

EVALUATING CORN HARVEST TIMING

by Bruce Erickson and Luc Valentin

A later-maturing crop this year and high propane prices have many questioning how they should plan this year's corn harvest. "Last year we didn't even turn on the dryer, but this year it is a different situation," said Pete Pistorius, who farms near Blue Mound in central Illinois. "We went ahead and prepaid for 10,000 gallons of LP—our stalks look OK, but we've pretty well decided we will push ahead now that grain moisture is in the mid 20's."

If a farmer could harvest all of their corn in one short time period—and not be sidelined harvesting other crops such as soybeans, moving from farm to farm, or performing other duties such as off-farm employment or tending livestock, this might be a relatively easy decision. For an individual field, the optimum time to harvest is largely a balance of drying expenses from an early harvest and of usually greater field losses if waiting for the grain to dry. But harvest can sometimes be a long, cumbersome process, with delays from weather or the bottlenecks of moving grain away from the combine, through dryers, or into storage. Fortunately improvements in crop genetics have reduced harvest concerns in recent years. Hybrids seem to dry down faster today than those of past years. And genetic enhancements in the way of insect resistance have reduced some of the root and stalk lodging concerns from European corn borers and corn rootworms.

How Quickly Will Corn Dry? Corn kernels stop taking nourishment from the plant and generally complete the yield-making process about the same time a black layer develops at the tip of the kernel, where the kernel attaches to the cob. This occurs about 55 to 65 days after silking. After that, the rate of drying is largely related to temperature, humidity, hybrid characteristics such as ear and kernel size and husk cover, and field management such as fertilization and weed control. Weather is a major factor—corn in the field will dry very little when conditions are cool and wet, but can lose more than a point of moisture in a day with very warm, windy, and dry conditions. An Indiana study showed that corn lost grain moisture at about 0.4 points per day at an average daily temperature of around 55 to 60 degrees F, and lost grain moisture at around 0.7 points per day at average daily temperatures of around 70 to 75 degrees F.

Estimating Field Losses The longer that grain is left unharvested in the field, the greater the chance of dropped ears, root lodging, or stalk lodging due to wind, hail, insect damage, disease, or other factors. There could be many years that a farmer could leave corn to dry to late October with minimal losses—but most farmers can remember a harvest time windstorm or snow that caused real dollar loss and even more misery maneuvering from the combine cab. There is always the risk of field loss, but many would say it is not of great concern until mid-October, and then accelerating after mid-November. Some past publications have shown field losses of 1% per week starting in early October and then increasing to 2% per week during the late harvest period, adding up to more than 10% if harvest extends past late November. Farmers who have walked into their fields and noted little evidence of insect damage or stalk rot may consider their risks of field losses lower, whereas farmers who have seen evidence of poor stalk quality or disease concerns may want to plan for more.



Modeling the Economics of Harvest Timing A spreadsheet that uses 30-year temperature means to approximate field drydown and calculates the optimum harvest period to balance the costs of drying with the costs of field losses was developed to compare various harvest scenarios. As with any model it can only approximate what actually happens in the field--this means that for any given year the results may not be optimal, but should average over the course of time. To keep the model simple it assumes all of a farmer's corn is mature at the same time, when in actuality farmers plant hybrids of various maturities on different dates in different fields. Other assumptions for the model are noted in the heading for Table 1 below, and further explanation of assumptions and references are noted in the spreadsheet that is linked at the end of this article.

The results substantiate common farmer practice--for a farmer who can usually complete harvest in less than a month, that farmer can afford to save drying expenses and allow some field drydown before field losses begin to mount. But for a farmer pushing their harvesting capacity so that harvest might go longer than six weeks, harvest might best begin with grain moistures in the mid-20's. In this scenario, the probabilities of late season field losses justify the earlier start and its cost to dry (Table 1). And it follows logically that higher corn prices and higher field losses justify an earlier start at higher moistures, lower field losses justify allowing the crop to dry a bit more.

Table 1. Optimized harvest periods and accompanying grain moisture for various farm management situations. Base model assumes yields of 160 bu/A., \$2.25/gal. propane, 0.02 gallons of propane to remove 1% moisture per bushel, corn reaching black layer September 25, field losses of 1% per week Oct. 11-31 and 2% per week thereafter, all on a Central Indiana farm with 1500 acres of corn where harvest could occur for 36 hours per week. Long-term weather records for Indiana indicate that there are about four days per week suitable for field work in the fall, so three 12-hour days were selected to allow time for harvesting other crops or other activities on or off the farm.

	Base Situation	More Harvesting Capacity	Less Harvesting Capacity	Higher Corn Price	Higher Field Losses	Lower Field Losses
Corn price, \$/bu	\$5.00	\$5.00	\$5.00	\$8.00	\$5.00	\$5.00
Rate of harvest, acres per hour	7	10	5	7	7	7
Field loss Oct. 11-31, %/week	1	1	1	1	2	0.5
Field loss after Nov. 1, %/week	2	2	2	2	3	1

Outcomes Based on Input Above

Starting Harvest Date	8-Oct	13-Oct	1-Oct	2-Oct	1-Oct	15-Oct
Starting Harvest Moisture, %	23.5	21.4	26.8	26.3	26.8	20.6
Ending Harvest Date	18-Nov	11-Nov	28-Nov	12-Nov	11-Nov	25-Nov
Cost of grain drying	\$22,246	\$18,587	\$28,668	\$36,267	\$39,018	\$10,142
Cost of field losses	\$33,791	\$28,065	\$42,034	\$36,272	\$40,114	\$25,522
Drying and Field Loss	\$56,038	\$46,652	\$70,702	\$72,538	\$79,133	\$35,664



Management Decisions Regarding Corn Harvest Farmers of various farm sizes and harvesting capacities should analyze their own situation and consider the following:

Would it pay to increase my harvesting capacity?

Would it be cost-effective to hire a portion of my harvest to a custom operator?

At what grain moisture should I begin to harvest?

When can I expect to be done with harvest?

As noted in Table 1, the 1500 corn acre farmer with less harvesting capacity is experiencing about \$24,000 more in drying and field losses due to his/her inability to harvest at the most opportune time.

Test Your Situation A downloadable Excel spreadsheet is available by clicking on the link below. Enter your own variables to test various scenarios on your farm, including best-case and worst-case situations. Please note that for the spreadsheet to work, it needs a solver that may or may not be available with your version of Excel. Instructions for installing this solver and additional references are included in the spreadsheet.

LINK TO CORN HARVEST DECISION TOOL

For More Information

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