Crop Quality and Grain Storage Management: 3 Years of New Experience

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OUTLINE

• Crop quality – learning from history
  – 2009 Corn Issues
  – 2010 Weather and Quality
  – 2011 Weather and Quality

• Basic inventory management practice

• Future issues – what is coming?
Wet Corn!
Hail damage, Sac County, 8-09-2009

Photos courtesy: Mark Licht, ISU Extension
Ear rot assessments – percent severity; rot present

Cladosporium

Gibberella

Fusarium

Penecillium

Trichoderma

Fusarium
Corn, NE Iowa, January 2010
# Ear Rot Summary

<table>
<thead>
<tr>
<th>Total Damage</th>
<th>Mean ear rot severity (%)</th>
<th>Ear rots present</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hail damage samples</strong> <em>(N=56)</em></td>
<td>11.8 <em>(0 – 53.4)</em></td>
<td>Fusarium* Gibberella* Cladosporium, Penicillium</td>
</tr>
<tr>
<td><strong>Background samples</strong> <em>(N=27)</em></td>
<td>3.3 <em>(0 – 16.4)</em></td>
<td>Cladosporium* Fusarium, Gibberella</td>
</tr>
<tr>
<td><strong>Standing corn samples</strong> *(N=72) <em>(No increased toxin)</em></td>
<td>24.0 <em>(0.2 - 83.8)</em></td>
<td>Cladosporium* Fusarium, Gibberella</td>
</tr>
</tbody>
</table>

* Predominant ear rot present

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*Iowa State University*

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### Storage time cut in half if TW < 52 lb/bu

<table>
<thead>
<tr>
<th>Corn temperature °F</th>
<th>Corn, soybeans moisture content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13%, 11%</td>
</tr>
<tr>
<td>40</td>
<td>150</td>
</tr>
<tr>
<td>50</td>
<td>84</td>
</tr>
<tr>
<td>60</td>
<td>47</td>
</tr>
<tr>
<td>70</td>
<td>26</td>
</tr>
<tr>
<td>80</td>
<td>15</td>
</tr>
</tbody>
</table>

*Based on 0.5% maximum dry matter loss—calculated on the basis of USDA research at Iowa State University. Corresponds to one grade number loss; 2-3% pts in damaged seeds. Soybeans approximated at 2% lower moisture than corn.
2010 – warm and wet

Total Precipitation: Percent of Mean
June 8, 2010 to September 5, 2010

Iowa State Climate Office
Des Moines, Iowa

Iowa Environmental Mesonet
Map Generated 06 Sep 2010 7:01 AM

[Base 50° C]
Blue-eye; Penicillium or A. Glaucus
No Dry Air in July and August 2010!
Any time you have EMC balanced with 65% RH, Blue Eye is possible
Flooded Corn, August 2010
In September and October, 2010 we had **extremely dry air**.
2011 Quality

• Heat unit accumulation +/- to normal
• Hot July = Early maturity, pollination. Record heat!
• Dry August – reduced fill but cool nights were a buffer.
• Corn:
  Lower kernel weight; fewer kernels.
  Average+ TW except wilted, hail, frost, stalk rot
  Moisture – mid to low teens; wetter east
  Protein – highly variable; higher in dry areas

• Soybeans:
  Mixed bag – small seeds but lots of them.
  A few Green beans North, SW but dried fast.
  Low protein and low oil – very unusual
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/
Inbound Grading

Moisture
- 0.1% Moisture = 1-3 cents/bu
- +/- 0.3% vs GIPSA
- More than just once a year
- Calibration update

Test Weight
- +/- 0.5 lb/bu vs GIPSA
- 1 lb/bu = 1.5% inventory error
- Cup? Training or worse than meter!

By 8/1/2012?
Recalibrate small meters, yield monitors

Accuracy of GAC2500 Moisture Meter, 2010 corn

\[ y = 0.9498x + 0.8096 \]

- \( R^2 = 0.9953 \)
- \( n = 200 \)
- \( sd = 0.34 \)

Oven Moisture (%)

Meter Moisture (%)

Recalibrate small meters, yield monitors

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Storage Management

Choose which grain for less flexible storage.

– Clean

– Uniform moisture; means has been aerated

– Higher test weight; as possible (56+ for corn)

– From one crop year

– No history of problems; under your control for as long as possible.

– Sort on Test Weight.

– Remove the center core.
Shrink – Handling and Storage

• Lost kernels, dust, mold, increased FM
• Some Estimates:
  – 0.5% (0.005) weight loss per in and out. Out to Pile counts double. More if multiple turns.
  – 0.2% FM Increase per rotation (15% corn); 0.4% if 13%, etc. More with dryer stress cracks or low TW (2x)
  – 0.5% weight loss per 3% pt damage increase.

  • Example: 3% to 12% is 9% pts = 1.5% shrink
Aeration Phases

• Phase 1: Fall Cool Down
  • Lower grain temperatures stepwise
    • September 50-55 F!!!
    • October 40-45 F
    • November 35-40 F
    • December 28-35 F

• Phase 2: Winter Maintenance
  • Maintain temperatures with intermittent aeration
    • January, February 28-35 F

• Phase 3: Spring Holding
  – Keep cold grain cold
    • Seal fans
    • Ventilate headspace intermittently
    • Extra aeration is energy cost and shrink.

Source: Purdue Univ.
New Corn Storage as "105s"

"105" = 650,000 bu; 4 bu/acre/yr increase
FDA - Food Safety Modernization Act

- Update registration every two years
- A written food safety plan is required
- Carrier certification and examination (BSE)
- Surveillance inspection every 5-7 years

- Accuracy guidelines for enhanced traceability
- FDA now can force a recall
- Self reporting website apply to mycotoxins???
- Inspect records and audit without prior cause
First Actions

• **Train new inspectors**, visit facilities
• Emphasis on food safety plans – FEED!
• Specific audits and checks in familiar areas; eg sanitation, BSE/meat products
• Traceability/recall – ask state of the art
• Wild card: Moldy grain and mycotoxins
• Third party audits – fading reputation

• **Question:** Is grain a high risk item?

PREVENTION!
Coal

Asbestos

Glass

Dead vermin
Grain Farms and FSMA

- Farms are exempt but....

- Grain handling, storage, drying is considered part of the supply chain, not the farm.
- RMA, insurance carriers studying toxin rules.
- Traceability info may push back to the farm.
- FDA inspect grain farms? Probably not.
- Animals, animal products? Probably so.
- Progressively less tolerance for moldy grain.
Summary

• Variable weather outlook will increase grain management problems.
• Probably new issues never seen before.
• Challenges of volume despite known science.
• Higher value rewards precise management.
• Food safety regulations will apply.
• Some longtime practices may change.
Where To Find Us...

Iowa Grain Quality Initiative

Grain Quality Laboratory

www.iowagrain.org

www.grainlab.org

Analytical Programs
Quality Management Systems

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