

Crop Quality 2009 and 2010 and Grain Storage Management

The Extension Grain Management Team

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Agricultural Engineering

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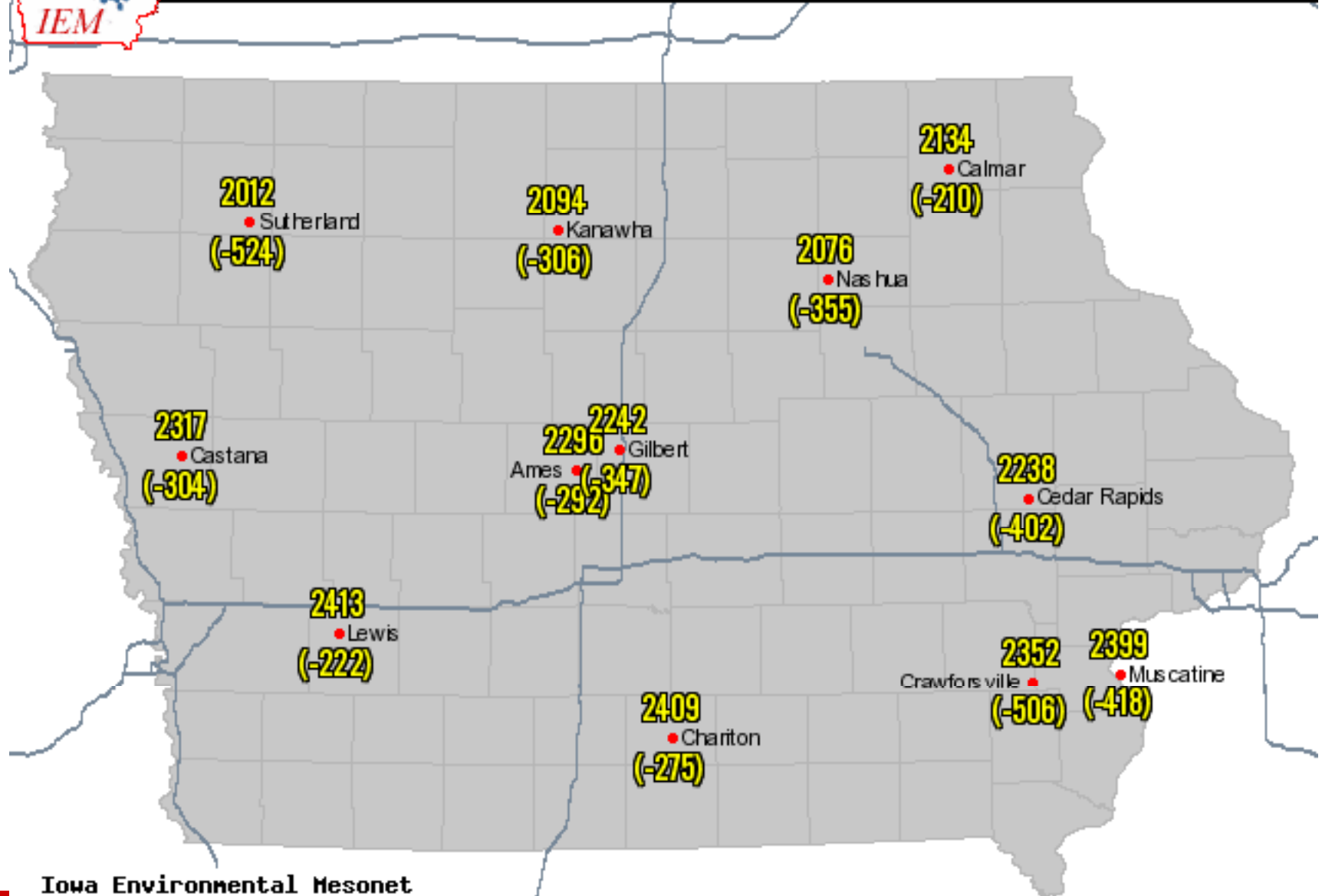
Alison Robertson: Plant Pathology

OUTLINE

- Crop quality
 - 2009 Corn Issues
 - Blending and Carryover
 - 2010 Weather and Quality
- Basic storage practice
- Future needs for grain storage



2009 Growing Degree Days (base=50) (Mar 01 - Sep 01)



Iowa Environmental Mesonet
Iowa State Ag Climate Network

IOWA STATE UNIVERSITY
University Extension

Wet Corn!

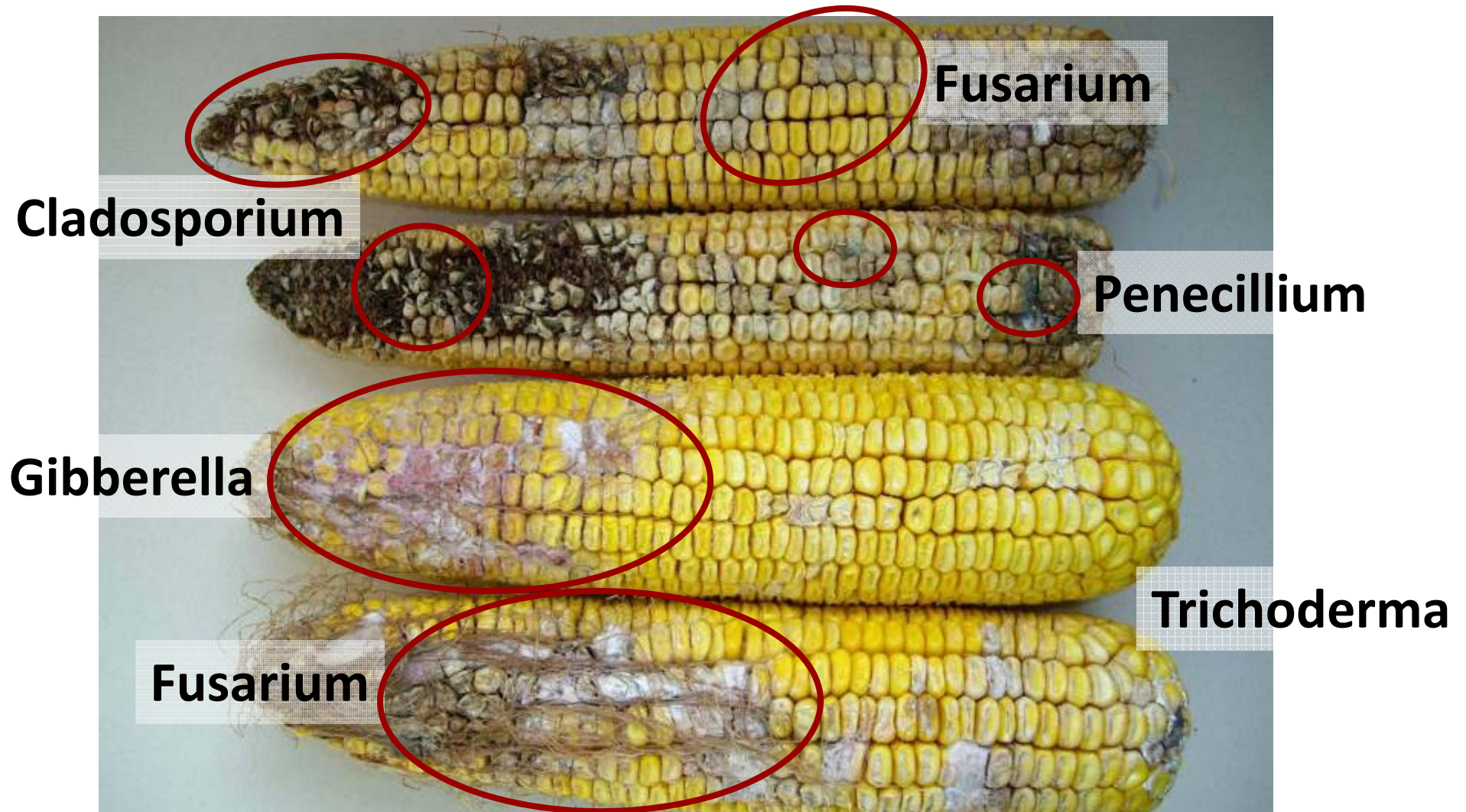


Hail damage, Sac County, 8-09-2009



Photos courtesy: Mark Licht, ISU Extension

Ear rot assessments – percent severity; rot present



Corn, NE Iowa, January 2010

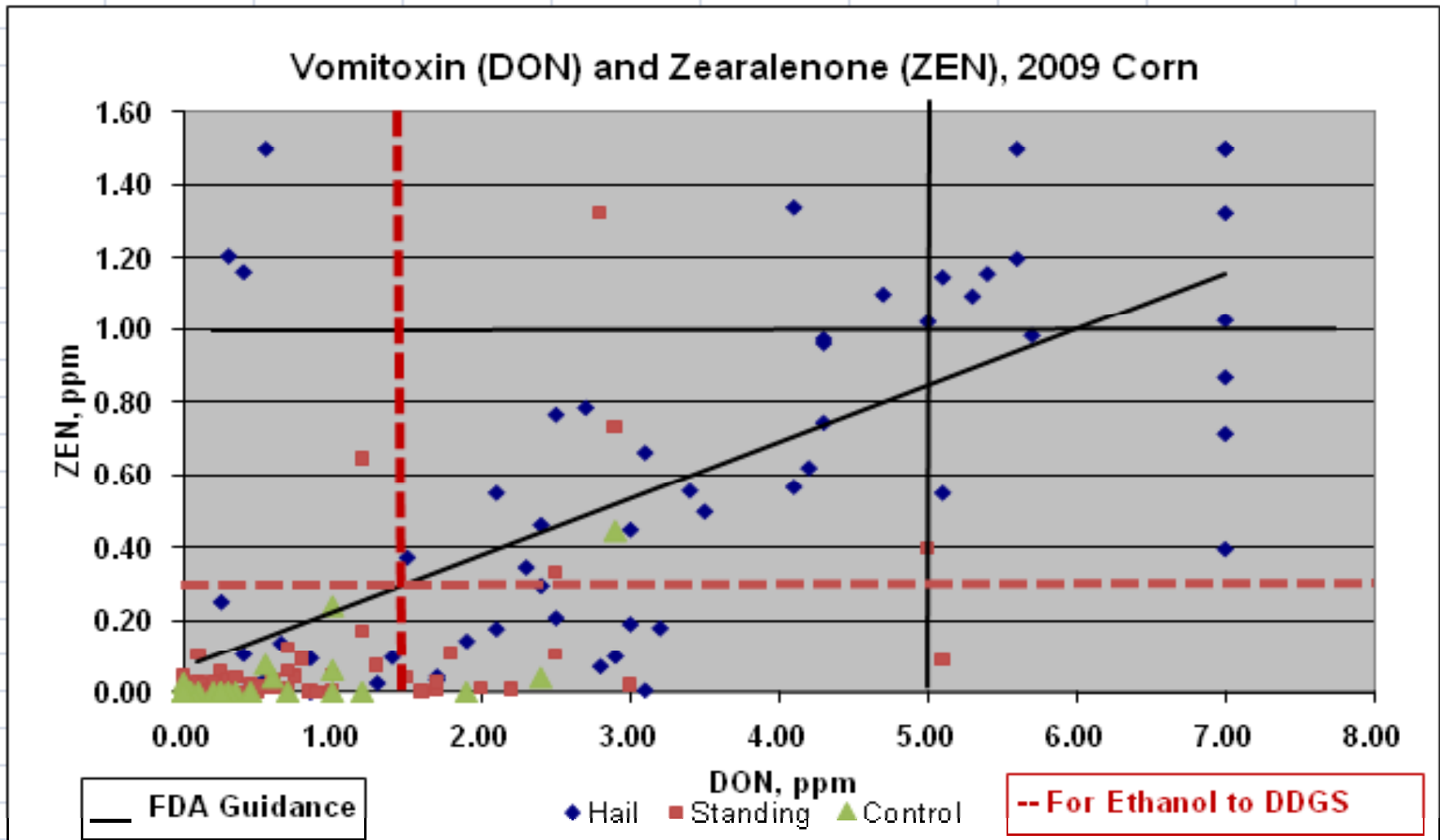


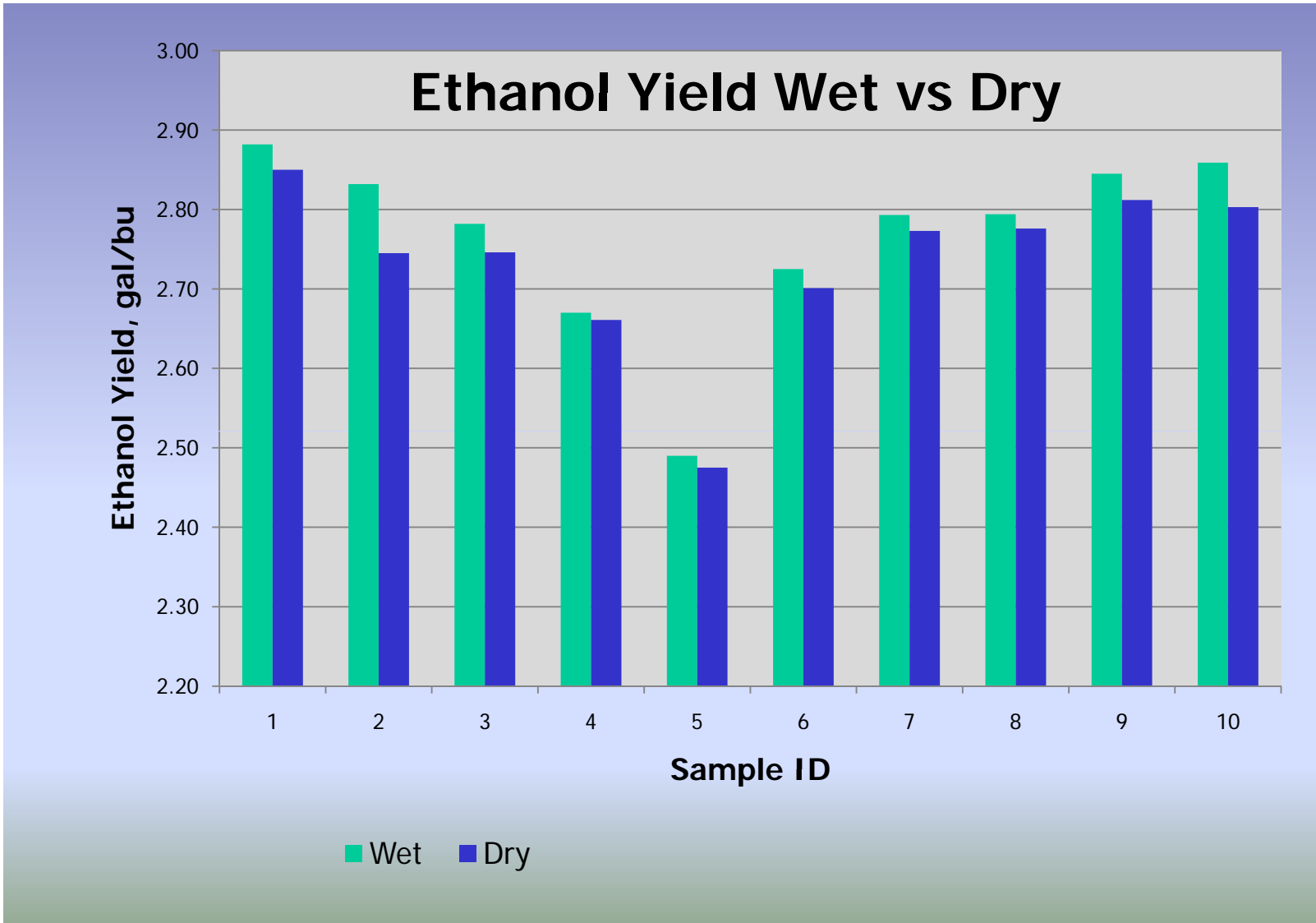
Ear Rot Summary

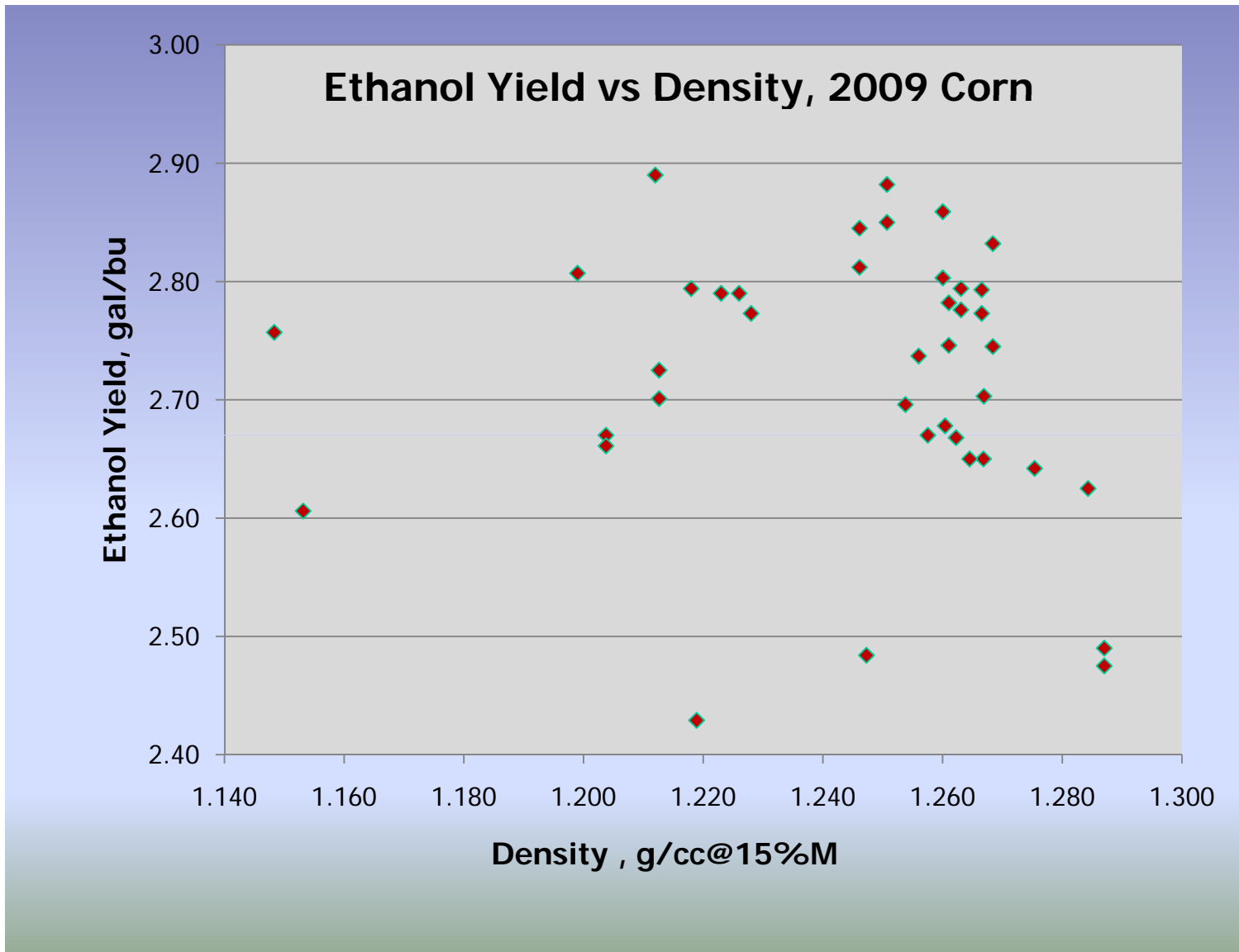
Total Damage →	Mean ear rot severity (%) (Range)	Ear rots present
Hail damage samples (N=56)	11.8 ↑ (0 – 53.4)	Fusarium* Gibberella* Cladosporium, Penecillium
Background samples (N=27)	3.3 (0 – 16.4)	Cladosporium* Fusarium, Gibberella
Standing corn samples (N=72) (No increased toxin)	24.0 ↑↑ (0.2 - 83.8)	Cladosporium* Fusarium, Gibberella

* Predominant ear rot present

DON and ZEN in 2009 Corn from Iowa







Reduce to half for 2009 crop

Maximum storage time (months) for corn and soybeans*							
Corn temperature ° F	Corn, soybeans moisture content						
	13%, 11%	14%, 12%	15%, 13%	16%, 14%	17%, 15%	18%, 16%	24% N/A
40	150	61	29.0	15.0	9.4	6.1	1.3
50	84	34	16.0	8.9	5.3	3.4	0.5
60	47	19	9.2	5.0	3.0	1.9	0.3
70	26	11	5.2	2.8	1.7	1.1	0.2
80	15	6	2.9	1.6	0.9	0.9	0.06
*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.							

Blue-eye; Penicillium or A. Glaucus No Dry Air in July and August!



EQUILIBRIUM MOISTURE CONTENT

Corn, yellow dent (Wet Basis)

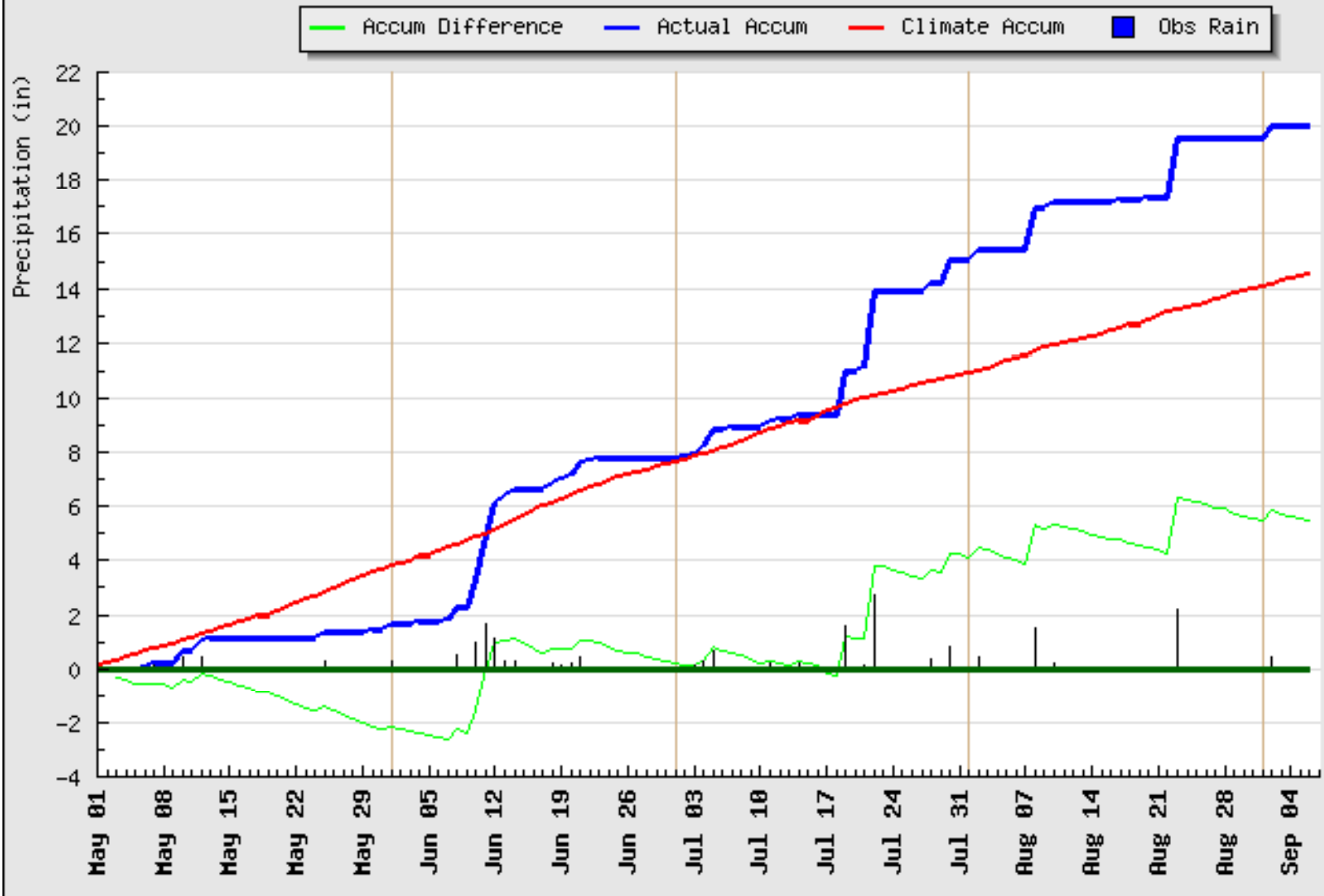
RELATIVE HUMIDITY

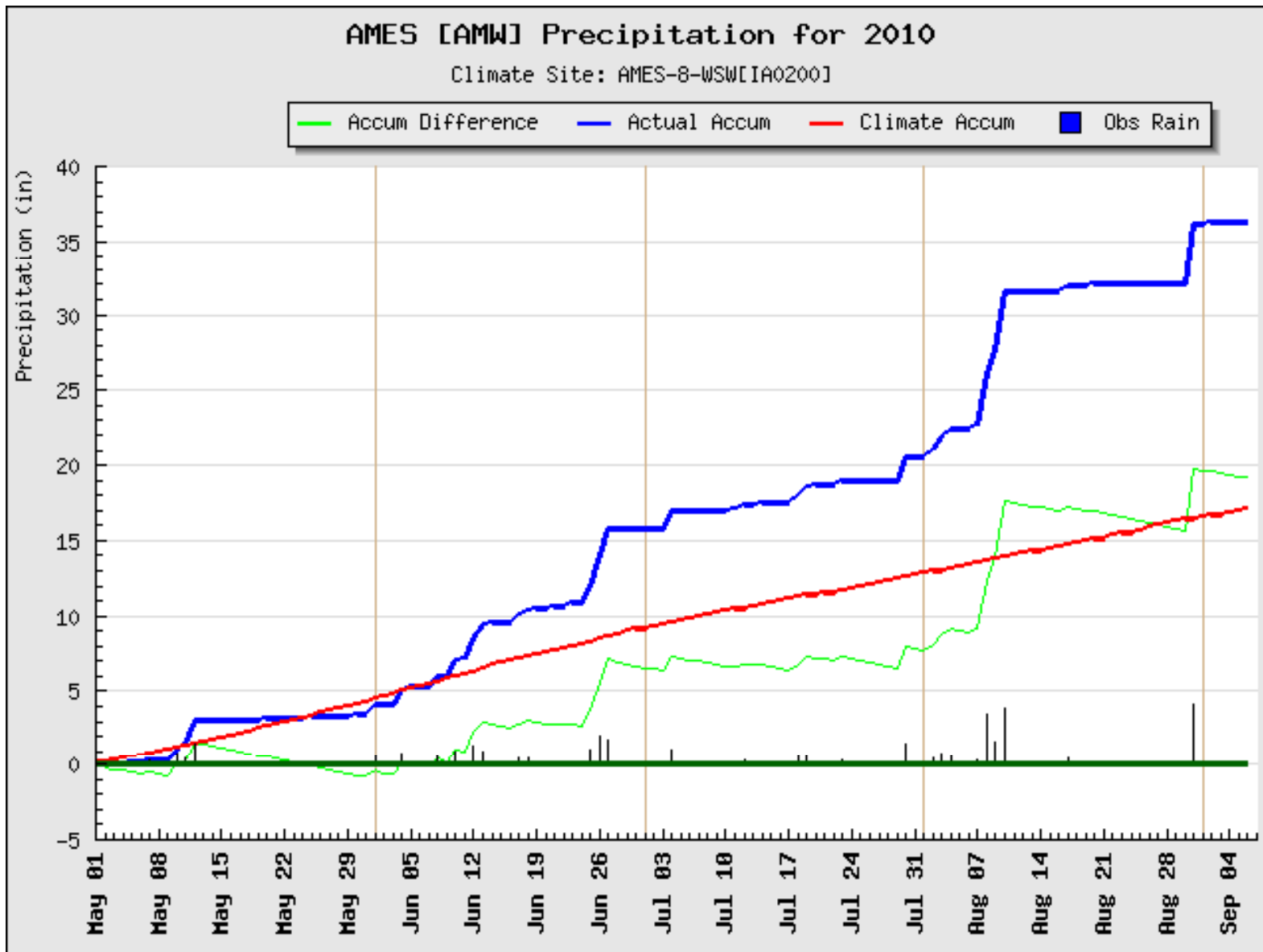
	<u>30%</u>	<u>35%</u>	<u>40%</u>	<u>45%</u>	<u>50%</u>	<u>55%</u>	<u>60%</u>	<u>65%</u>	<u>70%</u>	<u>75%</u>	<u>80%</u>	<u>85%</u>	<u>90%</u>
35°	11.0	11.6	12.3	12.9	13.5	14.2	14.8	15.6	16.3	17.2	18.2	19.5	21.1
40°	10.6	11.3	11.9	12.5	13.1	13.8	14.5	15.2	16.0	16.9	17.9	19.1	20.8
45°	10.2	10.9	11.5	12.2	12.8	13.5	14.1	14.9	15.7	16.6	17.6	18.8	20.5
50°	9.9	10.6	11.2	11.8	12.5	13.1	3.8	14.6	15.4	16.3	17.3	18.6	20.2
55°	9.6	10.2	10.9	11.5	12.2	12.8	13.5	14.3	15.1	16.0	17.0	18.3	20.0
60°	9.3	9.9	10.6	11.2	11.9	12.6	13.3	14.0	14.8	15.7	16.8	18.1	19.7
65°	9.0	9.7	10.3	11.0	11.6	12.3	13.0	13.8	14.6	15.5	16.5	17.8	19.5
70°	8.7	9.4	10.0	10.7	11.4	12.0	12.7	13.5	14.3	15.3	16.3	17.6	19.3
75°	8.5	9.1	9.8	10.4	11.1	11.8	12.5	13.3	14.1	15.0	16.1	17.4	19.1
80°	8.2	8.9	9.6	10.2	10.9	11.6	12.3	13.1	13.9	14.8	15.9	17.2	18.9

Any time you have EMC balanced with 65% RH, Blue Eye is possible

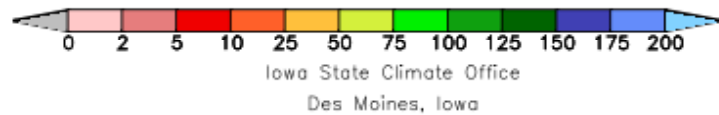
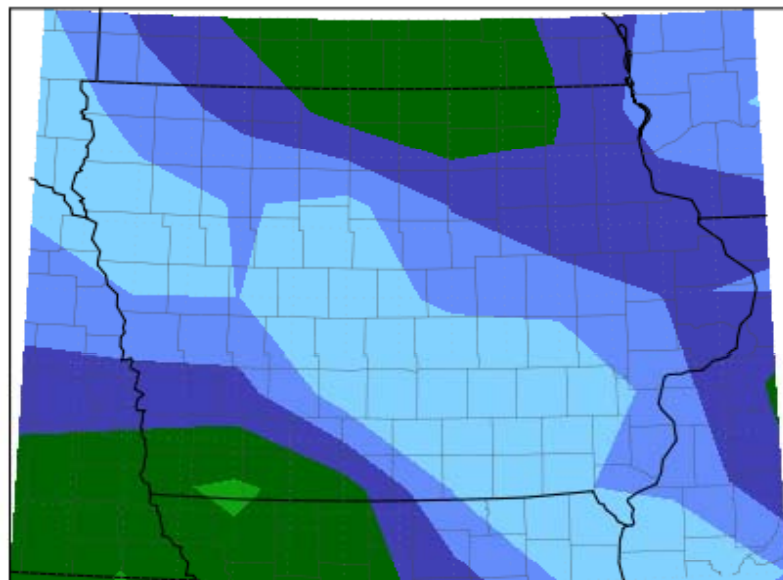
SIoux CITY [SUX] Precipitation for 2010

Climate Site: SIOUX-CITY-WS0-API[IA7708]

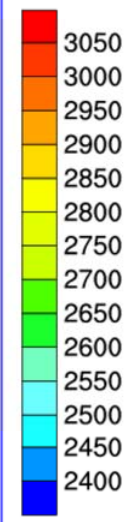
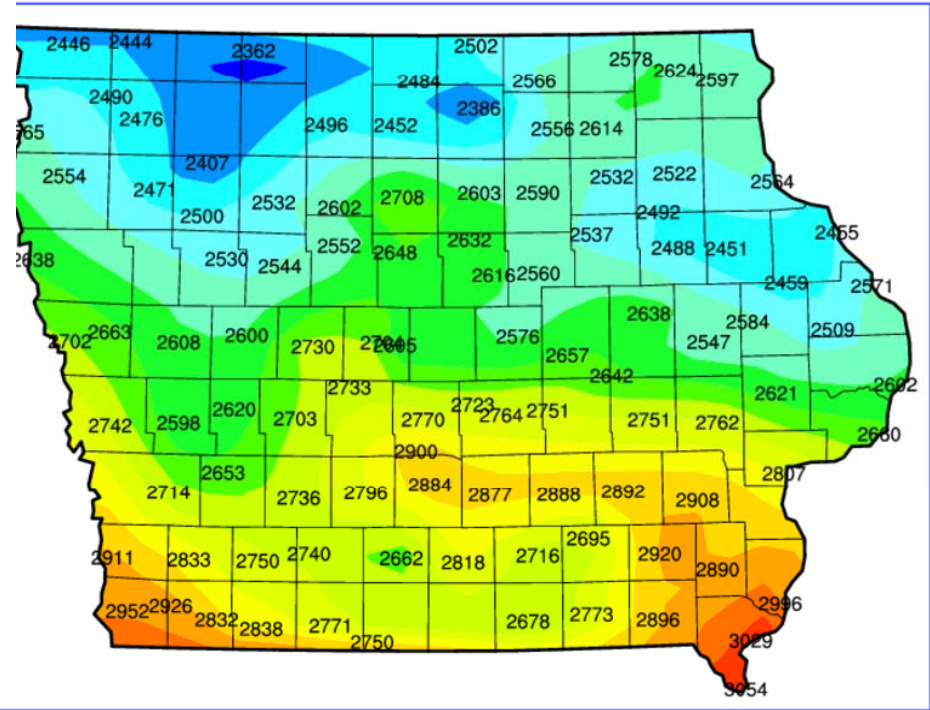




Total Precipitation: Percent of Mean
June 8, 2010 to September 5, 2010



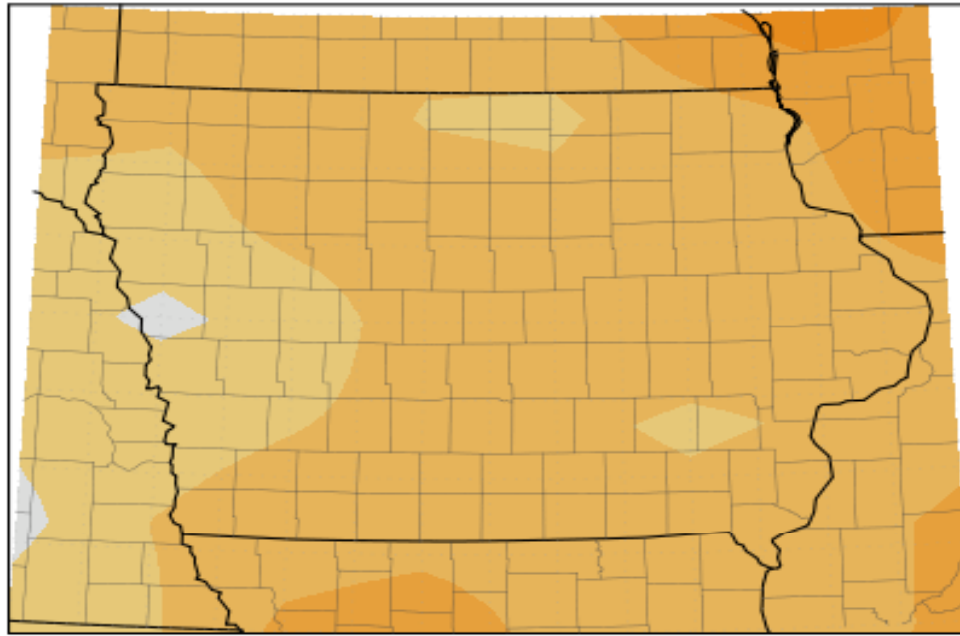
May 1 May - 06 September 2010 GDD Accumulation



[base 50]

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

Average Min Temperature (°F): Departure from Mean
June 8, 2010 to September 5, 2010



Iowa State Climate Office
Des Moines, Iowa

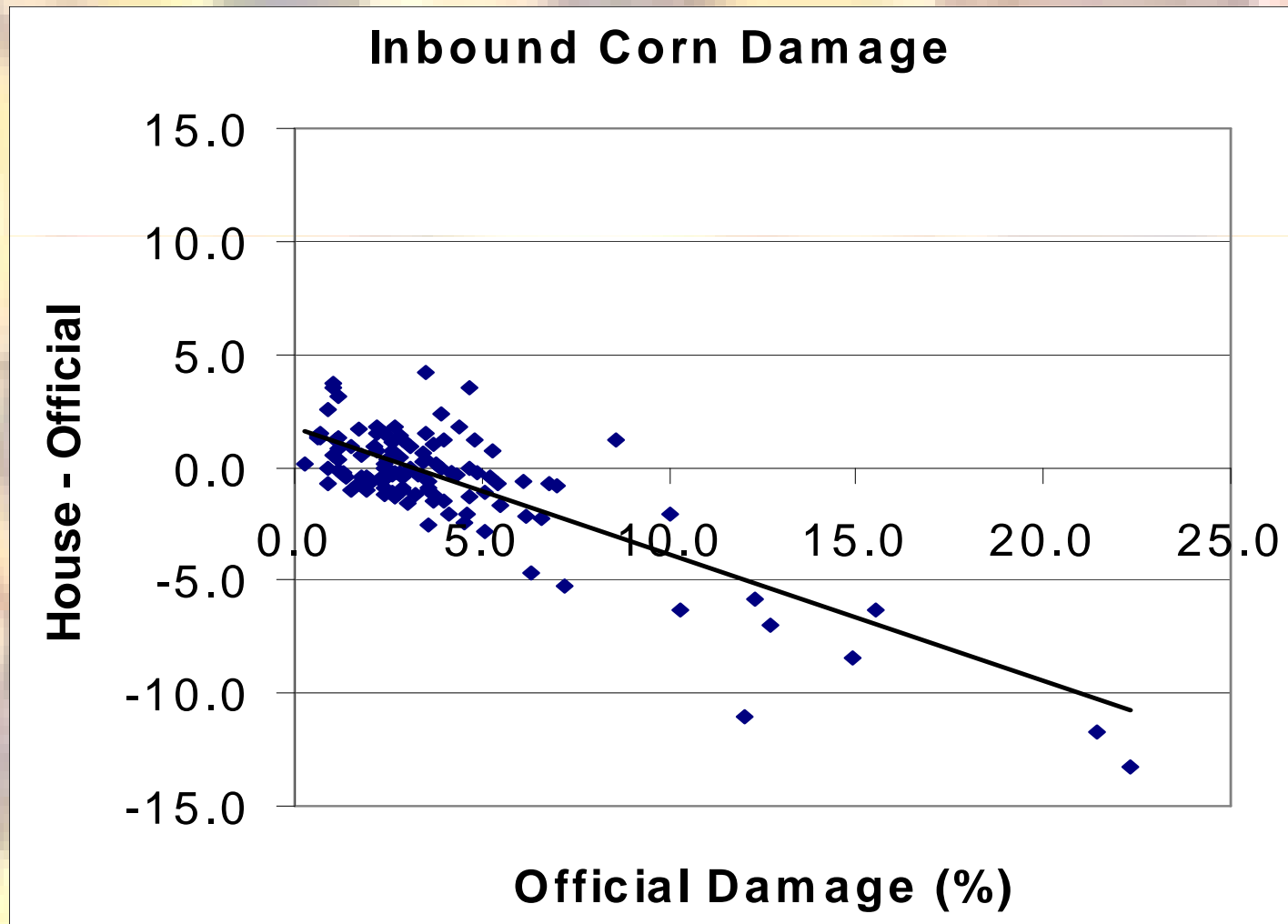
Flooded Corn

- A health hazard –flood waters not clean.
- Cob soaks up; gets moldy and soft.
- Spreads mold to ear; likely A. Flavus.
- Threat of toxins; a mess after shelling
- Destroy (FDA, IDALS October 1, 2010).
- Not in elevators or handling systems!

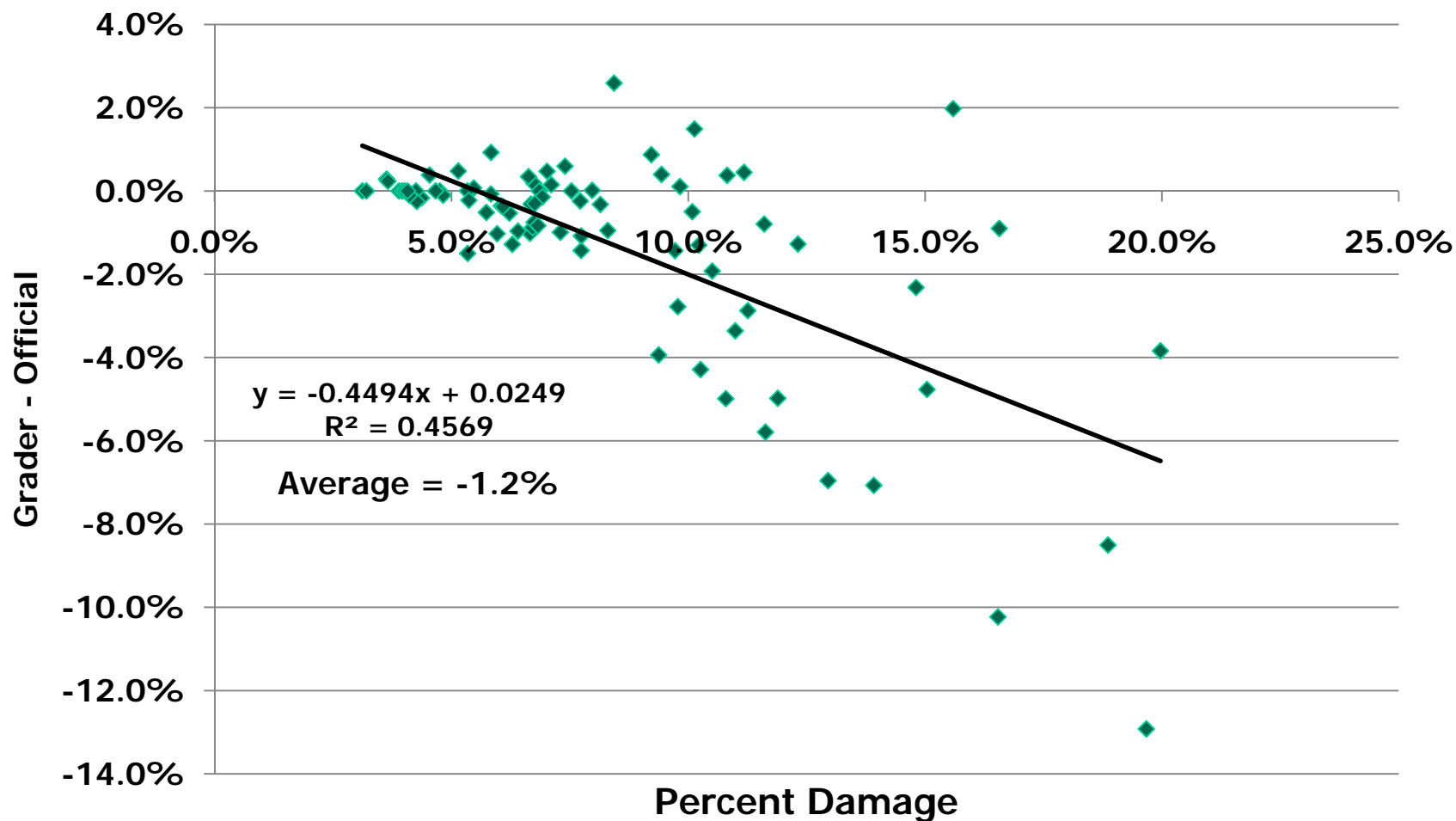
Flooded Corn



Inbound Grading- Corn Damage

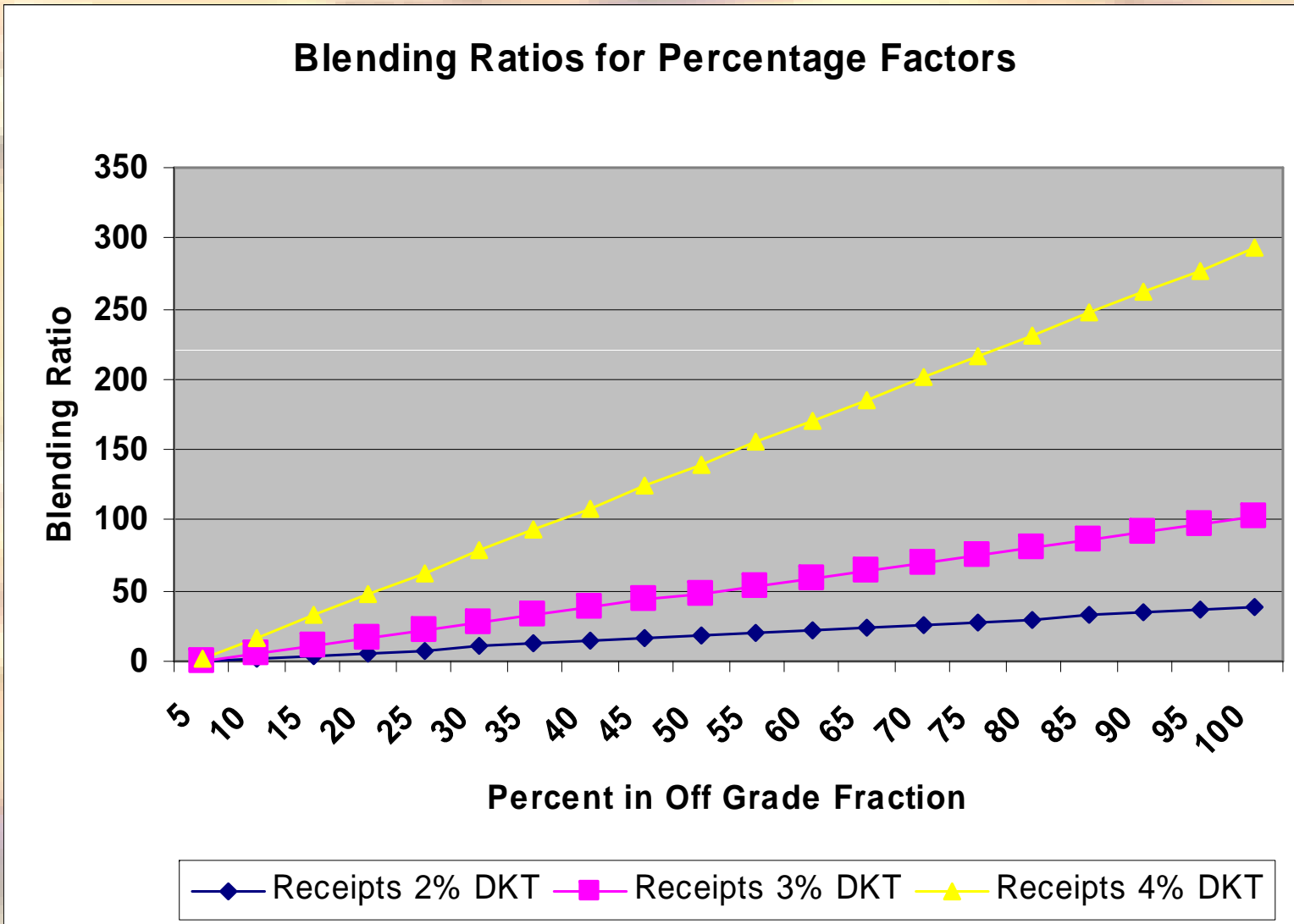


Net Error of Corn Damage Grading



Generally graders underpicked more as damage increased

Blending Ratios for Percentage Factors



Target = 4.5% Damage

EQUILIBRIUM MOISTURE CONTENT

Corn, yellow dent (Wet Basis)

RELATIVE HUMIDITY

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55°	9.6	10.2	10.9	11.5	12.2	12.8	13.5	14.3	15.1	16.0	17.0	18.3	20.0
60°	9.3	9.9	10.6	11.2	11.9	12.6	13.3	14.0	14.8	15.7	16.8	18.1	19.7
65°	9.0	9.7	10.3	11.0	11.6	12.3	13.0	13.8	14.6	15.5	16.5	17.8	19.5
70°	8.7	9.4	10.0	10.7	11.4	12.0	12.7	13.5	14.3	15.3	16.3	17.6	19.3
75°	8.5	9.1	9.8	10.4	11.1	11.8	12.5	13.3	14.1	15.0	16.1	17.4	19.1
80°	8.2	8.9	9.6	10.2	10.9	11.6	12.3	13.1	13.9	14.8	15.9	17.2	18.9

In September and October, 2010 we had extremely dry air.

Summary – Crop Quality

- 2009 crop continued to deteriorate.
- It will take a long time to clear out all the off grade inventories.

GRADE YOUR CORN!

Toxins don't go away!

Mixed feed will be an issue!

- 2010 corn crop quality is better, but not great. 54-56 lb/bu; dry but small kernels.

Allowable Storage Time

Maximum storage time (months) for corn and soybeans*

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*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.

Storage Choices

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

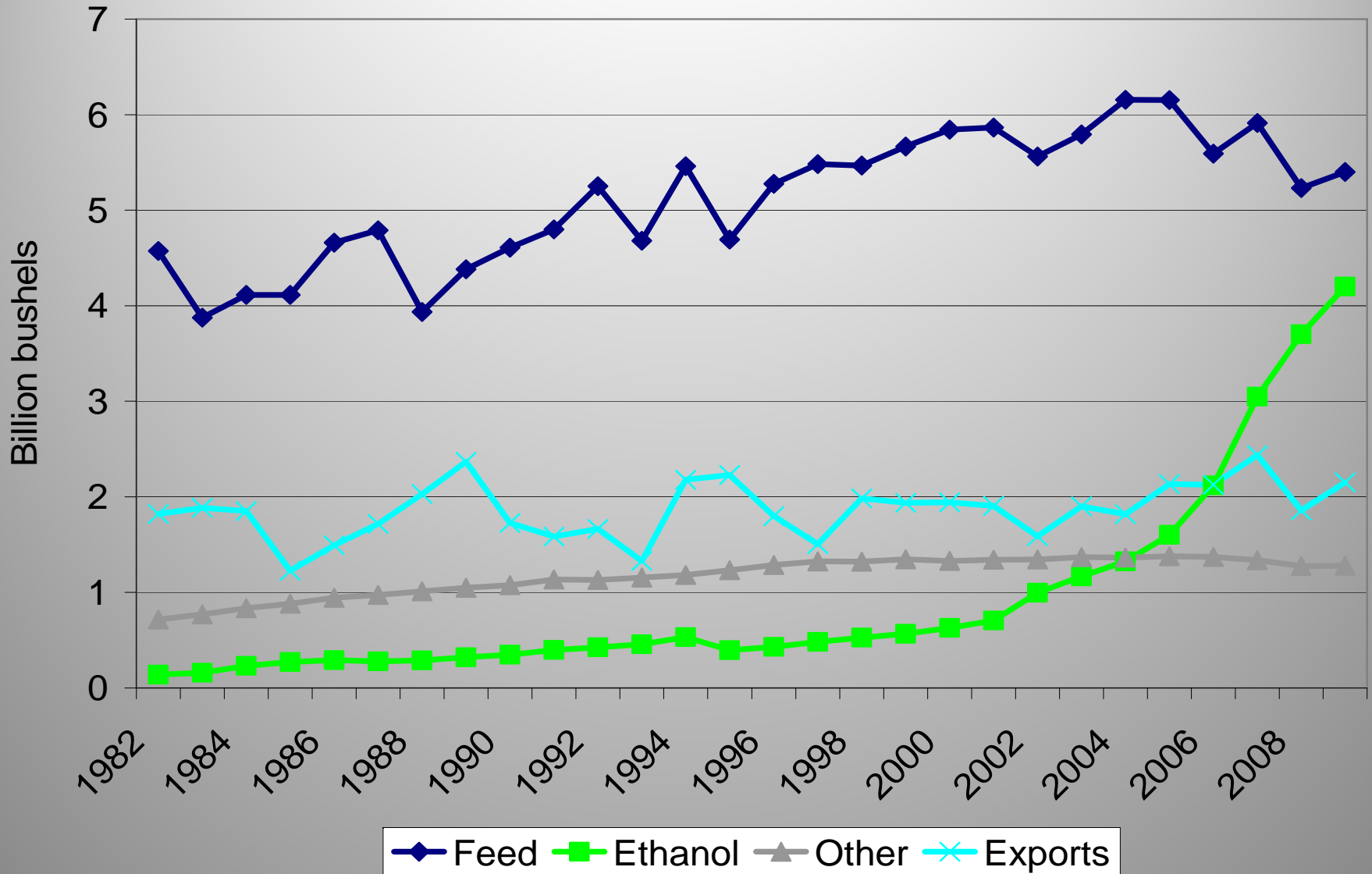
- Lost kernels, dust, mold, increased FM
- Some Estimates:
 - 0.5% (0.005) weight loss per in and out. Out to Pile counts double. More if multiple turns.
 - 0.2% FM Increase per rotation (15% corn); 0.4% if 13%, etc. More with dryer stress cracks or low TW (2x)
 - 0.5% weight loss per 3% pt damage increase.
 - Example: 3% to 12% is 9% pts = 1.5% shrink

Aeration Phases

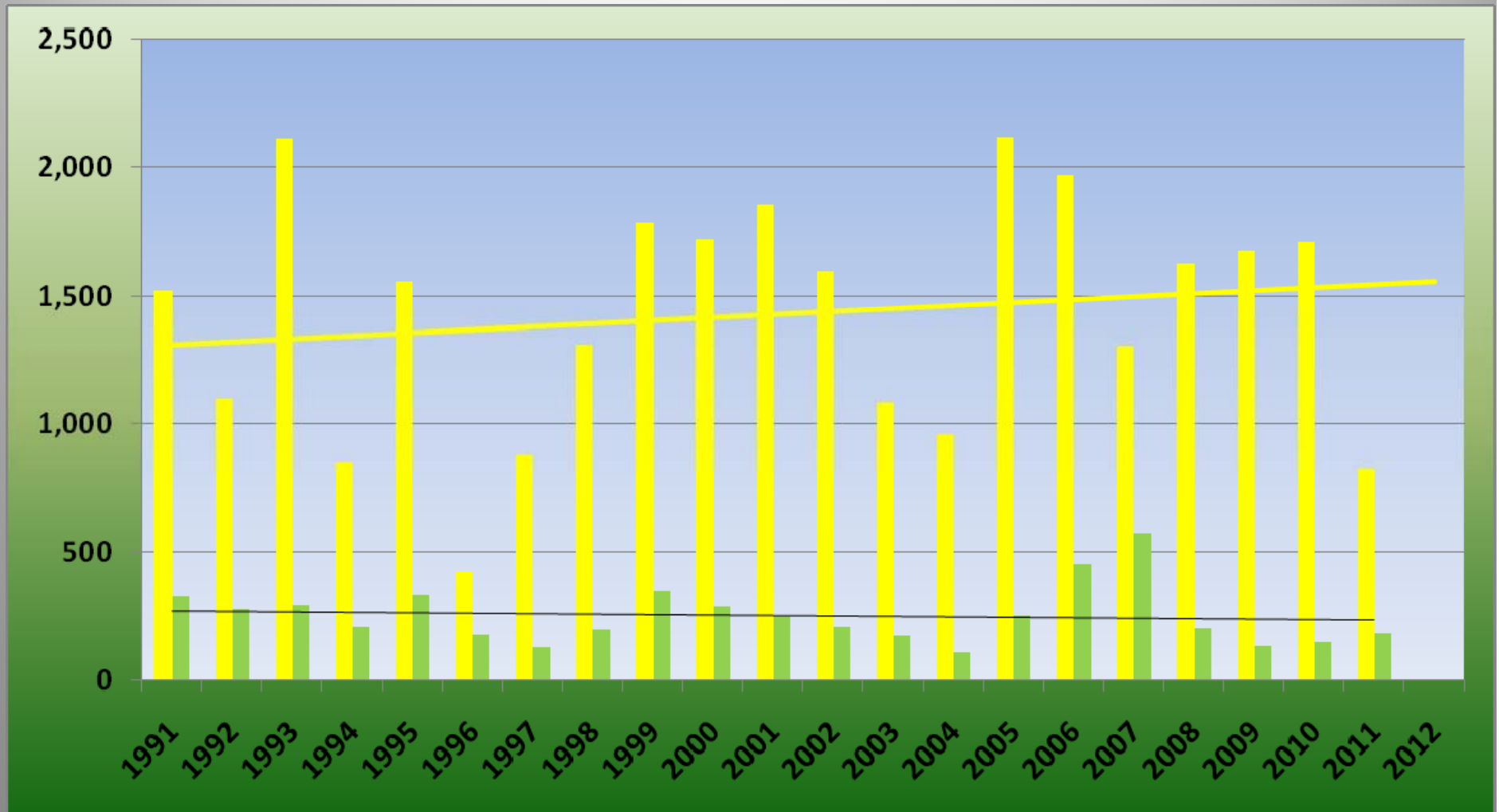
- **Phase 1: Fall Cool Down**
 - Lower grain temperatures stepwise
 - September 50-55 F!!! 2010 warm grain.
 - October 40-45 F
 - November 35-40 F
 - December 28-35 F
- **Phase 2: Winter Maintenance**
 - Maintain temperatures with intermittent aeration
 - January, February 28-35 F
- **Phase 3: Spring Holding**
 - Keep cold grain cold
 - Seal fans
 - Ventilate headspace intermittently

Source: Purdue Univ.

Corn Use



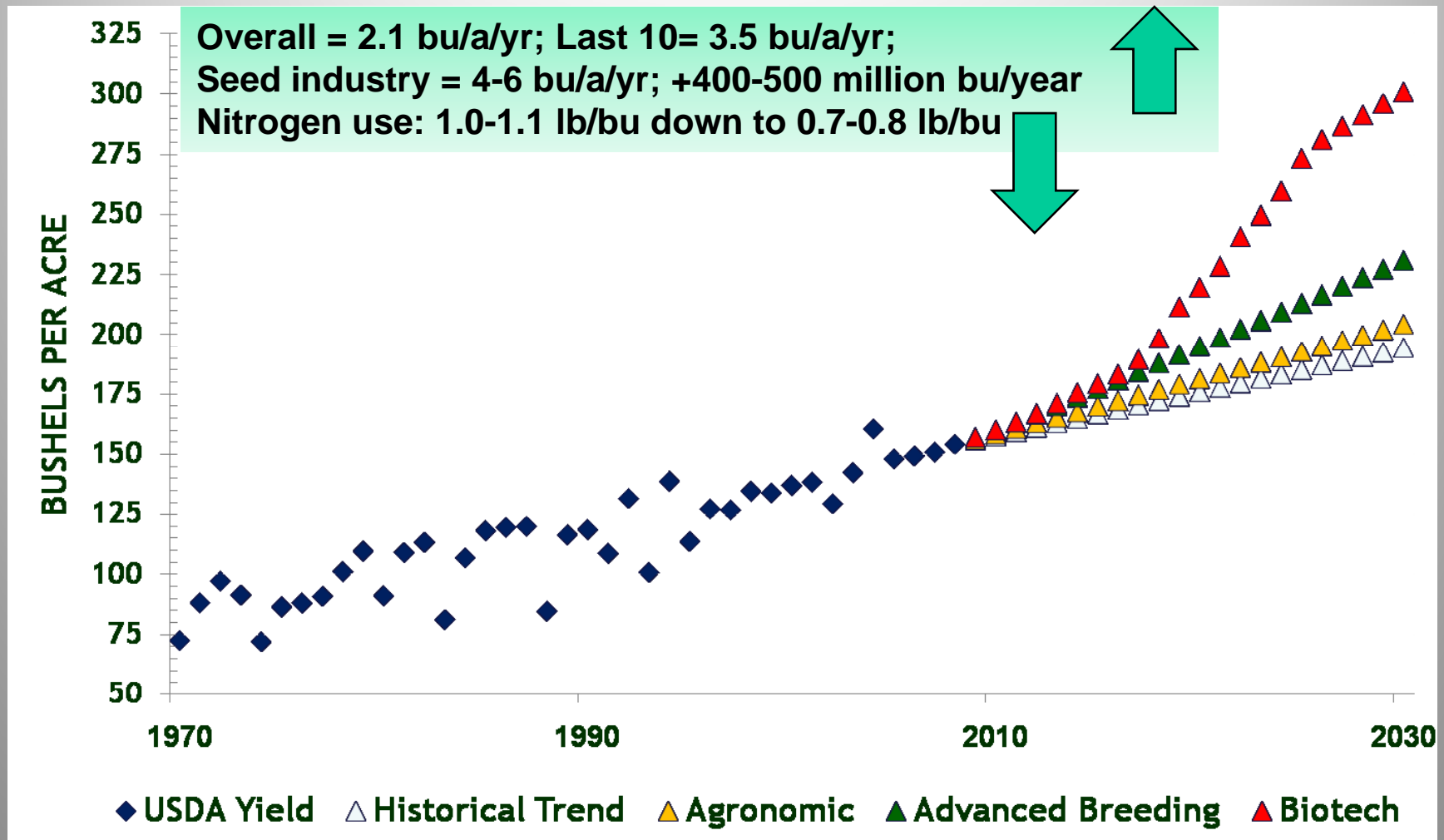
Corn and Soybean Ending Stocks, 1991 - 2011



Iowa Ethanol Production and Corn Usage

<i>Summary Statistics May-2010</i>	<i>n</i>	<i>Ethanol Produced mil gal/yr</i>	<i>Corn Used mil bu/yr</i>	<i>DGS 000 tons/yr</i>
<i>Current Dry-grind Plants</i>	<i>34</i>	<i>3,280</i>	<i>1170</i>	<i>10,237</i>
<i>Expansions and new construction</i>	<i>1</i>	<i>277</i>	<i>98</i>	<i>857</i>
<i>Wet Mills</i>	<i>4</i>	<i>500</i>	<i>178</i>	<i>1,557</i>
<i>Nearby Iowa</i>	<i>11</i>	<i>636</i>	<i>227</i>	<i>1,986</i>
<i>Total</i>	<i>50</i>	<i>4,693</i>	<i>1,673 (69% of 2009)</i>	<i>14,637</i>

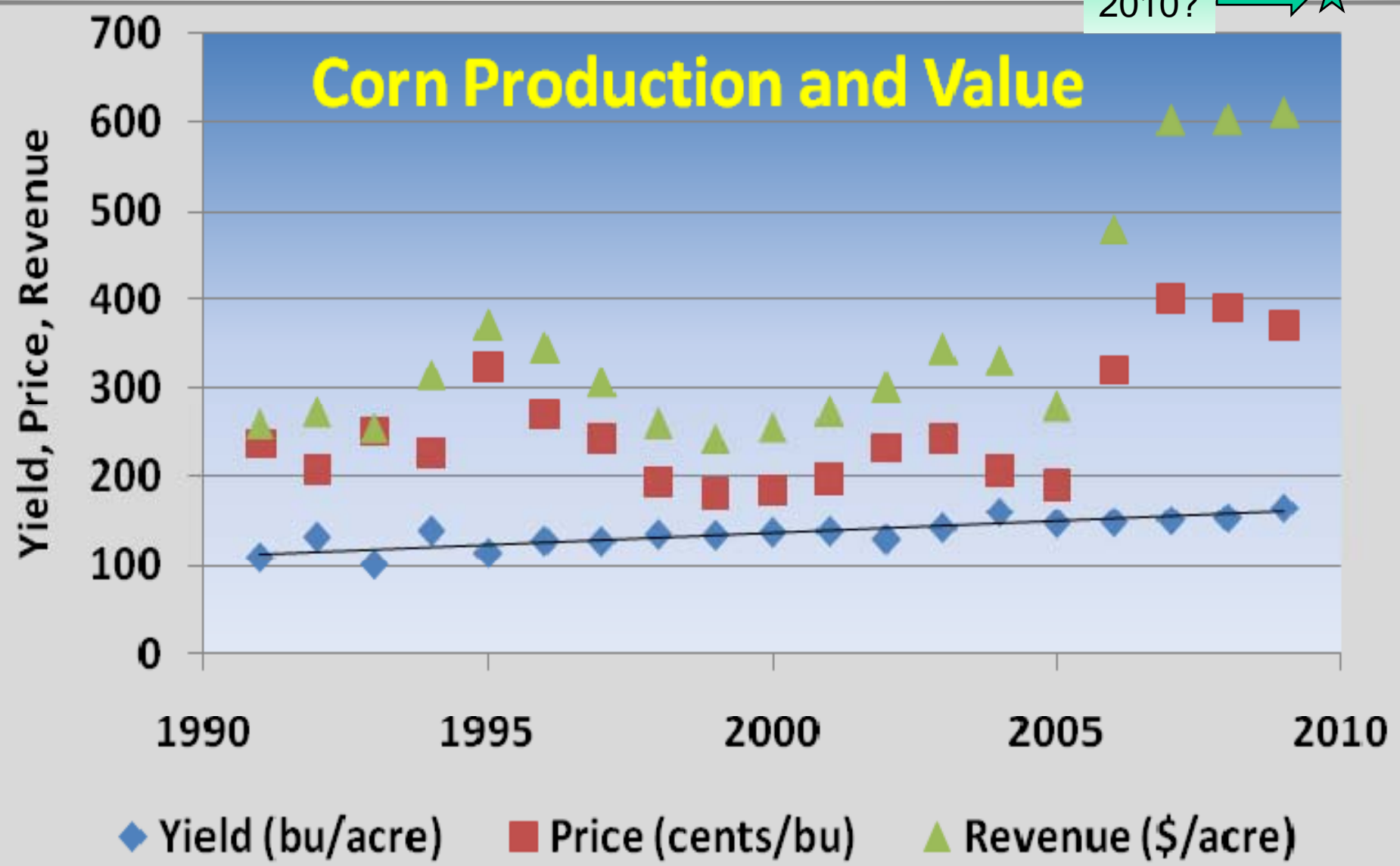
Corn Yield Potential



Source: Monsanto, June 2010

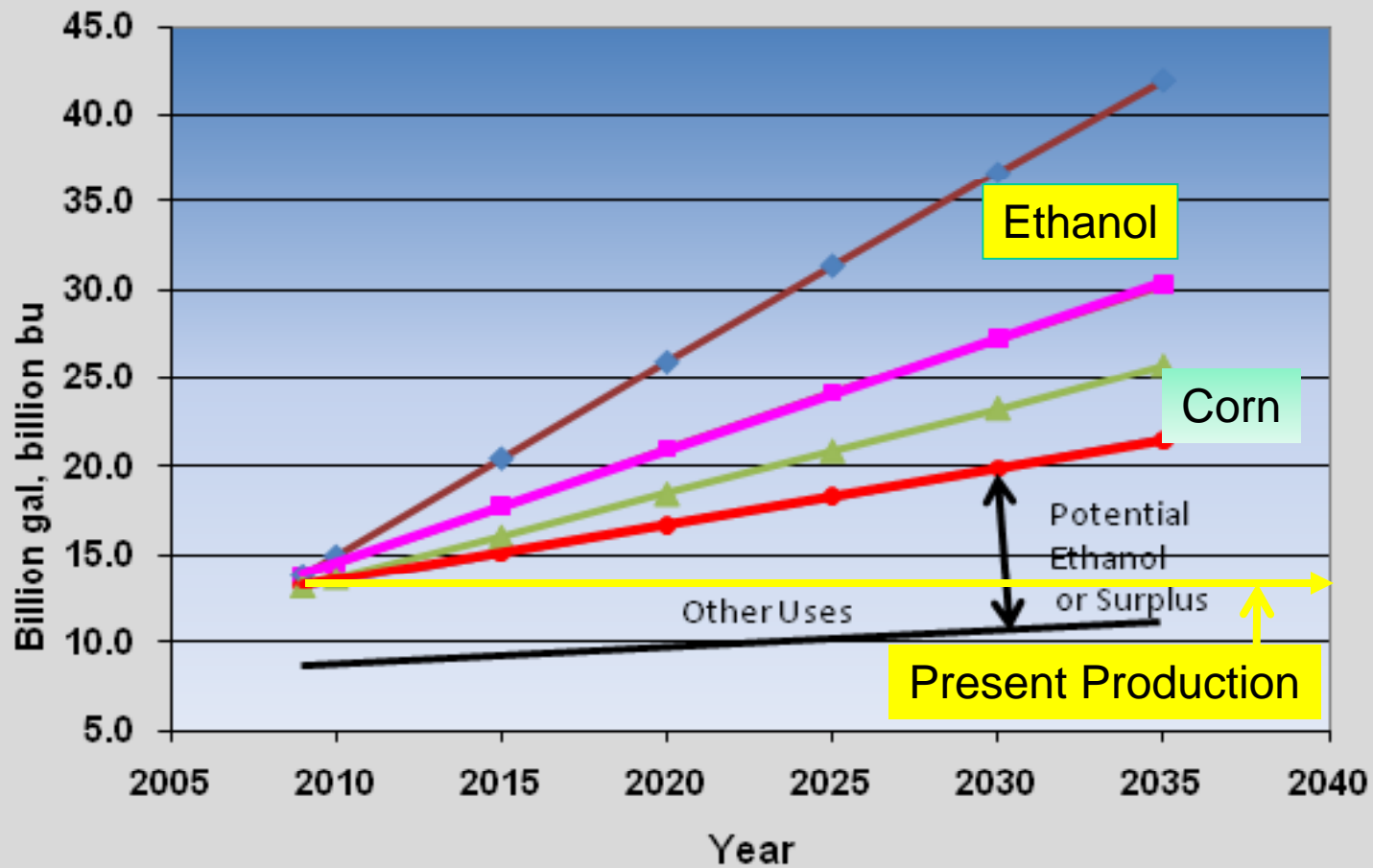
2010? → ★

Corn Production and Value



Potential Corn and Ethanol Production

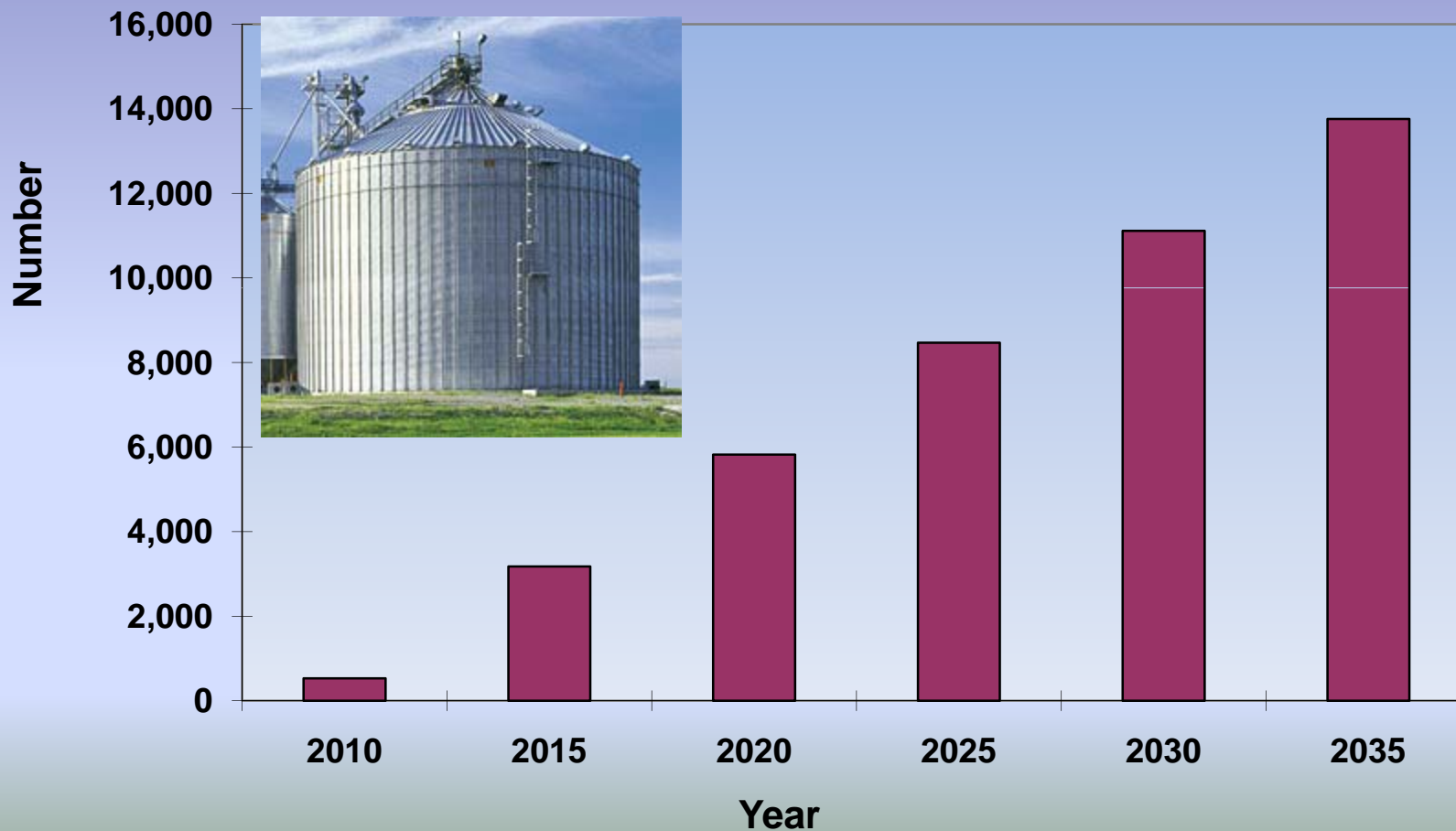
Feed, Food Export @ +1%/yr, 80MM Acres of Corn



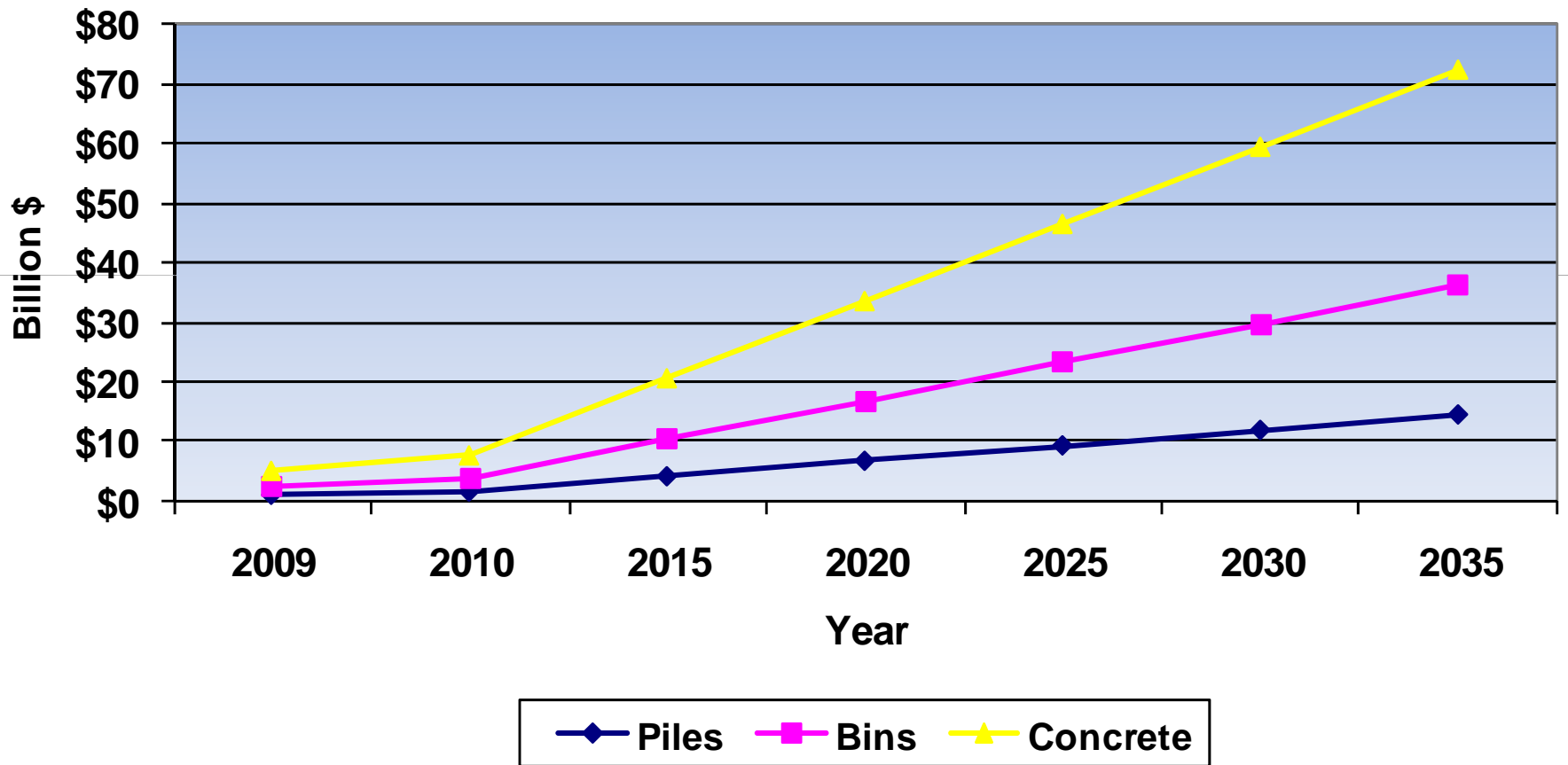
- Gal of Etoh, 4 bu/alyr
- Gal of EtOH, 6 bu/alyr
- Total Corn, 4 bu/alyr
- ▲ Total Corn, 6 bu/alyr

New Corn Storage as "105s"

"105" = 650,000 bu; 4 bu/acre/yr increase



Cumulative Cost of Additional Storage



Infrastructure Investments

- 4-8 new 100mgd plants per year
(\$200MM/plant + \$50MM fractionation)
- Storage and Handling (\$3-\$4/bu cap'y)
- Drying (\$250K/dryer)
- Related support
 - Railcars, trucks
 - Roads, other...

\$100 Bln+ is conservative

Summary - Storage

- **Attention to longstanding storage principles will be more necessary as volumes increase.**
- **Ethanol use is holding grain locally.**
- **Use has to increase to avoid surpluses.**
- **Significant infrastructure investment will follow corn production.**

Where To Find Us...



www.iowagrains.org
www.grainlab.org

**Analytical Programs
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Systems**

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