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MANAGING THE 2009 HARVEST: Resources for Drying, Storing, Grain Quality, Crop Insurance, and Marketing

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The combination of delayed planting, a cool summer, an early freeze in some areas and a rainy fall has created a harvest situation not seen for many years. This guide provides information on a variety of key management issues designed to help Indiana farmers make decisions related to harvesting, storing, and marketing 2009 fall crops.

How Much More Will Corn Dry?—Grain moisture content typically decreases very, very slowly from late October onward. Corn will normally dry approximately ¼%–½% per day in late October through early November. By mid- to late November, drydown rates typically drop to about 0%–¼% per day, and after Thanksgiving drying rates are usually negligible. The AVERAGE daily temperature statewide for Indiana in November is only 42°F, which helps explain why drydown rates decline significantly in November compared to October. The bottom line is that we should not expect much more grain drying in the field from this point forward, unless we experience an unusually warm and dry November.

Estimating Field Losses—Stalk health and grain quality continue to deteriorate due to the processes of weathering and disease. There is always the risk of field loss, but these can accelerate after mid-November. Field losses can range from 0.5% to 2% per week of harvest delay, with actual losses in a particular field dependent on weather conditions, hybrid, and plant health. The loss of one medium-sized ear per 100 feet of row translates into a loss of more than one bushel per acre. Fields showing evidence of poor stalk quality or disease should be given high priority on the harvest schedule.

Handling, Drying and Storing Wet Grain—Drying wet grain takes more time, reduces capacity, and increases the power required to operate augers, bucket elevators, and drag conveyors. Given this year's higher moisture levels, farmers who are using in-bin drying systems will generally need to dry grain in layers, adding only 4–6 ft of depth at a time. Each layer should be almost completely dried before the next layer is added. Adequate, uniform airflow is the key. Given 2009's high moisture levels, airflow rates of 1.0 cfm/bu into a drying floor are generally recommended.

After grain has been dried, cool it to ambient (seasonal outdoor) temperature. If holding it over the winter, eventually cool grain down to around 35°F to minimize mold and insect activity. Probe bins regularly, checking for hot spots and mold growth. Be careful when storing wet corn before drying. Shelled corn at 28% moisture at 55°F should be held no longer than 2 days. However, corn at 22% moisture and 55°F can be held up to 10 days. When shelled corn is placed in the bin, fines will generally accumulate near the center of the bin or near bin walls. Concentrations of fines encourage mold and insect growth and inhibit air flow. Low test weight and disease-damaged corn, both of which are common this year, will usually have more fines than normal and farmers will want to consider coring bins to alleviate airflow problems. In general, this year's corn crop will not store as well as corn from previous harvests—careful and regular monitoring of grain condition will be essential.

Consider Using Dryeration—When corn is dried in continuous-flow dryers using air temperatures above 180°F, corn is more susceptible to breakage during subsequent handling, and test weights are often lower than with low-temperature drying. With careful monitoring and good management, both the susceptibility to breakage and the fuel required to dry corn can be reduced using in-bin dryeration. In this method the cooling section of the dryer is eliminated and the corn is placed in the bin hot. The quality increase and fuel savings are even greater if combination drying is used, in which corn is dried "all heat" in the continuous-flow system down to 19% or 20% moisture, and cooling and drying are completed in a low-temperature drying bin.

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Drying Soybeans—Two to three points of moisture in a bin can be removed with natural-air drying, assuming low outdoor humidity. This works best with a drying floor and 1 to 2 cfm/bu airflow. This process may take several weeks depending on grain depth, but can be sped up by adding grain layer by layer and drying each layer before the next is added. Drying soybeans with continuous flow dryers or bin dryers should be approached with caution. If seed quality is not a major consideration, soybeans may be dried in continuous-flow driers at temperatures ranging from 120°F–140°F. High temperatures of 160°–180°F can lead to excessive cracks and splits. Drying will produce fewer splits if the air relative humidity is kept above 40%. For example, if outside air is 60°F and relative humidity 80%, it should not be heated above 80°F. Also, exposure to these temperatures should be limited to no more than one-half hour, depending on the initial moisture of the beans. Careful monitoring of the bin is important to make sure excessive splits are not occurring, particularly during stirring.

Ear Rots—These rots are common in cornfields this year, and fields with significant amounts of rot should be harvested as early as possible, handled separately, and dried to 15% or lower moisture immediately after harvest. Mycotoxin concentrations are almost always higher in fines and screenings—adjust combines to reduce the amount of fines and small, shriveled, or broken kernels.

Diplodia Ear Rot—This rot is characterized by bleached husks with tiny black specks. Removal of the husk of an infected ear will reveal white, fuzzy growth of the pathogen between the kernels, which often starts at the base of the ear, and the cob can also appear rotted. In the United States, mycotoxins have not been associated with Diplodia; however, feeding value and storability of the grain is reduced. Drying to 15% moisture and cooling grain below 50°F will prevent further growth of the fungus.

Diplodia Ear Rot

Gibberella Ear Rot—This rot can be readily identified in the field on intact ears, but it is much more difficult to identify once the grain has been shelled. Peel back husks and look for a pink to reddish mold that begins at the tip and develops toward the base. Severely affected ears may be largely rotted with husks and silks adhering tightly. Except in highly susceptible hybrids, the disease usually involves only part of the ear.

Gibberella occurs throughout Indiana, but it tends to be more prevalent in the north. Infection occurs during silking and is enhanced by cool, wet weather. It will be most severe in fields where corn follows corn or wheat. Fusarium Head Blight (Scab) in wheat is caused by the same pathogen.

Gibberella Ear Rot

Ear Rot Toxins and Livestock Feed—The pathogen that causes Gib ear rot can produce two toxins, deoxynivalenol (DON or vomitoxin) and zearalenone. These mycotoxins can impact the health of many monogastric animals, but swine are especially sensitive. Pork and poultry producers who don't test the new corn crop before feeding it are taking a big risk this year. Some levels of DON (vomitoxin) in 2009-crop corn are so high they have caused near 100 percent feed refusal. Pigs will have reduced feed intake when the complete diet DON levels are above 2 parts per million (ppm), and nearly complete feed refusal when DON levels are at 10 ppm or greater. Poultry are not as sensitive as hogs are to the toxins produced by Gibberella mold. Deoxynivalenol (DON) or vomitoxin is known to suppress the immune system in poultry, making them more susceptible to sickness. Levels of DON known to have these effects begin to occur at about 7.5 ppm or less.

Zearalenone, also found in Gibberella-infected corn, at fairly high concentrations (up to 800 ppm) may not cause any production impairments in laying hens. However, part of the concern may lie in transference of those mycotoxins to the egg. For producers who have reproductive swine on their farm, it is recommended to have the corn tested specifically for zearalenone. If levels of zearalenone are too high (above 3–5 ppm), it could impact the breeding herd, replacement gilts may not cycle, and there could be problems getting sows bred.

Mycotoxin binders or enzymes may be used to reduce the effects of the zearalenone and vomitoxin. About 2–4 ppm of vomitoxin can be bound with some binding agents or cleaved with some enzymes to reduce the toxicity in the diet. However, only a few binders are effective against vomitoxin or zearalenone. The clays and aluminum silicates do no work well for vomitoxin or DON. They work with aflatoxin, which is a completely different mycotoxin that is not of concern this year. Producers should talk with their feed companies and nutritionists to evaluate performance test data for these compounds and find out which ones they support as having efficacy for a particular mycotoxin.

Diplodia, another mold that is widespread in this year's corn crop, can cause low test weights. Diplodia-infected corn is prone to shattering, which creates a lot of fine material and a dusty, moldy feed. This increase in fines will create storage concerns all year with the potential for the corn to start molding again during storage. Stored corn may require testing/monitoring throughout the year as it is fed. Diplodia does not produce a known toxin and is safe to feed, but could reduce feed intake due to the moldiness of the corn. From a nutritional standpoint, the lower test weights influence the corn kernel's proportions of the germ versus endosperm, causing amino acid and energy shifts. If this is not accounted for during diet formulation, it could lead to decreased performance in both swine and poultry. Producers may need to look at options available to change the palatability and mask the taste with flavoring agents for Diplodia-infected corn when fed to swine. Some oil should be added to decrease the dustiness of the moldy feed and increase palatability, while also increasing the energy level of the feed to offset the lost starch and oil that the Diplodia was feeding on in the corn.

Crop Insurance Considerations—Loss of quality due to diseases such as ear rots is an insurable loss for some types of crop insurance. Insurance based on individual farm performance (APH, CRC, RA, and IP) does provide coverage. County-based insurance (GRP and GRIP) do not cover losses due to quality on individual farms. If the county average yield (GRP) or revenue (GRIP) falls below the guarantee level of a producer, then an indemnity may result.

High levels of mycotoxin may be an insurable cause of loss. Insured producers should contact their crop insurance providers before harvesting and/or placing harvested grain in storage, if their grain is suspected of containing mycotoxins. The Risk Management Agency (RMA) specifies quality discount factors (DF) to be used to compute the "production to count" for insurance purposes.

For corn, there are discounts for test weight, damaged kernels, and odors. In addition, there are specific discounts for aflatoxin, vomitoxin, and fumonisin, depending on the level of infestation. Generally, samples must be taken by specified professionals and tests run by certified labs before grain is placed in storage.

Some corn may be selling at a discount, but limited discounts are unlikely to result in payments by the insurance company. If a producer purchased insurance with a 75% level of coverage, no indemnity would be paid unless "production" was less than the 75% level. Assuming a normal yield, a 20% price discount would still result in "production" being over the 75% level. If corn harvest is delayed past December 10 due to an insurable cause (wet field conditions, etc.), farmers need to contact their crop insurance agent.

Marketing Considerations—A late and drawn-out harvest generally means that basis will be stronger during the harvest period and that there will be less basis appreciation post-harvest than in a typical year. This has two implications. First, there is reduced incentive to store the crop. Second, producers should consider using pricing alternatives that establish the basis, such as selling cash out of the field, a basis contract, or a minimum price contract. This fall, soybean price premiums for delivery into the late fall and winter are small, thus favoring pricing at harvest. Corn has larger premiums for later delivery, and has more favorable prospects for positive storage returns.

Moisture and Damage Discounts—Grain discounts are critical this year for producers trying to market high-moisture or damaged grain. Discounts can vary sharply from buyer to buyer, and buyers may change discount schedules. So it can really pay to know the discount schedules for alternative buyers.

For corn moisture charges, a small sample of six Midwest grain buyers found charges for drying corn from 25% down to 15% ranged from a low of 32 cents per bushel to a high of 55 cents per bushel. For those who are using elevators to dry, check with elevators for major differences in drying charges. There may be alternatives for some to dry on-farm. As an example, a tenant may be willing to dry a portion of the landlord's crops.

Producers may also need to check discount schedules for damage with mold and other grain-quality problems this year. The discounts for 10% damaged corn at the six elevators surveyed ranged from a low of 5 cents per bushel to as high as 15 cents per bushel as shown in the table. Moldy and musty grain may have additional discounts. Knowing the charges for these problems and the acceptable levels can help in deciding where to sell off-quality grain and in deciding how to blend lower quality grain to avoid excessive discounts.

Corn: Costs per bushel for drying charges

Moisture	**20%**	**25%**	**30%**
Elevator	***Cents Per Bushel Discount***		
1	18	38	58
2	30	55	80
3	20	40	65
4	20	40	65
5	17.5	35	52.5
6	15	32	53

Corn: Costs per bushel for damage

% Damage	**10%**	**15%**
Elevator	***Cents/bushel***	
1	12	32
2	5	10
3	15	35
4	15	Reject
5	7.5	17
6	10	25

Cost of On-Farm Drying Producers with on-farm drying capacity may face a drying bottleneck with high moisture corn. These producers may be considering delivering their wet corn to the elevator to keep the combines moving. How does the cost of on-farm drying compare to the elevator discounts listed above? The primary component of on-farm drying is the cost of liquefied petroleum gas (LP gas or propane). Drying corn from 30% down to 15% moisture will require about 0.25 gallons of LP gas. With LP gas at $1.60/gallon, the fuel cost is about 40 cents per bushel, and from 25% about 29 cents per bushel. Both dryer efficiency and LP gas prices will affect these costs.

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FOR MORE INFORMATION—SELECTED ONLINE RESOURCES

The Chat 'n Chew Café: Comprehensive List of publications related to harvesting, handling, storage, ear molds, and newsletters from around the Corn Belt: http://www.agry.purdue.edu/ext/corn/cafe/
Special section on Crop Maturity and Harvest Issues: http://www.agry.purdue.edu/ext/corn/cafe/harvest/

Purdue Post Harvest Grain Quality & Stored Product Protection Program: http://grainquality.org
Extension Publications related to grain quality, drying, aeration, and storage:
http://extension.entm.purdue.edu/grainlab/index.php?page=pubs/home.php

"Field Drydown of Mature Corn Grain," http://www.agry.purdue.edu/ext/corn/news/timeless/GrainDrying.html

"Harvesting, Handling, and Drying Corn with Ear Rots in 2009,"
http://extension.entm.purdue.edu/pestcrop/2009/issue26/index.html#harvest

"In-Bin Drying of Corn," http://extension.entm.purdue.edu/pestcrop/2009/issue26/index.html#inbin

"Drying Soybeans" http://extension.entm.purdue.edu/pestcrop/2009/issue26/index.html#drying

"Gibberella Ear Rots," http://extension.entm.purdue.edu/pestcrop/2009/issue25/index.html#gibberella

"Diplodia Ear Rots," http://www.agry.purdue.edu/ext/corn/news/others/2009/Diplodia-1002.pdf

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