Grain Safety Technology

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Successful Storage Makes Safe Storage

- Proper storage moisture
- Insect control
- Cool the grain
- Grain quality

$3.40/bu. x 10,000 bu. = $34,000
$3.40/bu. x 100,000 bu. = $340,000

Causes of Grain Storage Problems

- Grain too wet
- Grain too warm
- Storage facilities not cleaned before filling
- Too much foreign material and fines
- Grain not checked often enough during storage
- Uneven grain temperatures in storage bin

Grain Not Checked Often Enough

- Grain in storage should be checked
  - Weekly in fall and spring due to rapid temperature changes
  - Every 2-3 weeks in cold weather
  - Every 1-2 weeks in warm weather
- Small problems can quickly turn into large, expensive problems
- Mold and insects grow under similar conditions – producing heat and moisture which can make the situation worse

Grain Safety Tips 1

- Post signs on bins of entrapment hazards
- Install ladders inside bins
- Lock out children & bystanders from grain areas
  - No one under age 18 in a confined space
- Manage & storage grain for quality
  - Out-of-condition grain crusts, won’t flow
- Avoid entering bins if at all possible
- Check bins for proper oxygen levels
- Run fans before entry to clear toxic fumes

Grain Safety Tips 2

- Lockout/tagout power to unloading augers
  - Prevents anyone unknowing starting the equipment
- Always work in tandem around bins; communicate
- Never enter a bin of flowing grain
  - No escape within 3-5 seconds!
Suffocation Hazard

- Flowing grain can suffocate you in a matter of seconds

Crusty Grain

- Crusty grain on the surface with a void underneath will cause suffocation

What Entrapment Does to the Human Body

- Average human male body 62", 190 lbs.; approximately 3000 sq.in. surface area
- At 0.4 psi.....1200 lbs. of force spread over the body!
- Every square inch has 650 sweat glands, 20 blood vessels and over 1000 nerve endings
- Aseptic bone necrosis as well as other circulatory and body chemical disruptions develop from interruptions in circulation
- Nerve damage similar to diabetes symptoms
- Lactic acid build up

Grain Safety Tips

- Wear a body harness; tie off to outside of bin
- Stay near the outer bin wall when in bin
- Wear NIOSH-approved dust-filtering respirator
- Wear hearing protection around fans & dryers

Grain Rescue Tube

- Insert tube in sections
- Vacuum out grain inside
- Extricate person
Grain Safety Tips

- Keep shields in place
- Beware of ice/moisture on ladders
- Install safety cages on ladders
- Beware of power lines

Checking Your Grain

- Check for changes in grain condition
  - Temperature
  - Moisture
  - General condition
- Run fan and smell the exhaust for a musty or sour smell
- Check roof condition – does frost melt off one bin faster than another?
- Look for insects
- Keep records of the conditions – compare them!!

Checking Your Grain Moisture

- Pull multiple samples from various locations and depths –
  - Minimum is one from the center and one from the edge both approx. 3 feet from the surface
- Let samples warm to room temperature in sealed container or Ziploc bag BEFORE measuring

Moisture Meter Error

- Calibrated for 15% corn – error on high moistures
- Adjust for temperature
  - Not accurate <40°F
- Electronic meters more sensitive to outside of kernel
  - Moisture variation after rapid drying
- Meters affected by condensation

Checking Temperatures

- How??
  - Can be attached to a 3/8” diameter rod

Checking Your Grain Temp.

- Check in several locations
- Check at several depths
  - Use a probe with a thermometer attached or pull samples to the surface and measure
  - Record the temperatures
- Allows you to identify
  - Cooling front
  - Heating caused by insect or mold activity

$26.75 http://www.enasco.com/product/C12108N
Senses only grain near cable

Checking Grain
• How??

Probe as deep as 13-1/2 feet for samples

$159.95  http://www.enasco.com/product/C08661N

Sampling Tips
• Sample once a month when:
  – grain temperature less than 50°F
  – Bins condition stable
• Sample twice a month when:
  – Problems detected
  – Grain mass not stabilized

Sampling Tips
• Small problems are early indicators
  – Insects
  – Moisture
  – High temperature
  – Smell
  – Temperature differences greater than 10°F

Safety in Applying Structural & Residual Protectants
• Read all labels and follow instructions
• Use PPE recommended
• Check label for grains that can be treated
• Follow label rates to keep grain salable (within legal tolerances)

Online Resources
• Grain Bin Safety (MU) - 1:51 min.  https://www.youtube.com/watch?v=n0clGwULXkI
• Grain Bin Rescue Training (MU FRTI) – 1:40 min.  https://www.youtube.com/watch?v=iz0NwB-1BdQ
• Labor Talk: Grain Bin Safety – 3:51 min.  https://www.youtube.com/watch?v=KKopPxi0G9Q
• Grain Safety Training  http://grainsafety.org/

Questions??

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