

Caring for Stored Grain



in Kansas

**Cooperative Extension Service
Kansas State University
Manhattan, Kansas**

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Knowing how grain storage losses and deterioration occur should help you manage and protect your investment. This publication identifies five common grain storage problems, frequent causes, and suggestions on where to look for more specific information on possible solutions. Hiring reputable inspecting and, when warranted, pesticide application firms to manage the grain for you may prove to be a wise investment.

Other publications with more detail are available through the Extension Service, to help you manage your grain so that quantity, quality, and profitability are maintained. A copy of the Kansas Stored Grain Quality Handbook also should be available in your County Extension Office and in many ASCS offices. Limited copies of this 200-page reference are available as a For Sale Publication. Send a \$20 check or money order made out to Kansas Extension Service through the Department of Entomology, Waters Hall, Kansas State University, Manhattan, KS 66506-4004.

Insect-Infested Grain



Scarred, scalped (germ missing), or riddled kernels indicating insect damage. Kernels may appear stuck together in small clumps during bin unloading. Webbing may completely cover the grain surface in the structure.

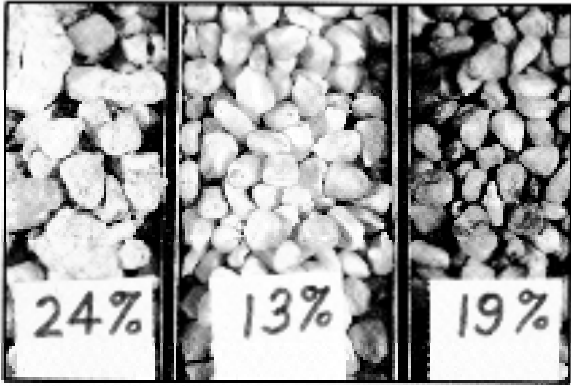
Causes

- Grain-damaging insects (confirm by sieving grain and identifying pest insects).

Cures

- Eliminate existing infestations. Apply a bin-wall or structural spray **BEFORE** storing grain. Clean or fumigate beneath perforated floors.
- If grain is to be stored through the next summer, consider applying a labeled protectant directly to the grain as it enters storage.
- Grain surface treatments help seal off the open upper surface, thereby slowing infestations, if protectants are not used.
- Dichlorvos resin strips, which continually release a volatile insecticide, can help control Indian meal moth adults. Control of larvae requires application of one of the newer protectants (Reldan or Actellic) or *Bacillus thuringiensis*.
- Routine sampling of grain with trier, bullet probe, beetle pitfall traps, or other insect sampling tools helps minimize and detect insect problems.
- Uniform cooling of grain temperatures below 50 degrees with aeration will halt insect activity. If grain warms, insects will become active.
- Fumigation may be necessary to stop serious infestations. Read and understand product labels. New regulations require use of gas concentration detectors before fumigated structures can be re-entered or grain removed. Special safety equipment must be available and/or be worn. Written records also must be maintained.

Moldy Grain



Spoiled or moldy grain signifying excessive moisture.

Causes

- High moisture and excessively warm grain.
- Moisture and heat generated by insect, rodent, or bird activity.
- Moisture from rain or snow entering the structure and falling on a warm grain mass.
- Localized spoilage zones caused by moisture migration and condensation.
- Pockets of damp grain.

Cures

- Repair damaged seals, joints, and other holes in roof and sidewalls.
- Store grain at less than 13 percent moisture content. Drying may be required.
- Aerate incoming grain to reduce high grain temperatures caused by field or drying heat.
- Aerate stored grain to equalize temperatures within the grain mass and prevent undesirable moisture movement (migration and condensation).
- Grain preservatives may prevent or reduce the seriousness of certain mold problems—but may limit marketing options.
- Cover aeration fans when not in use to prevent entry of birds or rodents.

Broken Kernels



Fragmented or broken kernels without obvious feeding damage. Undesirable plant debris or animal waste products may be present.

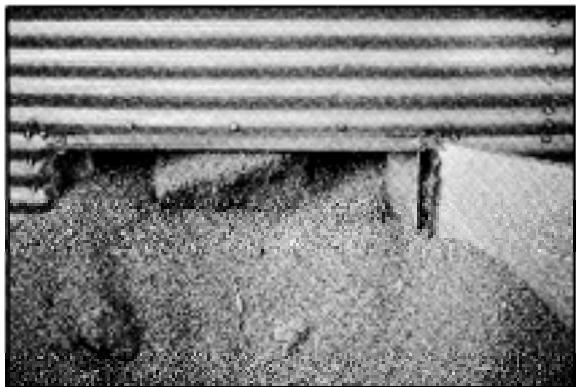
Causes

- Improperly adjusted grain harvesting, handling or cleaning equipment.
- Shock resulting from the depth-of-fall into the grain structure.
- Excessive post-harvest handling.
- Rodents and/or birds.
- Excessively dry grain.

Cures

- Adjust harvester cylinder speeds, concave clearance, and fan openings to recommended tolerances. Adapt ground speed to conditions.
- Operate augers at capacity and slower speeds.
- Use cleaners, scalpers, or perforated auger sections to reduce broken grain and fines.
- Improve weed control to minimize green foreign material.
- Redesign grain handling system and storage structures to minimize transfer of grain and stresses associated with grain movement.
- Clean and repair the storage structure before using. Cover fans when not in use.
- Prevent overdrying of grain if using a high temperature drying method.
- Monitor moisture content of grain during field drying and try to harvest near highest market moisture content at which no discounts are charged. Remember, however, that maintaining grain at higher moisture contents during storage may favor insects and(or) storage fungi.

Caked Grain



Caked grain that does not flow readily.

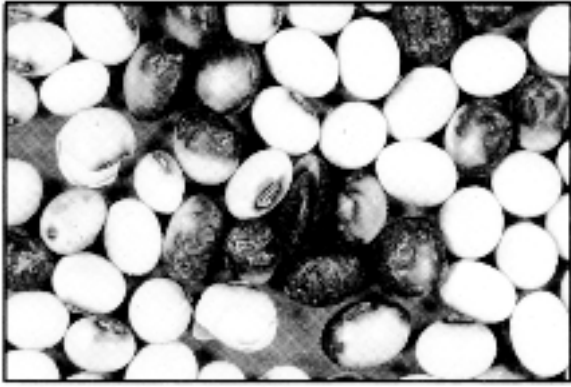
Causes

- Leaking roof or condensation on inside surfaces.
- Improper aeration. Horizontal zones of localized spoilage can result when aeration is halted before the cooling front has moved completely through and out of the grain mass.
- Unstorable, high-moisture grain.
- Insect or mold activity.
- Moisture resulting from bird or rodent waste products.
- Accumulation and caking of fines.

Cures

- Repair damaged seals, joints, and other holes in roof and sidewalls.
- Store grain at less than 13 percent moisture content. Drying may be required.
- Reduce grain temperature with aeration to slow mold and insect activity and thereby reduce the free moisture released.
- Proper aeration will eliminate temperature gradients within the grain mass, minimizing undesirable moisture migration and condensation. During aeration, provide one square foot of opening in the roof (exhaust vents, hatch openings, etc.) per 1,000 cfm of air being delivered.
- Cover aeration fans when not in use to prevent entry of birds or rodents.
- Do not place any wet loads of grain in with dry grain.

Heat-Damaged Grain



Many kinds of heat damage can occur, which affect the value of grain.

Causes

- Insect or mold activity.
- Wet grain respiring.
- Solar radiation.
- Accumulation and caking of fines.
- Improper or excessive high-temperature drying.
- Pockets of green material.

Cures

- Store grain at less than 13 percent moisture content.
- Proper summer aeration can reduce the heat load from solar radiation, limiting temperature gradients and moisture migration.
- Proper autumn aeration can reduce grain temperatures to 35-45°F, creating conditions unfavorable for continued pest development.

NOTE: *Proper aeration* means that the cooling front has moved completely through and out of the grain mass before the aeration fans are shut down.

- Moving the grain (turning) may break up established hot spots and permit uniform cooling by aeration.
- Use cleaners to reduce fines going into storage.
- Install a temperature detection system (thermocouples) to monitor temperature changes in remote locations to detect heating grain.
- Adjust harvesting procedures to minimize green material which cause heating.

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