DRYING GRAIN IN ILLINOIS

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Each grain crop has its own particular moisture content for minimum harvest losses and safe storage. Frequently, the moisture conditions under which harvest is most efficient are higher than those required for safe storage. For example, minimum field losses for corn occur at approximately 24- to 26-percent moisture, but maximum moisture content for long-term storage is 13.5 percent. Soybeans can be harvested at moisture contents above 16 percent but need to be below 11 percent for long-term storage. Wheat should be below 13.5 percent for long-term storage, although it can be harvested at moisture contents up to about 24 percent. (For short term storage periods — less than a year — most grains can be stored at approximately 2 percentage points above long-term storage moisture contents). Grain drying permits harvest at higher moisture contents, thereby allowing earlier harvest (or harvest during unfavorable weather conditions) and reducing field losses due to insect infestations, diseases, and weather factors.

The total benefit of drying, however, must be weighed against the amount of fuel required for drying. A typical high-speed grain drying operation consumes more gallons of fuel than were used in tilling and harvesting the grain. Fuel consumption for tillage, planting, cultivation, and harvesting typically will be in the range of 5 to 15 gallons of gasoline or diesel fuel per acre; drying 100 bushels of corn from 25- to 15-percent moisture requires 15 to 20 gallons of LP gas. Fuel requirements for drying soybeans and wheat are lower, since natural air can often be used. Because future food needs of humans and livestock will likely demand ever greater volumes of grain, the grain producer must keep alert to changes in technology so that production energy can be used to its best advantage.

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BASIC DRYING SYSTEMS

Three basic drying systems are in use in Illinois: in-storage drying, batch drying, and continuous-flow drying. All other systems are variations or combinations of these. For example, a bin designed as a batch dryer may be used as an in-storage dryer for the last binful of the season. In another variation of in-storage drying, a bin can be equipped with a conveyor to remove dry grain from the bottom of the bin and thereby become a continuous-flow bin dryer (Fig. 1).

In-Storage Drying

As the name implies, in-storage drying refers to drying grain in the bin in which it is to be stored. Systems in this category of drying are layer drying, stir drying, and low-temperature or natural air drying.

Layer drying. The bin is filled a layer at a time. After one layer of grain is partially dried, another layer is added and the process is repeated until the bin is full. How much grain to add and when to add it depend upon the moisture content of the grain and the fan-heater output. Bins must be filled according to manufacturers' recommendations or some of the grain may spoil before it is completely dry.

The grain is dried by air flowing up through a perforated floor or through a duct system in the bottom of the bin (Fig. 2). Drying begins in a narrow zone at the floor level, then moves slowly up through the grain until it reaches the top of the bin.

Stir drying. A stirring device (Fig. 3) can be added to an in-storage drying system to permit the use of more heat. The stirring device mixes the wet grain at the top with the dry grain at the bottom so that the moisture condition is more uniform and the problem of overdrying the grain at the bottom is reduced.

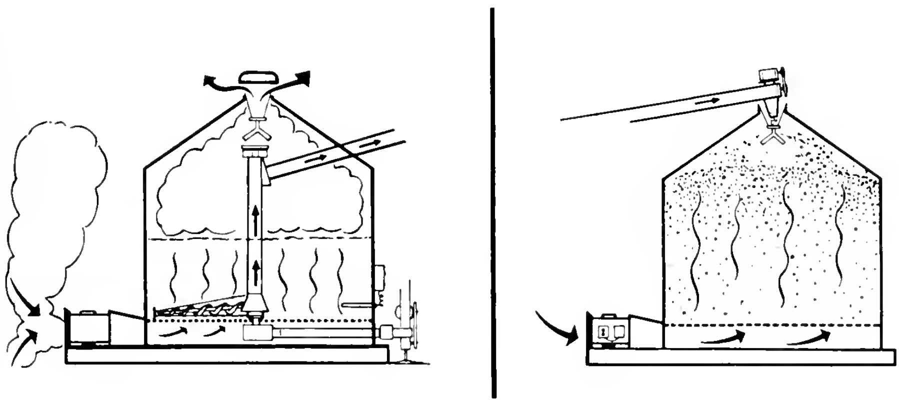

Figure 1. A bin dryer equipped with a conveyor for removing hot grain from the bin becomes a continuous-flow dryer.

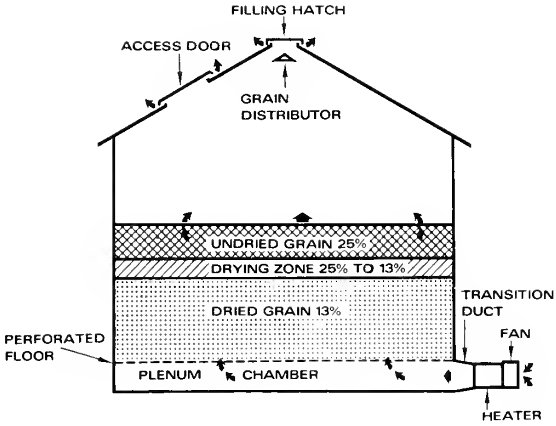

Figure 2. A drying zone is established as air is forced through wet grain. The movement of the drying zone depends upon airflow, temperature of the drying air, and moisture content of the grain.

After drying is completed, the stirring device and the fan should be operated for an additional 24 hours or more without heat. This will break up any undried areas and improve drying of grain next to the side walls and in any other unevenly dried areas. After drying is completed, the grain should be probed extensively and checked to insure that a satisfactory moisture level has been obtained.

Low-temperature and natural air drying. Low-temperature drying (including natural air drying and drying with enough additional heat to raise the temperature about 5°F.) can be used to dry fully loaded bins if the proper filling and drying procedures are followed. An understanding of the allowable storage time (Fig. 4) is important, as is proper sizing of air-moving and heating equipment.

Drying shelled corn with air having a daily average temperature of 30° to 50°F. is a slow process because of the limited moisture-absorbing capacity of air at this temperature. If sufficient air is moved through the bin, however, drying can be completed within the allowable storage time.

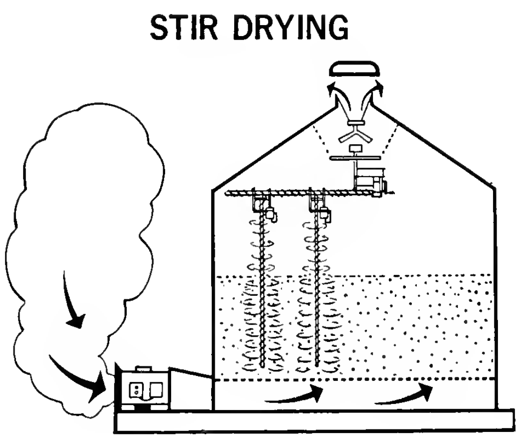

Figure 3. A stirring device permits drying deep layers of grain.

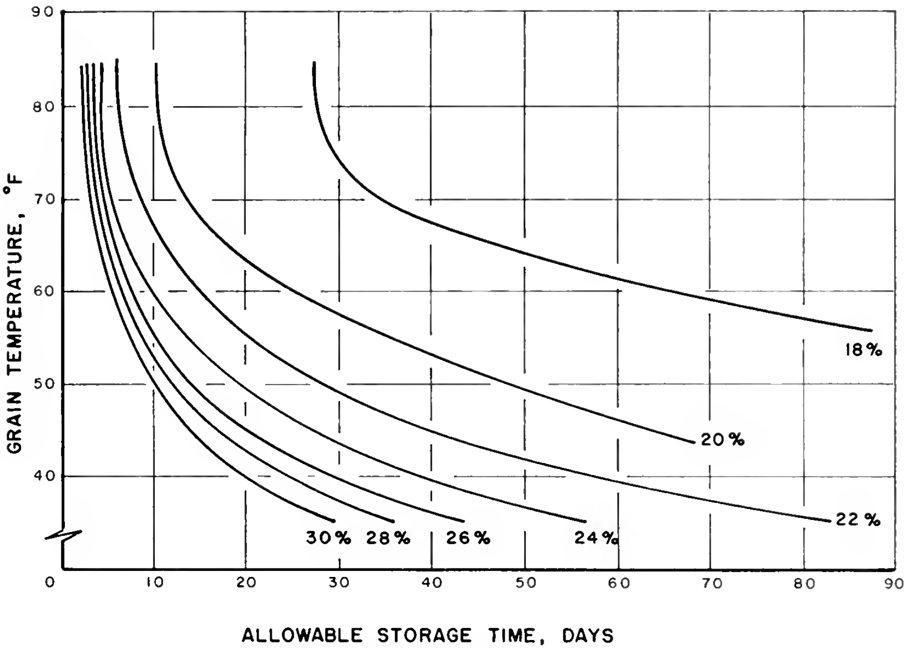

Figure 4. The length of storage time before excessive mold occurs depends upon the moisture content and temperature of the grain (graph based on USDA data).

An airflow of 1 cubic foot per minute (cfm) per bushel is considered minimum for low-temperature drying. For an airflow of 1 cfm per bushel, grain depth should not exceed 20 feet to keep power requirements within reasonable limits; 24 feet is the absolute maximum. For greater airflows, grain depth should be reduced (Table 1). Airflow per bushel for a given installation can be increased by filling the bin only partially. For example, if a 7½ horsepower fan delivers 8,000 cfm, providing 1 cfm per bushel in 8,000 bushels at a depth of 18 feet, the same fan will provide 2 cfm per bushel through 4,000 bushels at a depth of 9 feet.

Table 1. Airflow and Power Requirements for Low-Temperature Drying of Shelled Corn

Initial corn moisture, %	Minimum airflow, cfm/bu.	Depth of corn, ft.	Approximate fan power, hp./1,000 bu.
26	3	10 to 12	3
24	2	14 to 16	2
22	1	20 to 24	1

Generally, the air temperature must be raised a few degrees to lower the relative humidity so that corn can dry to a moisture content of 14 to 15 percent. The daily relative humidity often averages about 80 percent during much of the corn harvest season. Drying corn to 15-percent moisture will require the addition of a small amount of heat, enough to raise the temperature about 5°F. The heat from most grain-drying fans will raise the air temperature about 2°F., so the heater need raise the temperature only an additional 3°F.

For best results with low-temperature drying, the following procedures are recommended:

1. Use screening devices to keep the grain free of excess dirt, fines, and chaff.

2. Keep the grain level as the bin is filled. Grain leveling devices are recommended.

3. Start the fan as soon as the grain is placed in the bin. Continue to operate it even during periods of rain or high humidity until the grain is dry or until the air temperature drops to and remains below freezing for extended periods of 24 hours or more. When the temperature rises above freezing, restart the fan and finish drying.

4. Open and leave open all roof hatches to provide a large air escape area during the drying period.

5. Attach a manometer (pressure gauge) to the air plenum to measure static pressure, and use manufacturers' fan performance charts to determine airflow. The manometer can be used to check changes in airflow during filling and drying.

6. Do not exceed design criteria. If necessary, limit grain depth to obtain proper airflow in relation to grain moisture content. Drying must be completed before excessive molding occurs. See Figure 4 for safe storage time and Table 1 for airflow recommendations.

7. After drying is complete, close roof hatches and cover fan inlets.

8. Aerate dry grain to keep it cool (about the same temperature as the outside air) and to prevent moisture migration in the grain mass. The drying fan can be used about 12 hours every 7 to 10 days.

9. Inspect grain surface regularly during storage. Probing the interior grain for samples is an even better way to check the condition of the grain.

Batch Dryers

Batch dryers include bin dryers and separate drying units that may be portable or fixed in place. Large amounts of heated air, 30 to 100 cfm per bushel, are blown through shallow columns of grain 6 to 30 inches thick. Batch dryers operating at about 140°F. are designed to remove about 10 percentage points of moisture from a moist grain layer 18 inches thick in about 3 hours. An additional 30 to 45 minutes are required to cool the grain.

On some batch dryers electric controls operate the loading and unloading equipment. When a batch of grain is dry, it is automatically removed from the dryer into a storage bin and a new batch of wet corn is moved from the holding bin into the dryer. In one bin dryer the batch is held on a perforated floor installed below the bin roof. When the grain is dry, a series of doors opens and the grain falls into the final storage area. Since the bin floor is also perforated, the grain can be cooled either in the storage area or in the drying area under the roof.

Batch-in-bin dryers combine the advantages of batch drying and in-storage drying. A drying bin equipped with perforated floor, fan, and heater is used to batch-dry corn until all storage bins are filled. The drying bin then becomes a storage bin for the last batch by using the in-storage layer-drying technique described on page 3.

A wide range of drying capacities is available. The grain producer may choose from several drying units for bins up to 42 feet or more in diameter. A grain layer of any depth from a few inches to about 3 feet can be dried, as long as the grain is leveled. Usually, the grain is dried in layers of 1½ to 3 feet thick at temperatures of 100° to 140°F. with airflows of 10 to 40 cfm per bushel. Table 2 can be used to estimate the length of time to dry grain with 30 cfm per bushel.

Moisture content of grain to be dried in a batch-in-bin dryer may be as high as when a batch dryer is used: 28 to 30 percent. The time required to remove 10 percentage points of moisture will vary from a few hours to 24 hours, depending upon cleanliness of the grain, moisture content, depth of the grain, drying air temperature, and rate of airflow.

The complete drying cycle consists of loading or filling the drying bin, drying, cooling, and emptying the dryer. Cooling takes about an hour. The batch is then mixed as it is removed with a sweep auger and conveying equipment, and the cycle is completed. Batch-in-bin drying is easier to coordinate with harvest when batches are dried in a 24-hour cycle. Stirring devices can be used to increase batch size and reduce moisture variation throughout the grain depth.

Table 2. Approximate Hours to Batch-in-Bin Dry and Cool 1,000 Bushels of Corn to 13-Percent Moisture Content With an Airflow of 30 Cfm per Bushel

Initial moisture content, %	Drying air temperature, °F.		
	100	140	180
30	21	12	9
28	18	10	8
26	15	8	7
24	12	7	6
22	10	6	5
20	8	5	4
18	6	4	3

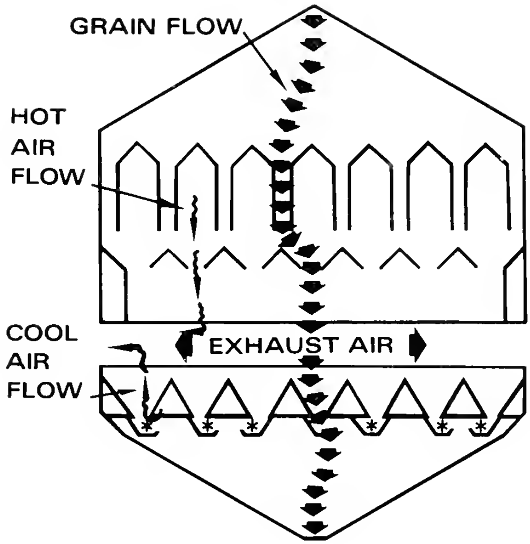

Figure 5. This dryer utilizes concurrent-flow in the heating section and counter-flow in the cooling section.

Continuous-Flow Drying

Most large grain dryers operate on a continuous-flow basis. In a cross-flow dryer, grain is dried in a column 6 to 24 inches thick. Heated air is forced through the upper, wetter part of the column of drying grain, and cool air moves through the dry, hot, lower portion. As dry grain is discharged at the bottom, wet grain is added to the top of the column.

In other continuous-flow dryers the air moves in the same direction as the grain (concurrent-flow) or opposes the flow of the grain (counter-flow). Some dryers employ a combination in which concurrent-flow is used for the wettest grain and highest air temperature while counter-flow is used in the cooling section (Fig. 5).

Continuous-flow grain drying and cooling is nearly automatic, but the moisture of the dried grain must be checked and the discharge control appropriately adjusted so the grain will be dried to the desired moisture content. Drying capacities range from 100 to several hundred bushels per hour.

SELECTING DRYERS TO MATCH HARVESTING RATES

Most farmers hope to dry their grain and place it in storage as fast as it is harvested. The harvesting rate may vary from 1,000 to 4,000 or more bushels a day. Selecting drying equipment with the capacity to meet the harvesting rate requires knowing the amount of moisture to be removed, the airflow rate, heat requirements, the size of dryer or drying bin, and horsepower requirements.

Assume, for example, that you have an annual production of 15,000 bushels of corn and would like to dry 1,000 bushels of 24-percent moisture corn to 13 percent in 10 hours. With this drying capacity, the corn can be harvested in 20 to 25 days, taking into account weekends and delays caused by weather and equipment breakdown. You decide to use a batch-in-bin dryer and to limit the drying air temperature to 140°F. (Although a batch-in-bin dryer is used in the example, the general equations should be helpful in determining equipment requirements for any grain-drying installation.)

Moisture to Be Removed

According to Table 3, 8.11 pounds of water must be removed from 64.11 pounds of 24-percent moisture corn to produce a bushel of corn (56 pounds) at 13-percent moisture. Thus, if 1,000 bushels of 24-percent moisture corn is to be dried in 10 hours, a total of 8,110 pounds of water, or 811 pounds per hour, must be removed.

Airflow

An airflow rate of 1,000 cfm of air, heated from 60° to 140°F., will remove 60 pounds of moisture per hour (Table 4). Since drying will not be 100-percent efficient for the complete drying cycle, an efficiency of 75 percent is assumed. To find the airflow rate needed, use the equation at the top of page 10.

Table 3. Pounds of Water[a] That Must Be Removed in Drying to Produce 56 Pounds[b] of Shelled Corn

Initial moisture content, %	Moisture content after drying, %			
	12	13	14	15½[c]
35	19.82	18.95	18.09	16.80
30	14.40	13.60	12.80	11.60
28	12.44	11.67	10.89	9.72
26	10.59	9.84	9.08	7.95
24	8.84	8.11	7.37	6.26
22	7.18	6.46	5.74	4.67
20	5.60	4.90	4.20	3.15
18	4.10	3.14	2.73	1.71
15½	2.32	1.66	.99	0

[a] One gallon of water weighs 8.33 pounds.

[b] The weight of one bushel of shelled corn in the commercial market. To find the initial pounds of wet corn required to produce 56 pounds of corn at a given moisture content, add 56 to the pounds of water that must be removed; for example, if 28-percent corn is to be dried to a moisture content of 15½ percent, it will take 65.72 pounds of wet corn to produce 56 pounds of dry corn (9.72 + 56 = 65.72).

[c] Maximum percent moisture content for No. 2 corn.

$$\text{cfm} = \frac{M \times 1{,}000}{E \times M_1} = \frac{811 \times 1{,}000}{0.75 \times 60} = 18{,}022$$

cfm = capacity of drying fan in cubic feet of air per minute
M = pounds of moisture to be removed from wet corn per hour
E = efficiency of drying air in removing moisture
M_1 = pounds of moisture removed each hour by 1,000 cfm of air

The assumption of 75-percent efficiency in the use of heat is based on an average air temperature of 60°F. and relative humidity of 65 percent. These conditions normally prevail in Illinois during early corn harvest in late September and October. If harvest is delayed until November or December, the efficiency of heat use may drop to 50 percent. In summer it may be as high as 85 percent.

Heat

Calculate heat requirements according to the following equation:

$$\text{Btu per hour} = 1.1 \times \text{temperature rise} \times \text{cfm of fan}$$

To raise the temperature of 18,022 cfm of drying air in our example from 60°F. to 140°F., a burner with an output of 1,584,000 Btu per hour will be required (1.1 × 80 × 18,022).

Horsepower

Calculate horsepower requirements for a drying fan as follows:

$$\text{fan hp.} = \frac{\text{cfm} \times \text{static pressure in inches of water}}{\text{fan efficiency} \times 6{,}356}$$

The static pressure is the inches-of-water column read on a manometer connected to the air duct or plenum chamber. Static pressure developed by airflow through shelled corn can also be determined if the airflow in cfm per square foot of bin floor is known (Fig. 6).

From the airflow rate equation (at top of page), we know that an

Table 4. Moisture Removed at Various Temperatures and Humidities

Temperature of air, °F.	Humidity of air, %	Pounds of water removed per hour per 1,000 cfm
60[a]	65.0[a]	7
70	45.0	12
80	32.0	18
100	18.0	31
140	5.8	60
180	2.2	78

[a] Initial condition of air; no heat added.

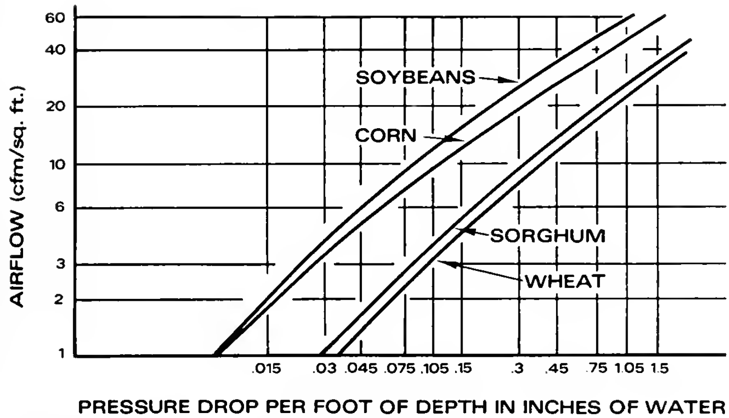

Figure 6. Resistance of grain to airflow.

airflow of about 18,000 cfm is required to dry 1,000 bushels at a temperature of 140°F. If the grain is dried in a 24-foot bin, the airflow rate per square foot will be as follows:

$$\text{cfm per sq. ft.} = \frac{\text{cfm}}{\pi r^2} = \frac{18{,}000}{\pi (12)^2} = 39.8\text{, or roughly } 40$$

With an airflow of 40 cfm per square foot of bin floor area, the static pressure is 0.79 inch of water per foot of corn depth (Fig. 6). The depth of 1,000 bushels in a 24-foot bin will be as follows:

$$\text{depth of grain in ft.} = \frac{\text{bu. to be dried} \times \text{cu. ft. per bu.}}{\pi r^2}$$

$$= \frac{1{,}000 \times 1.25}{\pi (12)^2} = 2.8$$

The total static pressure will be 2.8 feet of grain times 0.79 inch of water per foot of grain, or 2.21 inches of water. If we assume that most fans are about 50-percent efficient in moving air, the fan horsepower can now be determined:

$$\text{fan hp.} = \frac{18{,}000 \times 2.21}{0.50 \times 6{,}356} = 12.5 \text{ hp.}$$

Additional Limitations

Air temperatures of 110°F. are the highest recommended for seed grains and 140° to 160°F. for grain sold to processors. Air temperatures of 180° to 200°F. can be used for feed grains.

The safe storage time for wet grain varies with moisture content and grain temperature (Fig. 4). Corn harvested at 30-percent moisture when the temperature is 80°F. must be dried in about two days. However, if the same corn is harvested and cooled to a temperature of 40°F., the drying time can be extended to 20 days. If 18- to 20-percent moisture corn is harvested and stored at 30° to 40°F., it can be kept two or three months without drying.

Shelled corn that is to be fed to livestock does not have to be dried if it is field-shelled when temperatures are low or cooled after it is stored. If, however, it will not be fed during the safe storage period, it must be dried, treated with preservatives, or ensiled for longer storage.

MANAGEMENT CONSIDERATIONS

Whenever grain is dried, quality should be uppermost in one's mind. Key management techniques that can help preserve grain quality include drying with and without heat, dryeration, aeration, stirring, cooling, use of acid preservatives or high-moisture storages, plastic covers, and utilization of allowable storage time data (Fig. 4) to determine the length of time available before excessive mold occurs.

Good management could mean employing a combination of systems: drying part of the grain in the fall and the remainder in the spring when the weather is warmer, for example, spreads out the work load (but use good grain-handling and drying practices to keep the grain from spoiling during the winter).

The following combinations have also been used successfully:

Dryeration (Fig. 7) uses high temperatures to dry the grain to about 16- to 18-percent moisture content. The grain is then removed from the dryer and placed in a temporary storage bin and allowed to stand (steep) for 4 to 8 hours. After the steeping period, the grain is cooled with an airflow of ½ to 1 cfm per bushel. When the grain has cooled (about 12 to 20 hours later), it is moved to the final storage bin.

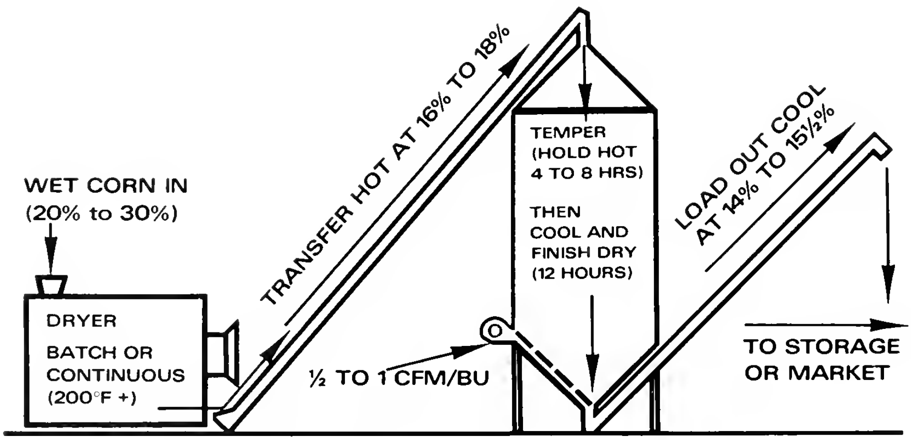

Figure 7. The dryeration process increases the capacity of a bin, batch, or continuous-flow dryer.

A combination of high- and low-temperature systems can be used; this is similar to the dryeration process, except the grain is removed from the high-temperature dryer at 20-percent moisture (either before or after cooling). The grain is then placed in the final storage bin, where the drying is completed by means of the low-temperature drying process. If the grain is cooled before being removed from the high-temperature dryer, very little if any moisture condenses on the underside of the storage bin roof.

Stir drying is a process in which the dry grain in the bottom of a bin is mixed with the wet grain at the top (Fig. 3). This process dries the full depth of grain at the same time rather than the bottom first and the top last. A higher drying temperature can be used than when drying unstirred grain.

Cooling the grain with cold night air is a worthwhile management tool. The cooler the grain, the longer it can be held at a reasonably high moisture content (Fig. 4).

Applying preservatives (acids) on high-moisture grain is a further management tool to keep corn over prolonged periods without drying. In most cases acid-preserved corn must be fed to livestock.

Plastic can be used for temporary storage. A small vacuum is used to hold the plastic tight to the grain. When temperatures change, condensate may form inside the plastic. Too much condensate can cause surface spoilage.

Aeration is a process in which dry or nearly dry grain is kept at the same temperature as the outside air. A small amount of air such as 1/20 to 1/5 cfm per bushel is blown through the grain steadily, or larger amounts of air may be used intermittently. This process keeps the grain in condition by controlling the air currents moving in the grain mass. Aeration should prevent condensation of moisture in the top layer of grain in the bin.

Checking Moisture Content

Close observation of grain moisture content is essential during drying, but even more so during storage. To measure moisture as accurately and as often as one should, it is important to have a moisture tester on the farm. Moisture meters are usually calibrated for grain at room temperature (77°F.), the temperature at which the most accurate readings are obtained. At other temperatures use the appropriate temperature correction.

When checking the moisture content, be sure to get a representative sample of grain. Moisture content can vary considerably from one location to another. Taking small quantities from several locations and mixing them is much better than taking the sample from a single location. A grain probe is a convenient device for taking grain samples.

Some dryers have special openings for taking samples for testing. Testing samples from a dryer while the grain is drying, however, will give you only an estimate of the moisture content. Instead, mix together several samples taken from the dryer as it is emptied and test this mixture, or take probe samples of the dry grain from the truck or bin.

The percentage of moisture in the wettest grain determines whether the grain has dried to a safe level. To get a representative sample of grain dried in a storage bin, take at least three samples: one on top, one near the center, and one near the bottom. If grain is being dried in storage, you will need to take additional samples to determine the drying pattern.

If the samples cannot be tested immediately, put them in metal cans or glass jars with airtight lids or in airtight plastic bags. Fill the containers completely, leaving as little air space as possible. Samples in tight containers can be kept in a refrigerator for testing at some later date. Unrefrigerated samples should be tested within 24 to 36 hours.

Safety

Safety considerations should be a part of all grain drying and handling installations.

1. Shield all moving parts, including conveyor intakes and power shafts.
2. Lower portable conveyors to the transport position when moving.
3. Ground all electrical equipment.
4. Inspect bin ladders periodically.
5. Keep areas around dryers free from unnecessary equipment and supplies.

The hazard of suffocation associated with bottom-unloading equipment in bins, wagons, hopper tanks, etc. must not be overlooked. As bottom-unloading equipment operates, the grain flows off the top and down a center cone. There have been numerous cases of operators, spectators, and children walking out onto the top of the grain and being drawn into the grain flow. The only way to prevent this kind of accident is to make absolutely sure that no one is on the grain surface or enters the storage area whenever bottom unloading is in progress.

Handling grain that contains mold or dust can cause respiratory problems. Wear dust filters whenever such grain must be handled.

DRYING SOYBEANS

Soybeans to be dried for seed must be handled carefully to preserve germination. Germination can be reduced to less than 50 percent at drying air temperatures above 130°F. Cracks in the seed coat develop at relative humidities below 40 percent, and additional handling removes the seed coat so that the bean splits.

Table 5. Percent Moisture Content to Which Soybeans Will Dry

Relative humidity of drying air, %	Temperature of drying air, °F.				
	30	40	50	60	70
40	9	8.5	8	7.5	7
50	10.5	10	9.5	9	8.5
60	12	11.5	10.5	10	9.5
70	14	13	12	11.5	10.5
80	16	15	14.5	13.5	12.5
90	20	19	18	17	16
100	26	25	24	23	22

Soybeans to be processed for food also need careful handling. Any injury to the seed coat causes the soybean to develop an off-flavor that is nearly impossible to remove during processing.

Low-temperature or natural air drying appears to work well for drying soybeans. Airflow rates of 1 to 2 cfm per bushel and enough heat to raise the air temperature by from 3° to 5°F., including the heat from the fan, can be expected to dry soybeans in less than three weeks with reasonable fall weather. The exact amount of time required will vary with the initial moisture content of the soybeans and the weather conditions. At relative humidities in the 50 to 70 percent range, soybeans can be expected to dry to 11- to 13-percent moisture content (Table 5).

Final moisture content will depend upon the average relative humidity of the air passing through the beans. Expect some reduction in germination if the moisture content remains above 13 percent for more than a month at temperatures below 60°F. At temperatures above 60°F. germination can be impaired in a shorter time.

High-temperature drying of soybeans is limited to situations where seed-coat damage and germination are not important. Even then, air temperatures should be limited to 190°F. or less and bean temperatures to 160°F. or less to avoid a reduction in oil content.

DRYING WHEAT

The major limitation on drying wheat is the maximum temperature of the drying air. Wheat to be used for milling should be dried at temperatures below 160°F.; higher temperatures severely reduce milling quality. Seed wheat should be dried at air temperatures below 110°F. to prevent a reduction in germination.

Any of the generally available drying systems can be used for drying wheat. Drying rates will be somewhat slower than for corn because of wheat's increased resistance to airflow (approximately double that of corn); therefore, a given fan size would be expected to take about twice as long to dry wheat as corn.

Since wheat is harvested during the warmer portion of the season, it is often possible to use in-storage drying facilities. For best results the drying bin should be equipped with a fan having at least one horsepower for each thousand bushels of wheat in the bin. Depth of fill should be limited to about 10 to 12 feet of wheat at 18-percent or less moisture. Reduce the depth about 2 feet for each 2 percentage points of moisture above 18 percent. The fan should be operated continuously from the time the first layer of wheat is placed in the bin until drying is complete. If the relative humidity averages 60 percent while the fan is running, the wheat can be expected to dry to around 13½ percent; if the relative humidity averages above 75 percent, some supplemental heat (about 3°F.) is desirable.

DRYING SORGHUM

Sorghum is mature at 30-percent moisture but is very difficult to harvest at moistures above 25 percent. Final moisture content should be 13 percent or less for long-term storage.

Trash can be a serious problem when drying sorghum and should be removed before drying. Trash increases the resistance to airflow and, when it accumulates and dries out, is easily ignited. High-temperature dryers should be emptied daily and all trash removed to minimize the fire hazard.

Airflow resistance of sorghum is nearly double that for corn (Fig. 6). This means a slower drying rate for a given fan size. With bin dryers it is especially important to limit depth to 10 to 12 feet to keep horsepower requirements within practical limits.

Drying air temperature recommendations for sorghum are the same as for corn. Use air temperatures below 110°F. for seed and below 200°F. for feed. For low-temperature drying, raise the air temperature about 5°F. above outside air at an airflow of 1 cfm per bushel (approximately 1 hp. per 1,000 bushels).

Allowable storage time appears to be about the same as for corn that is approximately 3 percentage points wetter. In other words, 22-percent moisture sorghum spoils as rapidly as 25-percent moisture corn, apparently because of the tighter packing of the sorghum. Trash and green kernels will increase the spoilage problems.

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