



Task Force

The 1992 Indiana Stored-Corn Quality Survey—Preliminary Conclusions

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Why Was the Survey Conducted?

Last fall's corn harvest was delayed and extended by bad weather and late maturity. This led to problems with drying and cooling of the grain, and ultimately to increased spoilage potential of the stored crop, especially in the northern half of Indiana. In discussions with farmers, elevator operators, and county agents during December and January, it became obvious that a significant concern was developing about how well and how long the corn might keep in storage. Because much of the corn is expected to be carried into the summer (as of March 1 about 230 million bu. remained in storage on Indiana farms and 161 million bu. at elevators) and because much of the corn in the state is used for livestock feed rations, the potential development of mycotoxins because of mold spoilage has been of special concern.

Who Conducted the Survey?

Problems with corn spoiling prematurely in farm and elevator bins were reported as early as mid-January. Consequently, the Purdue University Grain Quality Task Force initiated a survey of stored corn moving from farms to elevators for an eight-week period starting March 1. The Purdue Agricultural Experiment Station, the Cooperative Extension Service, and five grain elevator companies supported the effort and contributed financial and human resources to undertake the survey. Corn samples collected

at each elevator site have been tested in cooperating campus laboratories for germination, mold development, mycotoxins, protein value, insect infestation, moisture content, and breakage susceptibility.

What Has Been Found in the Survey?

- **Mycotoxins:** Only one sample among 51 tested so far has been identified positively as containing a mycotoxin above the allowable limit. The sample contained 1 ppm of zearalenone. The elevator was immediately informed and took precautionary measures with the identified load. Although this news is encouraging, mycotoxins are more likely to develop once temperatures begin to rise during spring and summer storage.

- **Mold Development:** The primary molds that have been found on single corn kernels are *Aspergillus glaucus*, *Fusarium moniliforme*, and *Penicillium*. All three mold species confirm the suspicion that higher than normal moisture and temperature conditions have prevailed in storage bins for much of this year. If grain moisture contents are above 14-15%, additional drying may be necessary to successfully carry corn over into the spring and summer. High grain temperatures and moisture contents allow molds to develop mycotoxins such as aflatoxin, zearalenone, and fumonisin.

- **Protein:** Protein values ranging from 6.0 to 8.0% indicate that on average the feeding value of the 1992-93 corn crop in northern Indiana may be about one percentage point lower than

normal. Hog producers will need to consider reformulating their feed rations to make up for potentially lower protein values with additional soybean meal.

- **Germination:** Germination values below 50% and as low as 16% have been observed in most corn samples. This indicates that during the drying operations last fall much of the corn was exposed to excessively high drying air temperatures for extended periods of time, reducing the keeping quality.

- **Breakage Susceptibility:** High values of breakage susceptibility confirm the high BCFM and Total Damage values reported by the elevators grading the samples. Large amounts of fines and broken kernels increase the storage risk, and decrease the efficient use of aeration for temperature management. Also, hot spots are more likely to develop in stored corn with high amounts of BCFM and other trash.

- **Moisture Contents:** Although the moisture content values indicate that much of the corn has been dried to 14.5-15.5%, the range of moisture contents found is a concern. Moisture contents above 17% have been observed in a number of shipments; the highest recorded moisture content was 27.7% in one shipment. Corn stored at moisture contents above 16% is much more susceptible to heating up and resultant spoilage. Overdrying of much of the corn to as low as 12-13% has increased the total damage levels; the lowest moisture content was 7.9% in one shipment.

What Do the Survey Results Mean to a Farmer or Elevator Manager?

One of the key consequences for everyone storing corn and planning to carry it into the summer should be to immediately take a close look at the quality of their corn and plan accordingly.

- **Sampling:** Samples for moisture content from the grain surface and 6-12 inches into the grain should be taken at several locations; the moisture contents should not be higher than 14.5-15%. Grain temperatures should be measured 3-6 ft. into the grain at several locations (even if permanent thermocouple cables are installed); temperatures should be 35-40° F.

- **Rewarming - or Not:** Grain that is cold and dry, and is stored in bins larger than 30,000 to 40,000 bu. or flat storages, generally does not need to be rewarmed in the spring. Although the grain will warm along the outer layers and on top of the pile, the bulk of the grain will remain cool all summer. [Seal the fan inlet to prevent warm air updraft and maintain cool temperatures longer!] Grain stored in smaller bins to be held into the summer should have its temperature raised to 50-60° F as soon as the average outdoor temperature is 10-15° F above the grain temperature. The approximate grain warming time depends on the airflow rate through the grain. At 0.1 cfm/bu., a 10-15° F grain temperature rise can be achieved in approximately 120 hours; at 1 cfm/bu., rewarming will take about 12 hours of continuous fan operation.

- **Removing Grain:** For bins of corn of questionable quality, it is advisable to move the grain out of storage before it has a chance to spoil during warm weather. If a number of bins pose spoilage problems, rotate unloading between the bins to keep them cored and the surface layers exposed for minimal time periods. Feed or sell out of smaller bins first, because they will warm up faster.