

Hail Damage and Grain Quality– Iowa State University North Central Iowa Hail Meetings

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Corn Quality

- Intense band – corn killed. Milk stage
- Test weights in the 40s; will not go up.
- Unusual weather since storm – dry
- Damage – 10-30% likely
- Breakage in handling! Storage not advised. Less than 50% storage life.
- Feed value ok by weight if no mycotoxins.
- Don't wait long to harvest

Corn Quality

- Progressive to edges; more fill, corn stayed green.
- Test weight trend; damage 5-10%.
- Still poor storage quality.

**Test weight below 50 lbs/bu?
Move out by February!!!!**

- Unusually high damage for corn out of the field



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Inbound Grading



Moisture AND Test Weight

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

Test Weight

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



Corn Damage

- Visually graded factor; kernels discolored by mold or weathering
- At least 125 grams, mechanically divided from 2 lb sample.
- Normal tendency – pick low.
- Dispute on grades? Sample to USDA GIPSA. See www.iowagrains.org
- Elevator should retain samples or composites of discounted grain



Inbound Grading

Particle Size/Count Based Factors

Must use a divider on samples. Sampling is important.

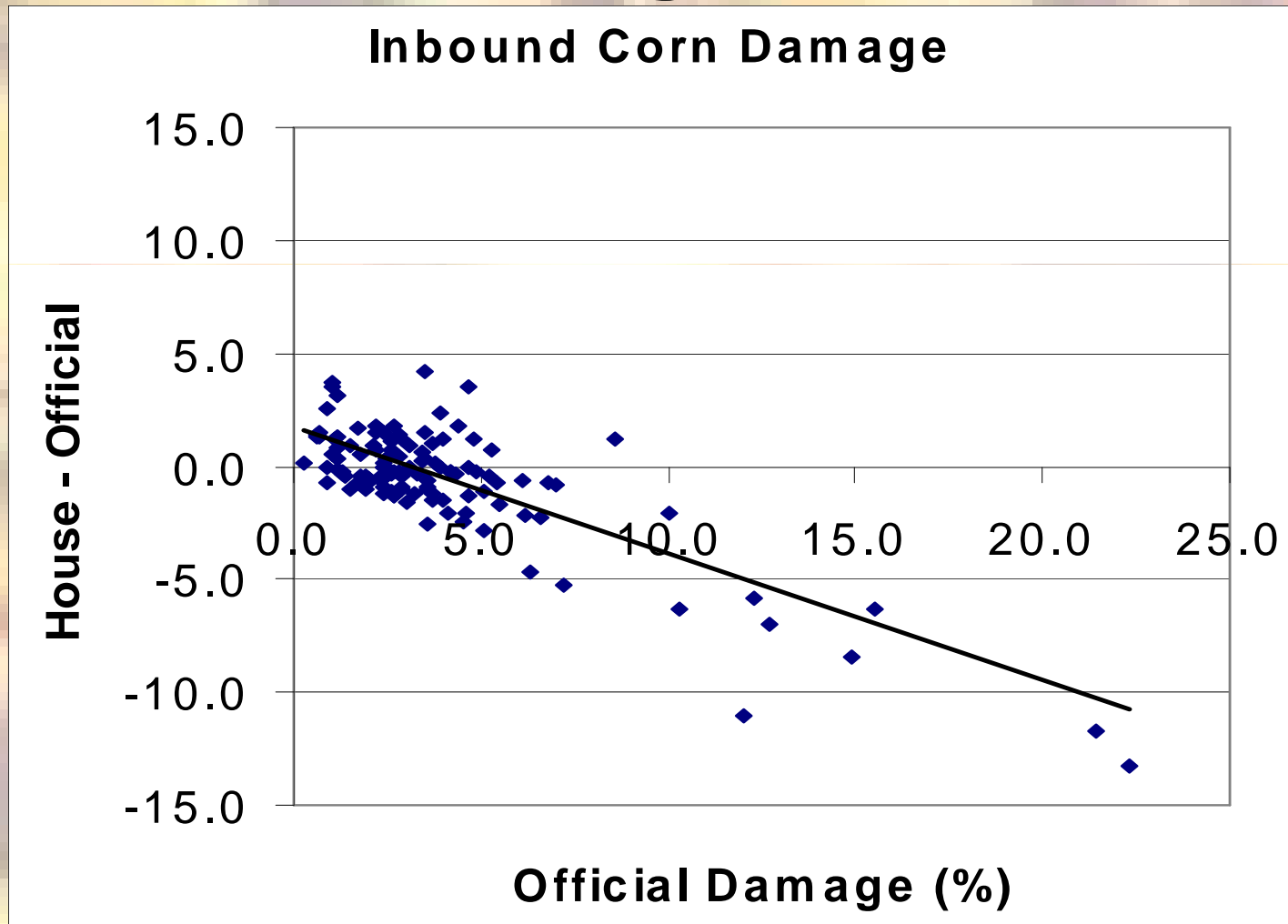
Check the division by weight.

Compare 5-10 samples vs GIPSA; +/- 0.2 – 0.5% FM;

+/-2-3% Damage depending on amount.



Inbound Grading- Corn Damage



Normally low – not enough time to be overly detailed

Mycotoxins

- Can be produced in moldy corn. Toxic residues
- Action levels, advisory levels, regulatory limits
- Aflatoxin – hot dry; vomitoxin, fumonisin – cool and wet.
- Risk in hail damaged corn; weather has been good however.



FDA AFLATOXIN ACTION LIMIT

- 20 ppb for humans, immature animals (including poultry) and all dairy animals
- 100 ppb for breeding beef cattle, swine and mature poultry
- 200 ppb for finishing swine (100 pounds and up)
- 300 ppb for feeder cattle

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FDA DON ADVISORY LIMITS

Vomitoxin

- No advisory limit for raw wheat
- 1 ppm for finished wheat products for human consumption
- 5 ppm for swine and other animals (except cattle and chickens); not to exceed 20% of swine diet and 40% for other animals.
- 10 ppm for beef and feedlot cattle older than 4 months and for chickens; not to exceed 50% of the diet.

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FDA FUMONISIN ADVISORY LIMITS

- 5 ppm for horses and other equine
- 10 ppm for swine
- 50 ppm for cattle and poultry (except for turkeys where there is not sufficient data to determine the proper levels)
- 4 ppm – human food corn products except
- 3 ppm - popcorn

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Mycotoxin Testing

- Black (Ultraviolet) light (BGYF) Aflatoxin only
 - Not positive proof of aflatoxin
 - Requires a color standard, dark room
 - 4 glowers/5lb sample = high probability
- Test Kits (immunoassay strips, etc)
 - USDA GIPSA approved list:
[//151.121.3.117/techservsup/metheqp/testkit.htm](http://151.121.3.117/techservsup/metheqp/testkit.htm)
Generally yes-no for preset level
- Laboratory analysis for level
 - List of Labs:
 - www.iowagrain.org



Mycotoxin Sampling

- Sampling = largest source of error
 - 25-40% sampling error
 - Includes handling of subsamples
- **1 lb/500 bu (5lb min/load; 10 others)**
 - Use entire sample
 - Grind whole sample for strips, lab test
- Bin sample
 - 1 lb cut per load, take in middle
 - Combine, submit entire sample to lab



Mycotoxin Sampling

- Field sample
 - 2 ears/acre covered = 10 ears/5 acres
 - Can use GPS block if available
 - Again, combine sample, shell and submit.
- Field strip sample
 - Desired: 1 lb/500 bu; 10lb/5000 bu
 - Adjust strip frequency to give possibility for 10lb/5000 bu.
 - More strips are better (5lb/2500 bu)



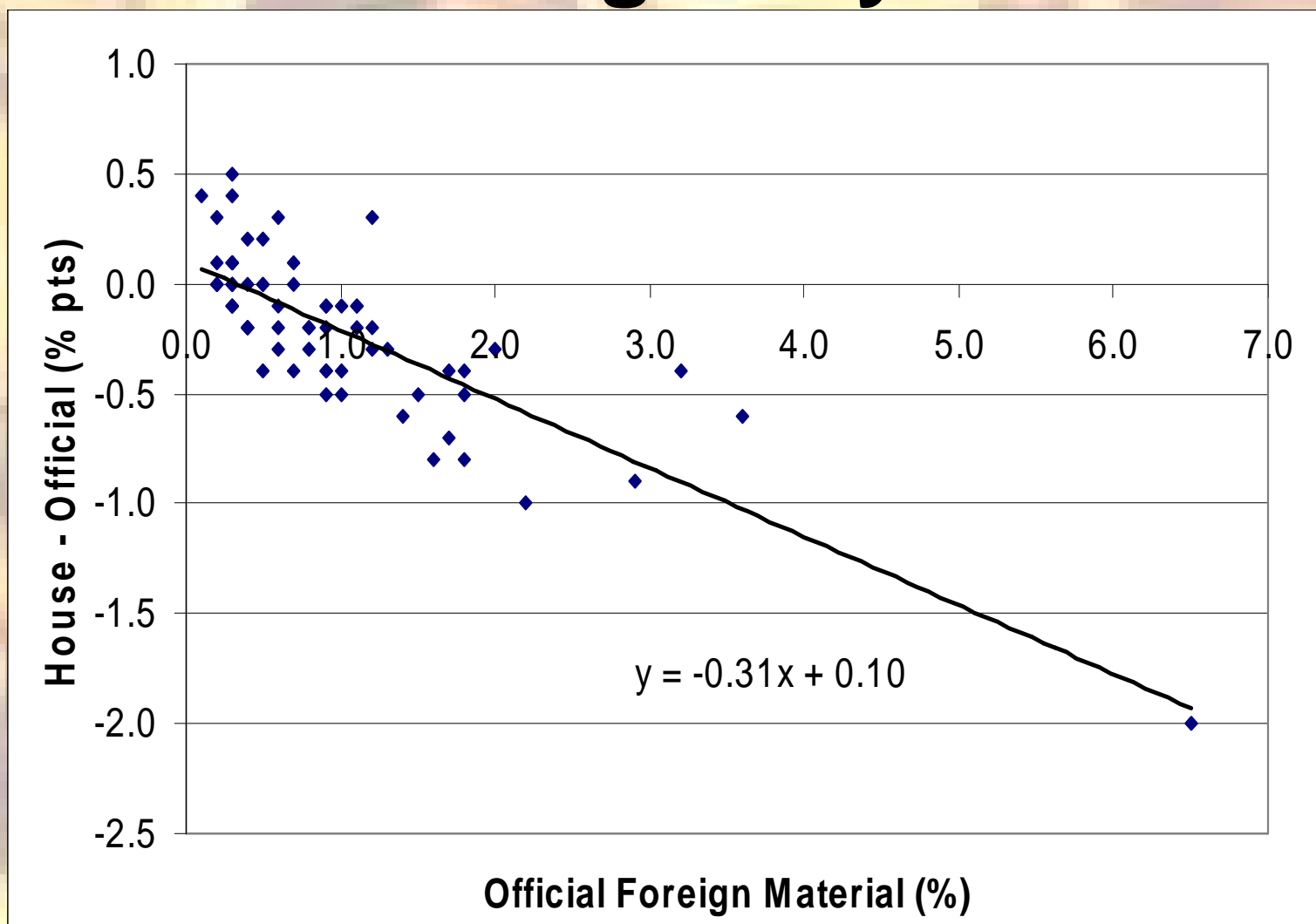
Mycotoxin Management

- Store cool, dry corn – not likely to increase in storage.
- Once known, IP/tracking required.
 - Documentation of use
 - Adulterant – cannot blend (aflatoxin)
 - After field sampling – keep fields separate.
- Does not go away in storage; cleaning may help.
- Concentrates in processor co-products (gluten, DDG). 3x!

Soybean Quality

- Small seed, chips, discoloration
- Low protein
- Plants will probably die quickly
- Weak stems; more FM in the soybeans
- Wide range of maturity!!
- Moisture meters will read low.
- Clean and sell as quickly as possible

Inbound Grading - Soybean FM



Same as damage – not enough time to handpick in detail

Shrink - Moisture

- Moisture Loss - Dryer
- Moisture Loss – Aeration and Storage

$\% \text{ Shrink} = \text{pts removed} * 100 / (100 - \text{End MC})$

15% moisture = 1.176% per point

13% moisture = 1.149% per point

Necessary down to spec; loss below spec

Rest of shrink factor for handling shrink.

Shrink – Handling and Storage

- Lost kernels, dust, mold, increased FM
- Some Estimates:
 - 0.5% (0.005) weight loss per in and out. 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.**
 - 0.5% weight loss per 3% pt damage increase.
 - Example: 3% to 12% is 9% pts = 1.5% shrink
 - Much worse for hailed, low test weight, moldy



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.



How Useful is the Storage Table?

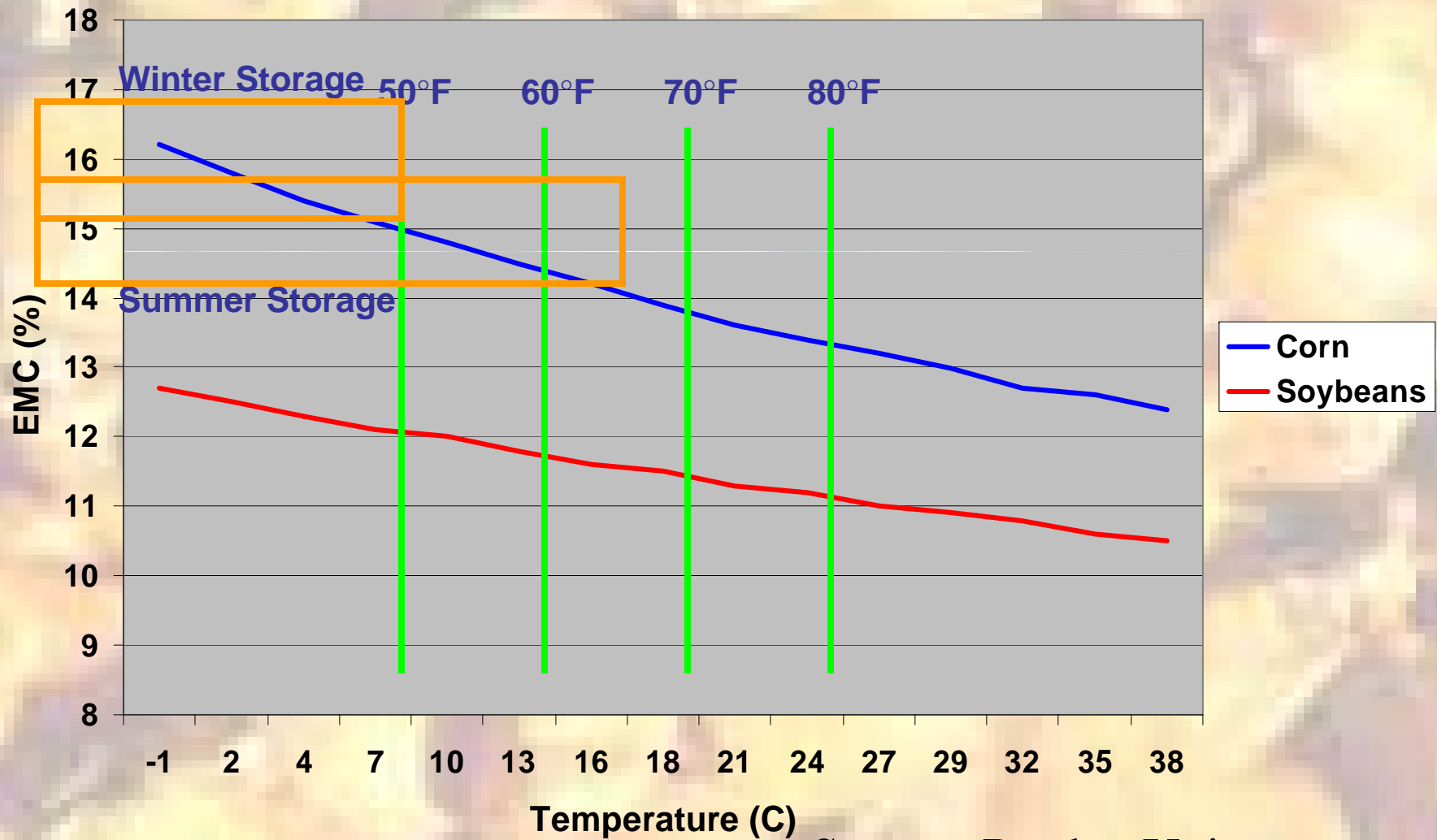
- Is grain at constant temperature?
- Grain heats when it spoils.
- Shelf life is a time line; percentages used at various conditions.
- Example: One day of 24% corn at 80F will use $\frac{1}{2} = 50\%$ of the storage life.
- That's equal to several months later on.
- **Use 50% of the table numbers for the hail grain!!!!**



Purpose of Aeration

- **Preserve stored grain quality**
 - suppress spoilage agents and grain pests
- **Keep temperatures as low as feasible**
 - geographic location; ambient vs. chilled air
- **Maintain uniform temperatures**
 - avoid moisture accumulation and condensation
- **Ventilate headspace above grain**
 - avoid moisture accumulation and condensation
- **Aerate grain after a fumigation**

Safe Grain Moisture Content (ERH = 65%)



Source: Purdue Univ.



Aeration Phases

- **Phase 1: Fall Cool Down**
 - Lower grain temperatures stepwise
 - 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.

Summary

- **Hailed corn – low to very low test weight**
- **Damage above grade limits.**
- **Maybe toxins – but not for certain.
Contact your insurance carrier (s)**
- **Hard to store**
- **Hailed soybeans – small seeds, FM, low protein**



Where to find us...



www.iowagrains.org