

## Holding Wet Shelled Corn – “Shelf Life” Estimation

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Shelled corn is usually harvested at moisture contents well above those required for long term storage. Fungi can grow in this high moisture corn causing discoloration of the kernels, a drop in germination, and a loss of dry matter. Some fungi can produce mycotoxins, which are substances that are harmful to animals and people when they are ingested or inhaled. Several mycotoxins can cause harm when they are at sufficiently high concentrations and they come in contact with the skin. For additional information on mycotoxins see [www.grainquality.org](http://www.grainquality.org) Extension Publications, “Diseases and Mycotoxins,” Publication BP-47.

When corn is harvested faster than it can be dried and held at high moistures for several days, or when corn is dried in an ambient or low temperature in-bin drying system, producers and people working in the grain industry would like an estimate of how long they can hold the corn at an above average moisture content before an unacceptable level of fungal growth occurs. The table shown below, taken from ASABE Standard D535, can be used to answer this question. However, it must be used with caution. The values shown are the times required for shelled corn at various temperature-moisture combinations to reach 0.5% dry matter loss. On the average, the shelled corn will drop one grade level (e.g. from No. 2 to No. 3 corn) by the time 0.5% dry matter loss occurs. Note that as moisture and temperature decrease, there is a noticeable increase in the number of days required to reach this dry matter loss. **One half of the values shown in the table should be used.** For example, the table gives 11 days as the allowable storage time of corn at 24% moisture and 60°F. The producer should try to hold the corn no longer than 11 divided by 2 = 5.5 days!

Explanations: There are several reasons for dividing the table values by two. First, the change in grade would cause a significant economic loss and dividing by two reduces the risk. Secondly, the values given in the table are general and only approximate. Tests have shown that a change in grade can sometimes occur before 0.5% dry matter loss is reached. Thirdly, mycotoxins can also be produced before 0.5% dry matter loss is attained. Fourthly, corn hybrids differ in susceptibility to invasion by fungi. Fungi will develop more rapidly in some hybrids and less rapidly in other hybrids. Fifthly, corn has a finite shelf life and if storage at high moistures uses up most of that storage life, it will be much more likely to mold when it is stressed by being placed in high temperature and/or high humidity environments. Finally, the values in the table assume a normal level of damage. If the harvest moisture is high and/or if combine cylinder speed is relatively high or the combine is not adjusted properly, the levels of damage could exceed those used to determine the values shown in the table. Fungi grow faster at these higher levels of damage and the values given in the table must be divided by a correction factor that is greater than 1. The correction factor can be as high as 2 for severe levels of damage.

Additional information: Data for moistures below 16% are not included in the table because fungal growth is slow under these conditions and it is difficult to make dry matter loss measurements. At high ambient temperatures (e.g. 90°F), fungi can grow slowly in shelled corn at moisture contents as low as 14.0%. If corn is held at two different moistures, a rough estimate of the allowable storage time can be obtained using a two step process. First, the percentage of allowable storage time used at the first temperature and moisture is calculated. This is subtracted from 100% and the remainder is multiplied times the allowable storage time at the new moisture and temperature. Consider shelled corn harvested at 26% moisture and held at 75°F for 2 days and then quickly dried to 20% moisture and stored at 55°F. According to the table, the allowable storage time at 26% moisture and 75°F is 4 days. Therefore after 2 days the storage time used will be 2 divided by 4, which is 0.50 or 50%. The allowable storage time at 20% moisture and 55°F is 43 days. Therefore, the corn could be stored (1-0.50) times 43 or approximately 21.5 days before 0.5% dry matter loss is achieved.

**Maximum Allowable Shelled Corn Storage Time for 0.5% Dry Matter Loss, Days.<sup>(a)</sup> (ASABE Standards 2005)**

Corn temp		Corn moisture, % wet basis						
°F	16	18	20	22	24	26	28	30
35	1144	437	216	128	86	63	50	41
40	763	291	144	85	57	42	33	27
45	509	194	96	57	38	28	22	18
50	339	130	64	38	26	19	15	12
55	226	86	43	25	17	13	10	8
60	151	58	29	17	11	8	7	5
65	113	43	22	13	9	7	5	4
70	85	32	16	10	7	5	4	4
75	63	24	12	8	5	4	3	3

<sup>(a)</sup> D = 30%, M<sub>D</sub> = M<sub>H</sub> = M<sub>F</sub> = 1, Times calculated using °F temperature values.