
 - Asphyxiation
 - Abortion in sub-lethal doses



Nitrate Accumulators

- Sorghum
 - Sudangrasses
 - Forage Sorghums
 - Grain Sorghums
 - Johnsongrass
- Pearl Millet
- Pigweed
- Corn (volunteer)



Nitrate Levels

- Vary by location in the plant
 - Stalks > Leaves >> Grain
- Vary by age of plant
 - Young/actively growing > maturing/mature
- Vary with soil moisture levels
 - Drought-stressed
 - Drought ending rain
- Vary with fertilization

Nitrate Accumulators

- Cover crops
 - Turnips
 - Radishes

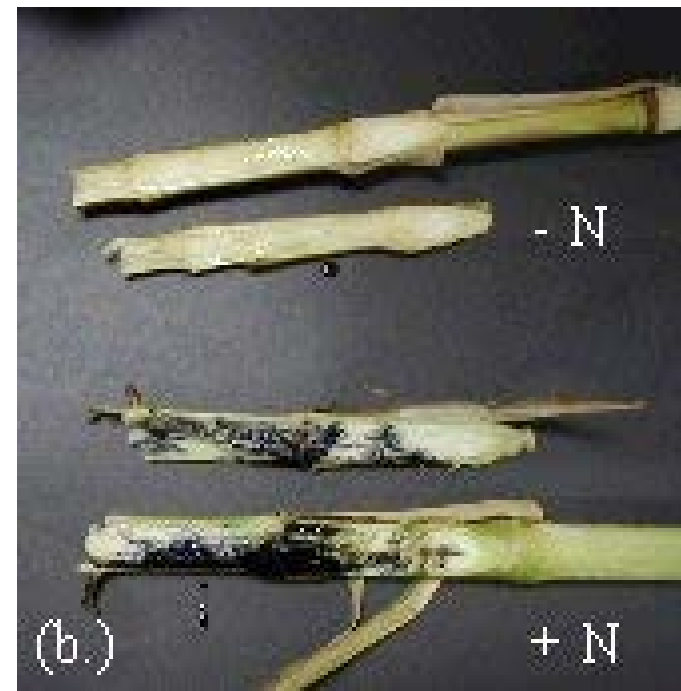


Nitrate Levels

- Can increase with cloudy, overcast days
- Does not dissipate when harvested as hay

Managing Toxicity

- Test plants before grazing or harvesting
 - Diphenylamine spot test – qualitative
 - Quantitative testing



Testing Labs

- Agronomy Dept
- SDK – Hutchinson
- ServiTech – Dodge City, Hastings, Amarillo

Interpretation of Forage Nitrate Test

ppm NO₃ (dry matter basis)

0-3,000

3,000-5,000

5,000-10,000

>10,000

Interpretation

Generally safe for all cattle.

Generally safe for non-pregnant beef cattle. Low risk or reduced breeding performance and early term abortions.

Some risk for all cattle. May cause mid to late term abortions and weak newborn calves. May decrease growth and milk production.

Potentially toxic for all cattle. Can cause abortions, acute toxicity symptoms, and death.

Managing Toxicity

- Test plants before grazing or harvesting
- Don't graze or harvest "hot spots"
- Raise cutter bar when harvesting
- Ensiling will reduce $\text{NO}_3 \approx 20\text{-}50\%$
- Control weedy accumulator species
- Do not turn hungry cattle in on suspect forages
- Cattle can partially adapt over time

Fungal (Myco)toxins



Fungus:

- Aspergillus flavus
- Fusarium graminearum

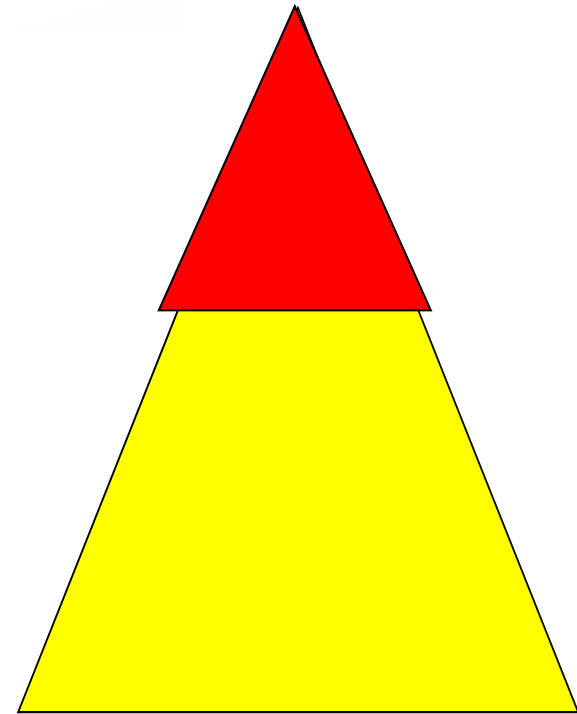
- Fusarium spp.
- Aspergillus & Penicillium spp
- Fusarium verticillioides

Toxin:

- Aflatoxins
- Trichothecenes
 - Vomitoxin (DON)
 - T-2
- Zearalenone
- Ochratoxin
- Fumonisin

Mycotoxins

- Dose-dependent response
 - Death
 - Sudden
 - Gradual onset
 - Organ damage
 - Performance loss
 - Reduced feed intake
 - Performance loss
- Young animals most susceptible



Mycotoxin effects

- Hepatotoxic
- Nephrotoxic
- Impaired protein synthesis
- Carcinogenic
- Embryotoxic
- Impaired immune function
- Pulmonary edema
- Ovarian dysfunction

Aflatoxin

FDA guidelines for acceptable aflatoxin level in corn based on intended use (www.fda.gov).

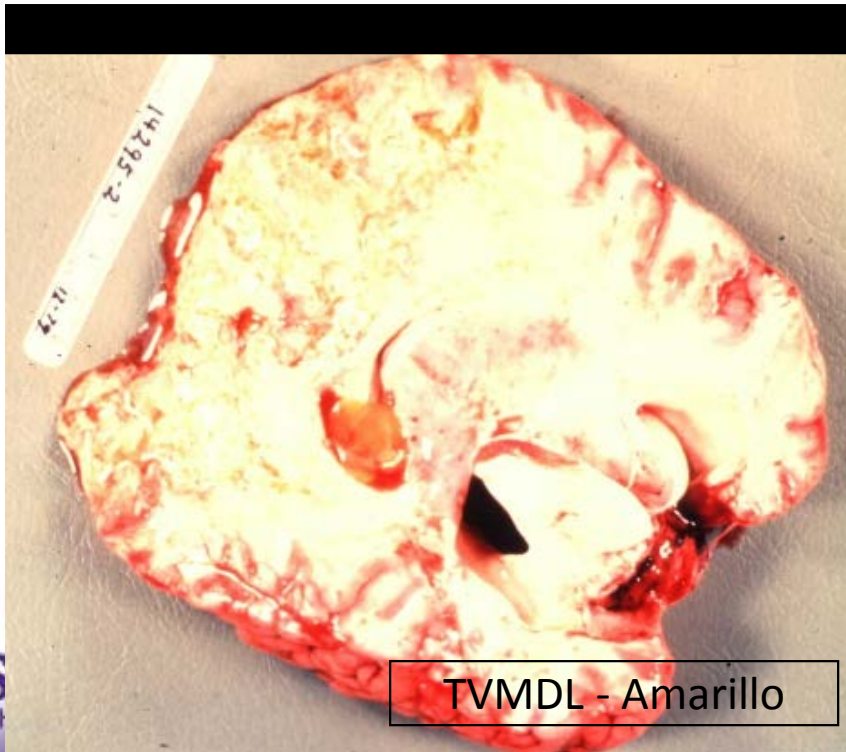
Intended use

Max. legal aflatoxin level

Milk (dairy calf feed)	None detected
Corn of unknown destination	<20 ppb
Corn for young animals	<20 ppb
Corn for dairy cattle	<20 ppb
Corn for breeding beef cattle, swine, and mature poultry	<100 ppb
Corn for finishing swine	<200 ppb
Corn for finishing cattle	<300 ppb

Fumonisin

- Equine Leukoencephalomalacia
- “Moldy corn poisoning”



Toxic Plants

- Lack of available forage will force cattle to eat toxic plants that they would normally ignore.

Drought Effects: Summary

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Questions?

