GRAIN QUALITY
Task Force

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Purdue University

Slow Versus Fast Low-Temperature Bin Drying of Corn

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Low-temperature in-bin drying of corn using airflow rates of 1 to 3 cfm/bu, and natural air or air heated by 5 to 15°F takes a few weeks (fast) or several months (slow) depending on grain and weather conditions. Grain Quality Fact Sheet #5 (Low-Temperature Drying of the 1992 Indiana Corn Crop) provided specific guidelines based on the Purdue low-temperature drying computer program. It lists maximum filling depths for layer drying with low air temperatures at three harvest moisture contents (22, 25, and 28%) and three airflow rates (1, 1.5, and 2 cfm/bu) during good, average, and poor drying years for central Indiana weather conditions.

This fact sheet supplements the previous information by summarizing the recommendations for 19% moisture content corn harvested in November and dried under central Indiana weather conditions. The tables apply for slow drying when natural air is used without any supplemental heat, and for fast drying when a minimum amount of supplemental heat is used to complete drying before the end of the current calendar year. The specific recommendations are summarized in the following tables.

The recommended filling depth can be used regardless of bin diameter as long as the design airflow rate is maintained. Airflow is the key to successful low-temperature drying. When more air is moved through the grain, more water will be carried out. If the airflow rate from a fan for a particular grain depth is unknown, the fan manufacturer should be contacted, or refer to publication AE-106 “Fan Sizing & Application for Bin Drying/Cooling of Grain” available from your local county Extension Educator.

Is 1994 a Good, Average, or Poor Drying Year?

Based on our own low temperature drying test at the Agronomy Research Center, West Lafayette, Indiana, it appears that 1994 is a good drying year. At an airflow rate of about 1 cfm/bu, and with an initial moisture content of about 20.5%, our 12 foot deep corn mass has dried to 17.3% near the bottom and to 17.8% moisture near the top since October 31. Fan operation has been CONTINUOUS, rain or shine, warm or cold. No supplemental heat has been used. We chose to dry the corn slowly because marketing will not occur until late next spring. We expect to turn off the fan in early December because the top layer will be well below 18% by then. The fan will be operated intermittently for about 4 hours a week during dry cold days for corn quality maintenance during the winter storage period. By about March 1, we will turn the fans back on continuously to complete drying to 15% moisture.

According to Table 1, drying during a good year for an 18 foot deep bin filled with 19% moisture corn should be complete by mid-March for as little as 1.04 kWh/bu. If supplemental heat of 5°F was used, drying could be completed by early December for about 1.53 kWh/bu. Many farmers use supplemental heat in their low-temperature systems to complete drying without excessive dry matter loss. Although it is wise to have supplemental heat available, there are many years in which it is not needed. The use of supplemental heat often leads to over-drying of the bottom layers of corn. However, supplemental heat is an advantage when it is used during a poor drying year, in a year when harvest is delayed until after November 1, or

when the corn moisture content is above 25%. Fan and heater operation for the recommendations summarized here were assumed to be continuous until the corn had dried to 15% maximum moisture content.

Table 1. Estimated drying time and energy use for in-bin low temperature drying of corn harvested at 19% moisture during good, average, and poor drying years in central Indiana. Single day fill to 18 feet grain depth. When necessary, drying is completed in the spring. Natural air only, no supplemental heat used.

Harvest Date (m/d)	Airflow When Bin Full (cfm/bu)	Drying Year	Estimated Drying Completion Date	Energy Use per Dry Bushel (kWh/bu)
11/1	1	Good	3/16	1.04
		Average	3/30	1.35
		Poor	4/7	1.87
	1.5	Good	11/26	1.44
		Average	3/7	2.17
		Poor	4/11	3.56
	2	Good	11/18	2.11
		Average	3/7	4.59
		Poor	3/28	7.05
11/15	1	Good	3/29	1.41
		Average	3/31	1.45
		Poor	4/3	2.11
	1.5	Good	3/18	2.33
		Average	3/23	2.83
		Poor	3/31	4.04
	2	Good	3/23	4.82
		Average	3/22	4.94
		Poor	3/29	6.32

Table 2. Estimated drying time and energy use for in-bin low temperature drying of corn harvested at 19% moisture during good, average, and poor drying years in central Indiana. Single day fill to 18 feet grain depth. Drying is completed before the end of the calendar year. Supplemental heat is used as necessary.

Harvest Date (m/d)	Airflow When Bin Full (cfm/bu)	Drying Year	Estimated Drying Completion Date	Energy Use per Dry Bushel (kWh/bu)	Supplemental Heat (deg. F)
11/1	1	Good	12/4	1.53	5
		Average	12/10	1.79	5
		Poor	12/1	2.62	10
	1.5	Good	11/26	1.44	-
		Average	11/27	2.46	5
		Poor	12/14	4.01	5
	2	Good	11/18	2.11	-
		Average	11/27	4.44	5
		Poor	12/16	7.57	5
11/15	1	Good	12/15	2.62	10
		Average	12/16	2.70	10
		Poor	12/26	3.55	10
	1.5	Good	12/12	2.55	5
		Average	12/16	2.92	5
		Poor	12/8	3.61	10
	2	Good	12/7	3.79	5
		Average	12/11	4.44	5
		Poor	12/2	4.39	10