Mycotoxins....What can we do?
By
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Fast Start Mod #8

What are Mycotoxins?
• They are a defense mechanism produced by molds as a ways of protecting themselves from being consumed by other biological creatures.
• Prevent bugs and rodents from eating the mold that was growing on the grain.

Molds
• Know there are more than 235,000 different types of molds.
• Commonly put into 12 classes
• About 1,900 different molds produce Mycotoxins.
• Most of these are in 3 classes.
• These classes produce 119 known toxins
• We commonly test for 4 or 5 toxins.

3 Common Classes of Molds
• Fusariums
• Penicilliums
• Aspergillus

Fusarium Molds
• Most common mold in grains
• Common Toxins Produced
  • DON (vomitoxin)
  • Zearalenone
  • T-2 Toxin
  • Other toxins
    • Fumonisin B1 & B2
    • Fusaric Acid
    • DAS

Over Generalization
• “Red Molds”
• Starch eaters
• Grow best w/ big temp swings
• Like “drier” feedstuffs
• Grow in “pockets”
DON Corn Silage

Fusarium Toxins
- DON
  - Feed refusal
  - Reduced milk production
  - Unthriftiness
  - Immunosuppression
  - Diarrhea
  - Repo problems (poor heats)

Fusarium Toxins
- Zearalenone – The Repo Toxin
  - Infertility
  - Prolonged heats (Crazy Heats)
  - Off heat cycles
  - Pregnant Cows showing heat
  - Lower conception rates
  - Prolapses
  - Abortions
  - Feed take, milk production, diarrhea

Fusarium Toxin
- T-2 Toxin
  - Feed refusal
  - Coughing
  - Higher SCC
  - Bloody manure (dark color)
  - Diarrhea
  - Rough coats

Penicillium Molds
- “Blue Molds”
- Starch eaters (found in grain)
- Like “wet feeds”
- Common Toxin
  - Ochratoxin
  - Other toxins
    - Secalonic acid, Patulin, PR toxin, Roquefortin

Feed it?
Penicillium Toxin
- Ochratoxin
  - High SCC
  - Poor Milk Production
  - Fatty Livers in Fresh cows
  - Poor urine output
  - Slow growth in calves
  - Thin cows
  - Low BF%

Aspergillus Molds
- “Grey Molds” – mix blue/green (glow)
- Like it “Hot”
- Like high humidity
- “Drought Molds”
- Soil-borne spores
- Grain, forage, (Cottonseed)
- Toxins – Aflatoxin & Gliotoxin

Aspergillus Mold

Aspergillus Toxins
- Aflatoxins (B1, B2, G1, G2, B2A, Ga)
  - Liver damage (ketosis in fresh cows)
  - High SCC
  - Bleeding (slow clotting)
  - Poor digestion => weight loss (poor repo)
  - Poor BF% (higher DA%)
  - Passes to milk (FDA test)

Aspergillus Toxin
- Gliotoxin
  - Bloody diarrhea
  - Hemorrhagic Bowel Syndrome (HBS)

Corn Silage Test

<table>
<thead>
<tr>
<th>Toxin</th>
<th>Result</th>
<th>Tested Level</th>
<th>Method</th>
<th>Detection Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aflatoxin B1</td>
<td>NEG/POS</td>
<td>TLC/FLC</td>
<td>5 ppb</td>
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<tr>
<td>Aflatoxin B2</td>
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<tr>
<td>Aflatoxin G2</td>
<td>NEG/POS</td>
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<tr>
<td>Aflatoxin B2A</td>
<td>NEG/POS</td>
<td>TLC/FLC</td>
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<tr>
<td>Deoxynivalenol</td>
<td>NEG/POS</td>
<td>TLC</td>
<td>0.1 ppm</td>
<td></td>
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<tr>
<td>DON</td>
<td>3.1 ppm</td>
<td>TLC</td>
<td>0.1 ppm</td>
<td></td>
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<tr>
<td>15 Acetyl-DON</td>
<td>0.5 ppm</td>
<td>TLC</td>
<td>0.1 ppm</td>
<td></td>
</tr>
<tr>
<td>3 Acetyl-DON</td>
<td>0.5 ppm</td>
<td>TLC</td>
<td>0.1 ppm</td>
<td></td>
</tr>
<tr>
<td>T-2 Toxin</td>
<td>0.5 ppm</td>
<td>TLC</td>
<td>0.1 ppm</td>
<td></td>
</tr>
</tbody>
</table>

These results are intended for animal health diagnostic purposes only.
Samples in 2007

- DON - 18/21 samples
- T-2 – 1/14 samples
- Zearalenone - 0/14 samples
- Ochratoxin - not tested
- Aflatoxin – 0/14
- Gliotoxin – 1/2 (suspected)

Samples in 2012

- DON - 08/28 samples
- T-2 – 0/12 samples
- Zearalenone - 2/12 samples
- Ochratoxin - 0/6 samples
- Aflatoxin – 6/56 samples
- Gliotoxin – 1/2 (suspected)

Why some years?

- Molds need moisture, warm temperatures, neutral pH, oxygen, and a food source to grow.
- Very warm, very wet fall
- Drought damage
- Insect damage
- Bird damage
- Corn on Corn plantings (no-till)

Must Remember

- Mold grow in the fields (produces toxins)
- Mold stops growing when
  - Runs out of oxygen
  - pH makes a change
  - Moisture is too high/low
  - Too hot/too cold
- Mold in the field = Mold in the silo
- Mold stops growing, toxins are still there.

Stop Mold Growth in Feedstuffs

- Take away the food source
- Take away the oxygen
- Change the pH (faster better)
- Take away the moisture
- Make it too cold

Keeping Molds Out

- Minimize stress on plants
- Pick insect resistant plants
- Timely harvest
- Fast ensiling
- Add an acid/bugs that produce acid
- Leaky silos (Blue Tubes/Bags/Bunkers)
- Poor face management
I think I got a problem, now what?

- Do you Really have a problem?
- DON
- Feed refusal
- Reduced milk production
- Unthriftiness
- Immunosuppression
- Diarrhea
- Repo problems (poor heats)

I think I got them, now what

- Do you REALLY have a problem?
- Dilution is the Solution!
  - Get the TMR below 0.5 PPM (20 PPB Afl)

Can’t Dilute (Inventory)

- Can we remove?
- Can we swap feeds?
- Ration changes
  - Increase immune response (Se, Zn, A, E)
  - Increase rumen function (higher fiber)
  - Add a toxin binder (FDA claims)

Toxin Binders

- Four types
  - Clay Products
    - Bentonite, Feedbond, Geobond
  - Aluminosilicates
    - Nutrisound
  - Yeast Products
    - MTB 100, Ominigen AF
  - Combinations
    - Mycodoc

In Vitro Mycotoxin Binding Studies

<table>
<thead>
<tr>
<th>Mycotoxin</th>
<th>T-Bind</th>
<th>Mycotex Product</th>
<th>UltraSorb</th>
<th>Test product Test period 1</th>
<th>Test period 2</th>
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<td>45</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Fumonisin</td>
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<td>Not tested</td>
<td>Not tested</td>
<td>Not tested</td>
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<tr>
<td>Ochratoxin</td>
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<td>63</td>
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<td>80</td>
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<td>Vomitoxin</td>
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<td>80</td>
<td>98</td>
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<tr>
<td>Zearalenone</td>
<td>30</td>
<td>63</td>
<td>81</td>
<td>80</td>
<td>98</td>
</tr>
</tbody>
</table>

Economics of Testing

- Testing for 4 (or 5) major toxins
  - $85/test
  - 10 days for results
  - Snapshot of that day at that bunk spot.
  - "How much toxin binder can I feed for $65?"
  - 3 or 4 days for results.
  - Feed 2 weeks and see what happens.
Questions?

- Thanks