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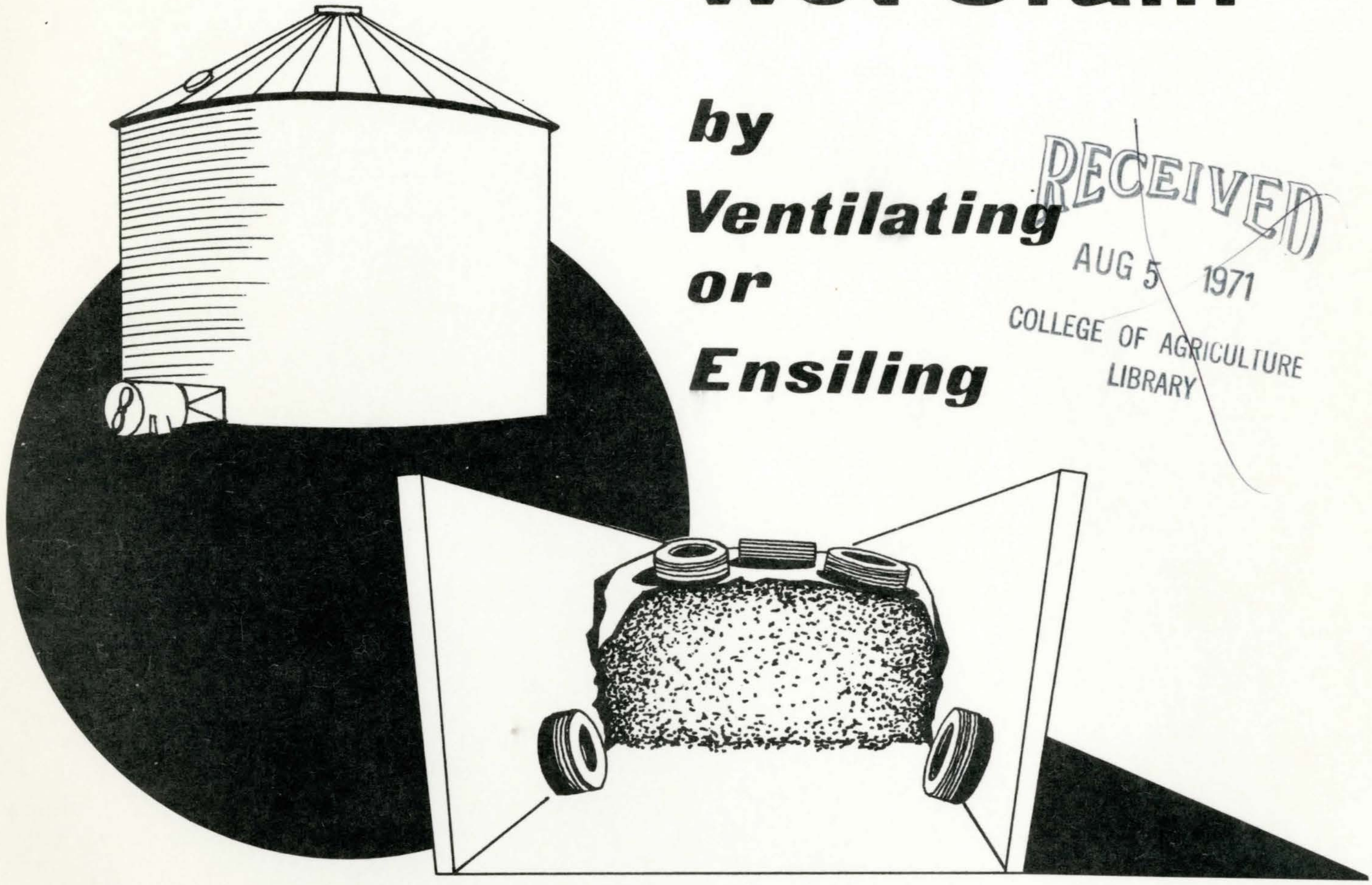

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BINS AND EQUIPMENT FOR EMERGENCY GRAIN STORAGE

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Wet grain can be kept in low cost, multi-use space but handling costs may be high. Two emergency grain storage practices are: (1) continuous ventilation to cool and dry the grain and (2)ensiling to produce animal feed.

Ventilating Grain

The time that wet grain can be held without too much damage depends upon its internal temperature and moisture content. Ventilation removes heat from grain, dries it slowly and cools it as temperatures drop at harvest time. The main purpose of ventilation is to keep grain cool. Ventilate grain continuously, rain or shine, night and day, because rates of spoilage increase rapidly when temperatures rise in grain.

Amount of air required depends upon:

Moisture content of grain—Amount of spoilage is doubled for each 2% increase in moisture in the 20 to 25% range.

Season—There may be a two-fold change in grain spoilage as a result of weather differences in different years.

Harvest date—Amount of spoilage of ventilated grain is halved for each 15-day delay in the date of harvest from Oct. 1 to Nov. 15. Figs. 1, 2, 3 and 4 show effects of moisture, season, harvest date and amount of ventilation on dry matter loss in wet grain stored at Lincoln, Neb. Dry matter loss is associated with spoilage and with a resulting loss in commercial grade. Generally speaking, a 0.5% dry matter loss will cause a reduction of one market grade.

For Nebraska use at least two cubic feet of air per minute per bushel of 24% moisture grain, 1 CEM for 20%. If these airflow rates cannot be supplied, the amount of grain spoilage doubles each time the airflow rate is halved.

Power required for ventilation is greatly affected by grain depth. Fig. 5 shows power needed for a good fan delivering 2 CFM per bushel through 1000 bushels of corn when piled 3 feet deep and 15 feet deep.

Some fans will not deliver air at a pressure of 3.6 inches of water, the pressure required to ventilate corn 15 feet deep at a rate of 2 CFM per bushel.

Depth is an arbitrary value but generally shelled corn piled 8 to 10 feet deep can be economically ventilated.

Milo has more resistance to airflow than corn. Horsepower for 1000 bushels of milo 3 feet deep and 15 feet deep for a fan efficiency of 60%, like that used for corn, is 0.11 HP and 4.6 HP, more than twice the requirement for corn. Piling milo half as deep as corn is conservative because milo is usually drier at harvest than corn.

Table 1 gives approximate horsepower and static pressure required for ventilating corn and milo.

Air distribution is best through a perforated floor under all of the grain but a duct system can be arranged for emergency use. Ducts can be constructed from boards, improvised from boards and concrete blocks or purchased from grain storage dealers. Ducts should have a cross section of one square foot for each 1000 CFM of air. Some duct systems have been abandoned because of difficulty in handling corn onto them and because of maintenance problems.

Planning a typical ventilated system will vary with the production, sale and use situation. One advantage of having 25% emergency ventilated storage is that it can be used as a surge bin for grain going into the drier. For example, a farm with 260 acres of corn averaging 110 bu. per acre has a normal harvest of 28,600 bu. An emergency plan should provide for 7,200 bu.

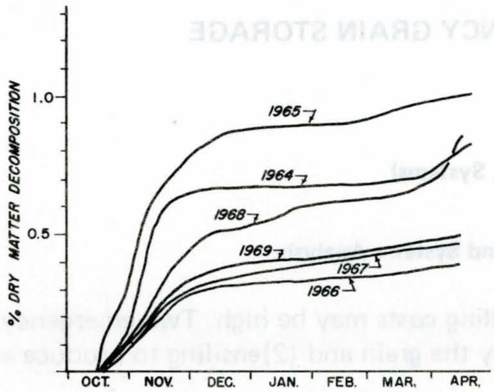

FIG 1

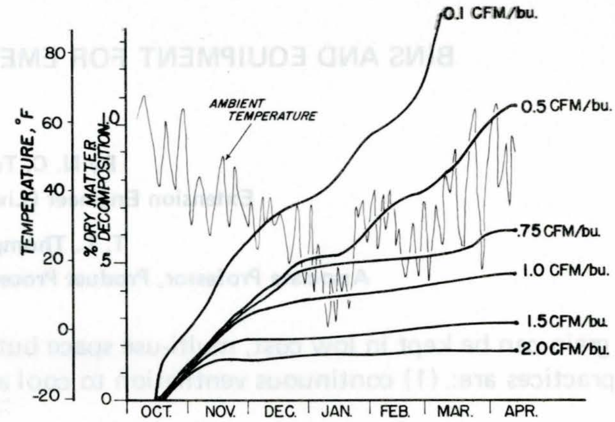

FIG. 2 **Effect of airflow on percent dry matter decomposition.**

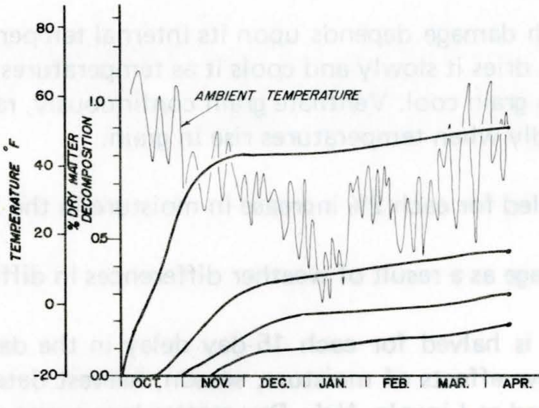

FIG. 3 **Effect of starting date on percent dry matter decomposition.**

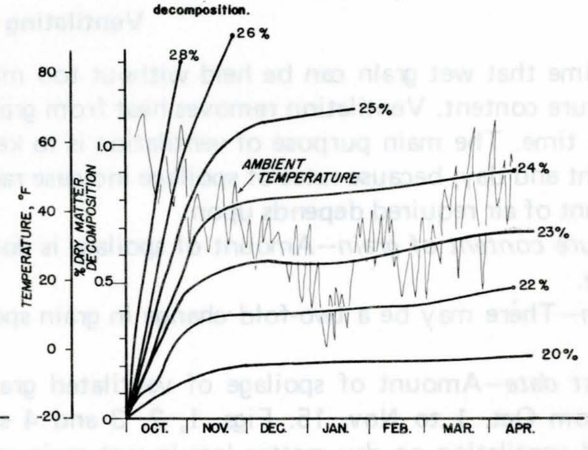

FIG. 4 **Effect of initial moisture content on percent dry matter decomposition.**

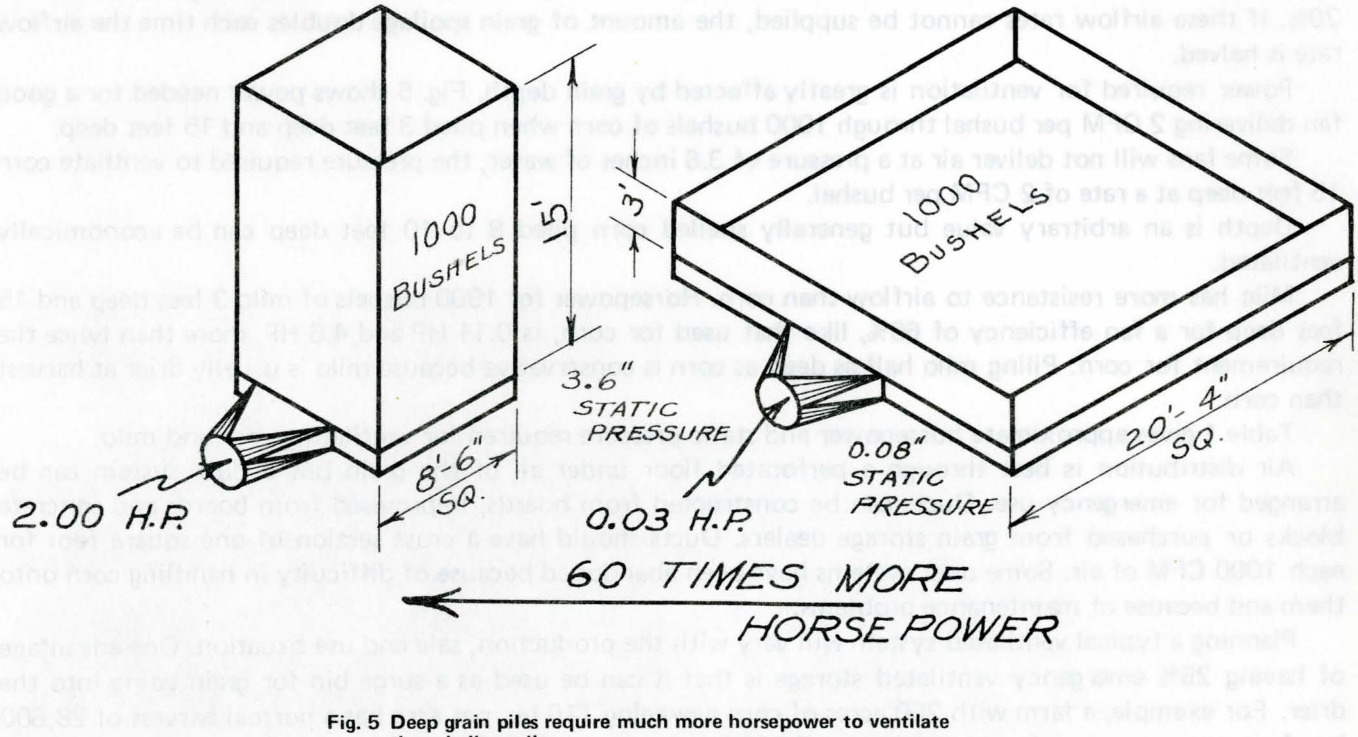

Fig. 5 Deep grain piles require much more horsepower to ventilate than shallow piles.

Table 1. Static pressure and horsepower required to ventilate corn and milo with 2 CFM/bu. at various depths.

	Corn		*Milo*	
Depth in Feet	*S. P. in. water*	*H. P./1000 bu.*	*S. P. in. water*	*H. P./1000 bu.*
4	0.16	0.08	0.48	0.25
6	0.40	0.21	1.11	0.58
8	0.77	0.48	2.00	1.03
10	1.30	0.68	3.15	1.65
12	2.22	1.59	4.92	2.58
14	3.19	1.67	7.21	3.78
16	4.40	2.40	9.84	5.14

Table 2. Capacity of grain bins per foot of depth.

Diameter	*Capacity for 1 foot of depth*
Feet	Bushels
15	141
18	204
21	277
24	362
27	458
30	565
33	684
36	814

A ventilated holding bin is needed ahead of the drier. Table 2 shows grain capacity of bins of various diameters per foot of depth.

Continuing with the above example, Table 2 shows that 7200 bu. shotred in a 27-foot diameter bin would have to be $\frac{7200}{458} = 15.7$ feet deep. At this depth, from Table 1, about 4 horsepower are needed for each 1000 bu. of corn, or about 30 horsepower. This is not practical. It is better to use two, 27-foot diameter bins or two, 24-foot, each equipped with a fan. A 2 or 3 horsepower fan on each bin should deliver enough air.

One of these bins can serve as a normal holding bin ahead of the drier. It could be equipped with a sweep unloading auger. Instead of a second bin, provision may be made to use part of a machine shed, old grainery or other shelter. The fan must be purchased and wired before harvest time.

Ensiling Grain

Choice of silage may be whole plant, ear corn, shelled corn, milo grain, milo heads or sorghum silage. All ensile well without preservatives.

Moisture level required for good ensiling is higher as more foliage-type roughage is included in the silage. Corn silage may be 65% moisture; ear corn, 30% and corn grain as low as 25%. For grain silage, the best range is 25 to 30% moisture. Grain below 25% may be wetted by adding about 3 to 3½ gallons of water to each ton of material for each percentage point below 25%. Whole grain cannot be reconstituted more than 2% without special equipment.

Limit oxygen by packing ground grain into horizontal silos or putting the grain in oxygen-limiting silos. Cover the grain in horizontal silos with 8 mil black polyethylene plastic. Keep the plastic tight and weight it down. Fill the silo rapidly to exlude oxygen as soon as possible.

High moisture grain must be fed to livestock as it has undergone a chemical change that is not acceptable in the normal grain market.

PLANNING FOR EMERGENCY STORAGE OF WET GRAINS THE LIVESTOCK FEEDER

By Paul Q. Guyer
Extension Livestock Specialist (Beef Cattle)

Livestock feeders can store sizable amounts of wet grain on a temporary or emergency basis should the need arise.

High moisture corn stored in temporary facilities or horizontal silos should preferably be fed out during the winter. Such feed is satisfactory during the summer months if the covers can be maintained and if enough is removed daily from the exposed material to keep ahead of spoilage. Hogs are more sensitive to molds and soured feeds than cattle.

Livestock feeders can help alleviate wet grain storage problems by storing high moisture grain in above-ground piles or temporary trench silos covered with plastic. They can help by harvesting their own crops as high moisture grain, by buying grain from the neighbors or by storing their crop as high moisture material and then leasing any drying equipment and dry storage to neighbors who do not have livestock.

Grain must be rolled or ground to store satisfactorily in temporary facilities or horizontal silos. The cob can be included in corn that is stored for feeding to cattle. Ground milo heads are also satisfactory for cattle. Corn should be shelled or milo combined before grinding for hogs.

The satisfactory moisture range for grain is about 24-30%. More research is needed to determine optimum moisture levels for grains for hogs and cattle. Harvest losses are usually lowest for corn at about 25 or 26%. For milo harvest losses are lowest in the 22 to 24% range. Some farmers report problems in harvesting milo above the 28 to 29% moisture range.

At moisture levels above 28 to 30% the appetite of cattle fed high moisture corn is often lower than most desirable. Milo does not seem to give this problem until moisture percentage reaches the middle 30s.

Reconstitution of the grain harvested during the latter part of the harvest season or blending to a standard moisture content simplifies ration formulation where feedstuffs are weighed. Where feedstuffs are measured a variation in moisture content within the accepted range creates no particular problem.

The grain can be ground through either a hammer, roller or burr mill. The product needs to be cracked or ground just fine enough to pack well. If it is coarser than this, the exposed surface usually deteriorates faster from day to day as it is fed.

The grain should be packed well and then covered with plastic. The more quickly it is covered the lower the nutrient losses. The plastic needs to be weighted down to keep out air and prevent tearing of the plastic. This may be accomplished with tires, nylon cords or net, and if the sides are not too steep and the storage facility is protected from the wind, green chop alfalfa may be used successfully. Ground limestone may also be acceptable where wind is not a problem.

Eight-mil plastic is less likely to tear than 4- or 6-mil plastic.

High moisture corn harvested and stored properly will have a bright yellow color. Milo will look like dry ground milo. Neither will have mold or spoilage next to the cover. They will not deteriorate rapidly, especially in winter. For temporary storage it is probably wise to store in several smaller units rather than an exceptionally large pile or trench. Small units will be more easily covered and fed out more quickly and mud may be less of a problem in feeding from smaller units.

SHOULD I PROVIDE AN EMERGENCY PLAN FOR WET GRAIN OVERFLOW EQUAL TO 25% OF MY HARVEST?

By Michael Turner
Extension Economist (Marketing)

While the above title raises a question, perhaps a second question is also in order. Will I need an emergency plan to handle my feed grain crop in 1971? Of course, the concern stems from difficulties encountered by farmers and grain traders in handling a Nebraska record 548,267,000 bu. corn and grain sorghum crop in 1969. In early December, 1969, there were 35,776,000 bu. of corn and grain sorghum stored on the ground plus an additional 2,293,000 bu. to be stored on the ground. Corn and milo in temporary storage or yet to be put in temporary storage totaled 3,150,000 bu. Warehousemen's estimates of the quantity of corn and milo which would suffer deterioration included:

10,521,000 bu.	slight loss
5,694,000	moderate loss
2,996,000	severe loss
19,221,000 bu.	total

The situation was further complicated by the fact that most of this crop was harvested in a high moisture condition, a good cultural practice which is becoming more popular.

Much of the loss incurred in marketing the 1969 feed grain crop was assumed by the grain trade. The trade accepted delivery and made payment on high moisture grain. Due to inadequate drying facilities, storage and a lack of boxcars, losses on this grain were high. As a result of this experience, it is unlikely the grain trade will accept for immediate payment such quantities of wet grain under similar circumstances in 1971. Thus, the farmer will have to assume a much larger share of the marketing risk in the future.

What are the prospect in 1971? The March 1 estimate of corn and grain sorghum to be planted in Nebraska in 1971 was 8,456,000 acres. This compares to the 1969 estimate of only 6,885,000 acres. The increase reflects the U.S.D.A. insurance policy against Southern Corn Leaf Blight.

If 88% of the planted acres of corn and grain sorghum are harvested for grain (a pattern consistent with recent years) 7,441,000 acres of corn and grain sorghum will be harvested in 1971. Corn would total 5,410,000 acres and grain sorghum 2,031,000 acres.

The record 1969 harvest was the result of excellent growing conditions and outstanding yields. The state average corn yield was 93 bu. per acre and 76 bu. per acre for grain sorghum. To be a bit more conservative, use a 5-year average yield of 62 bu. for grain sorghum and 79 bu. for corn. Estimated 1971 production:

Corn	427,390,000 bu.
Grain Sorghum	125,922,000 bu.
Total	553,312,000 bu.

This is over 5 million bu. larger than the 1969 record crop.

The storage situation based on April 1 estimates looks brighter for 1971. Total stocks of grain April 1, 1969 were 626-928,000 bu. compared to 605,694,000 bu. in 1971. Thus, there are 21,234,000 bushels of additional storage space available to handle the 1971 crop. This does not account for any additions or reductions in storage space since 1969. Of the total reduction in stocks, there were 11,965,000 fewer bushels on farms in 1971 compared to April 1969. However, this does not necessarily reflect a change in grain drying capacity either on farms or commercially.

Based on May expectations, the 1971 wheat crop could be 500,000 bu. larger than the 1969 crop. This represents a significant increase but it is more than offset by the reductions in carry-over stocks of all grains.

There are still many uncertainties concerning the 1971 crop. Weather conditions, disease and insects can all influence production. Yet there is a real possibility that 1971 may bring even more problems in grain marketing than were realized in the hectic harvest season of 1969.

The following discussion on the economics of drying corn may be of some help in explaining the costs involved in drying high moisture feed grains.

Economics of Drying Corn

Because of the extra weight in the form of water that it contains, corn with high moisture is worth less per pound and per bushel than No. 2 corn. A bushel of No. 2 corn contains no more than 15.5% moisture and weighs 56 lb. It contains 47.32 lb. dry matter and 8.68 lb. water. Shelled corn is sold at 56 lb. per bushel, regardless of the moisture content. You sell more water and less dry matter when corn is sold at moisture contents above the 15.5% standard for No. 2 corn.

Wet grain is shrunk so the quantity of dry matter is equivalent to that in the buying specifications. For example, No. 2 corn would have 15.5% moisture and 84.5% dry matter. When high moisture corn dries, moisture and dry matter are lost. The amount of shrinkage caused by the removal of excess moisture can be determined mathematically. The dry matter loss consists of the removal of chaff, tips of corn, fine parts or cracked kernels, dust and gas produced by respiration that occurs in the grain. This is often referred to as an invisible loss. The amount of the dry matter loss varies with different lots of grain and different conditions. Usually, ½ to 1% is allowed for the invisible loss.

The actual weight loss or shrinkage caused by drying is proportionate to the change in moisture content but always exceeds it. The actual shrinkage is greater than the percentage change in moisture because the percentages are of different total weights before and after drying. For example, when corn is dried from 20 to 15½% moisture, we have 4.5% reduction in moisture content. But we must remove more weight than this—5.33% of the original weight—to end up with corn at 15½% moisture. An additional allowance must be made for the dry matter loss.

Thus, in this illustration in which 20% moisture shelled corn is shrunk to 15.5% moisture the total percentage shrinkage is:

Moisture loss	5.33%
Dry matter loss	.50%
Total shrinkage	5.83%

The general formula for shrinkage is:

$$\left[1 - \frac{100 - \%\ \text{initial moisture}}{100 - \%\ \text{final moisture}} + .005\right]$$

For 20% corn sold at the No. 2, 15.5% base, the shrinkage is:

$$\left[1 - \frac{80}{84.5} + .005\right] = \left[1 - .946745 + .005\right]$$

$$\left[.05325 + .005\right] = .0583 \text{ or } 5.83\%$$

When corn is purchased by an elevator, the usual practice is to buy corn at the standard weight of 56 lb. per bushel and discount the basic bid for No. 2 corn to compensate for the excess moisture. Common discount scales include 1 or 1½ cents for each ½% moisture (2 or 3 cents per point) above the standard 15½% moisture for No. 2 corn. However, other variations in the discount scale are also used in the state. The discount scale amounts to more than the value of the shrinkage but might not be large enough to cover the cost of drying or conditioning on the farm.

Not all of the discount on wet grain is a penalty. The extra moisture in wet grain is being sold at the rate of the disocunted price for corn for each 56 lb. of weight. The difference between the discount and the returns to drying is the value of the shrinkage. The returns to drying on a wet weight basis is the penalty you incur when selling wet grain.

It is more profitable to dry grain when prices are low and discounts high than when prices are high and discounts are low. The larger profit from drying when high discounts prevail is obvious. The larger drying profits with low grain prices results from a lower value on the shrinkage—thus a wider difference between the discount and the value of the shrinkage.

PREVENTION OF MYCOTOXINS IN STORED GRAIN

By James L. Van Etten

Associate Professor, Microbial Physiology

Under certain conditions, some fungi (molds) growing on stored grain can produce toxic compounds. Collectively, these toxins produced by fungi are called mycotoxins. Since precise information is lacking about the particular combinations of conditions that cause these molds to produce toxic byproducts, the best way to avoid the danger from mycotoxins is to prevent the growth of fungi.

The following information on grain storage has been compiled by the United States Department of Agriculture and published as ARS Bulletin 20-16.

Although recommended procedures for preventing mold damage vary with the crop, its stage of maturity and environmental conditions, certain broad principles apply to most grain crops.

High moisture is the single most important condition contributing to mold growth. Consequently, it is essential to dry the commodity to a safe moisture level as soon after harvest as practicable without damaging it, and to maintain the crop at a low moisture level during storage and handling.

Warm temperature also encourages molding. Molds grow most rapidly at temperatures of 60° to 100° F. in combination with high relative humidities. A drop in temperature accompanied by moisture condensation on mold-susceptible items is a very common cause of fungal growth. Several reports suggest that prolonged growth of fungi on moist seeds at temperatures in the range of 35° to 55° may result in the formation of potent mycotoxins.

Other conditions favorable to mold development are damage to seed or kernels from insects or mishandling and presence of foreign matter.

Here are some basic approaches to mold prevention:

Mold prevention should begin with properly planting and growing the crop. Such practices as using sound, fungus-free viable seed, fertilizing properly and controlling insects and disease not only increase vigor of the growing plants but, in the opinion of scientists, should also reduce the likelihood of mold establishment in the plant product at maturity. Prevention of lodging is another generally recommended practice. Moisture content is higher in immature crops and their susceptibility to mold damage is greater. But permitting the crop to stand in the field after ripening can be an invitation to insect or mold invasion. In harvesting, equipment should be properly adjusted and operated at a moderate speed to avoid damaging the crop and picking up large amounts of leaves and dirt along with the harvest.

Since moisture control is crucial in mold prevention, testing for moisture content after harvest and prompt drying to the recommended level for safe storage are important. Adequate ventilation is essential in all systems of drying to assure the entire crop is dried to the recommended level. The safe moisture level varies with the crop, the length of time a commodity is kept in storage, the weather conditions in the area and the design of storage facilities. Recommended safe moisture levels refer to the wettest seeds of kernels in storage—not the average moisture content.

The grain should be cleaned thoroughly to remove as much foreign matter and damaged seed as possible. And if part of the crop has lodged or otherwise been exposed to mold, it may pay to store it separately. By interfering with proper air movement, foreign matter, broken seeds or kernels and grain dust not only obstruct even drying but make maintaining grains and oilseeds at safe moisture levels more difficult.

After crops are dried to safe levels, there is no assurance they will remain at these levels in storage unless proper conditions are provided. The need for weathertight bins to prevent dried grains from rewetting is obvious. Proper aeration, which is also essential, is difficult when large masses of grain are stored together, when there are severe changes in weather or when storage is long. Without adequate aeration, significant differences in temperature between different locations in stored grain causes the moisture to concentrate in damaging levels in the colder spots. Under most circumstances, mechanical ventilation is required to assure adequate aeration.

Even if storage is temporary, the storage area should be clean and the crop kept cool and dry during storage. Good insect control practices should also be used.

Crops stored on the farm and in market channels should be checked regularly to make sure that excess moisture, insects and mold are not developing in them.

Ear Corn

Where natural ventilation is used for drying, harvesting of late-maturing corn should be delayed as long as possible to get maximum benefit from field drying. With a mechanical drying system, the corn should be dried promptly after harvesting.

Harvesting can be started several days earlier with a machine that husks clean than with a less efficient one. Husks and silks in harvested corn interfere with air movement through it. As a result, drying is slower and less even and chances of heating and molding are greater. Shelled corn, chaff, dirt and other materials that fill space between ears should be removed before storage.

The risk of spoilage increases with moisture content. In the absence of artificial drying facilities, corn with about 20% moisture may be placed in ventilated cribs in the fall. Winter temperatures retard spoilage and by spring the kernel moisture is reduced to a safe level of 13% or less. Only then should the corn be placed in unventilated bins.

If corn stored over winter in ventilated cribs is to be kept in storage into warm weather, it should be shelled and dried to a kernel moisture of 13 percent or less at the approach of warm weather.

Shelled Corn

The harvesting of corn with a picker-sheller or a combine produces conditions that favor the growth of molds. The chief reasons for mold growth are high moisture, high temperature and damaged kernels.

The ideal way to control mold growth is to dry high-moisture corn to about 13% moisture within 24 hours of harvest. This is the safest, surest method of holding mold to a satisfactory minimum.

If this ideal is not attainable, corn should be dried to 18 to 20% moisture within 24 hours and aerated until it can be completely dried, fed to livestock or processed. If wet corn must be held at moisture levels above 20%, it should be ventilated and kept at the lowest possible temperature and for the shortest time possible unless corn temperatures are below 40^{O} F.

Current research shows that at any given temperature, it is possible to hold corn having 15% moisture nearly 10 times longer than 20% corn, about 27 times longer than 25% corn and roughly 45 times longer than 30% corn. At any given moisture content, it is possible to store corn at 35^{O} F. nearly 2½ times longer than at 50^{O}, over 4 times longer than at 60^{O}, and nearly 10 times longer than at 75^{O}.

Other Grains

Before storing wheat, grain sorghum, oats or other small grains, the dry grain should be cleaned if it contains more than a minimum of cracked or broken kernels, chaff and dust. The chance of insect infestation and mold growth is increased by the presence of damaged kernels and foreign matter.

Safe moisture levels for storing grain vary with the region in which it is stored. A moisture content of 13% or less is recommended for the Midwest.

Agricultural researchers emphasize that recommended moisture levels apply to all the grain to be stored—not the average moisture level of the lot. When some parts of the grain are insufficiently dried or accumulate moisture because of inadequate ventilation or heating, mold is likely to grow in the wet grain and spread to the drier grain.

Grain can be dried with heated air to safe-storage levels in any season or climate. However, in many climates unheated air can adequately do the job. Drying should be started promptly after harvest and should proceed continuously at a rate fast enough to complete drying before mold can develop. In heated air, grain temperatures should be kept low enough to avoid heat damage. For grain to be used for seed, 110^{O} F. is generally the upper limit. For grain to be milled, temperatures should not exceed 145^{O} F. For feed grains, somewhat higher temperatures are permissible.

Aeration of grain in storage has become an accepted and established practice. Proper aeration prevents deterioration and increases the storage life of dry grain. It is especially effective in reducing spoilage from moisture migration and accumulation in large storages. Although developed primarily to meet dry grain storage problems, aeration may also be used to hold damp grain from fall-harvested crops for short periods if the grain temperature can be maintained near freezing. Bins should be sound, weathertight and adequately ventilated. Small leaks can damage grain seriously.

EFFECT OF WEATHER AND PRODUCTION PRACTICES ON GRAIN HANDLING AND STORAGE

By Duane Foote
Extension Agronomist (Grain)

Grain production in Nebraska can tax the drying and storage capacity of commercial and farm facilities. This is particularly true under conditions unfavorable for normal maturity and harvesting. The size of the crop is also an important factor in assessing the problem each year.

Total grain storage capacity in Nebraska in 1968 was estimated at about 1,483,000,000 bu. Farm grain storage capacity accounted for 943,000,000 bu. of the total. Off-farm storage facilities consisting of commercial elevators, mills, warehouses, terminals and CCC bin storage had a capacity of 540,000,000 bu.

Weather at planting time, during the growing season and at harvest time will affect the plans you make for harvesting and handling the crop. Although you can't do anything about the weather, planning with possible weather conditions in mind can help in making the best management decisions.

Late planting because of cool wet weather, cooler than normal weather during the growing season, and adverse harvest conditions can each cause problems. If more than one of these conditions exist, harvesting and crop handling problems are multiplied.

Table 1. Yield and production of fall harvested crops for selected years in Nebraska.

	Corn		*Grain Sorghum*		*Soybeans*	
Year	*Yield*	*Production (000)*	*Yield*	*Production (000)*	*Yield*	*Production (000)*
	Bu./acre	Bushels	Bu./acre	Bushels	Bu./acre	Bushels
1950	36.0	249,000	25.0	4,850	24.0	1,200
1960	51.0	333,438	50.5	90,698	28.0	4,592
1969	93.0	429,660	76.0	118,636	33.5	25,661
1970	75.0	367,275	51.0	76,449	22.0	17,864

The increase in the volume of grain production in Nebraska since 1950 indicates why problems sometimes are encountered in handling the crop properly. Shown in Table 1 are the yield per acre and total production figures for the major fall harvested crops in Nebraska for selected years:

The volume of the peak crop years of 1966 and 1969 made handling and storage problems more critical. High production coupled with adverse weather conditions are cause for serious alarm and necessitate careful planning.

Planning must include all phases of the crop production system. Selection of hybrid or variety, planting dates, plant population, row spacing, fertility, irrigation practices and disease and insect control all affect efficiency in producing, harvesting and marketing various crops. Furthermore, decisions during the growing season need to be based on the final intended use of the crops grown.

The following are some considerations which are basic to all systems:

1. How will the crop be used? Will it be sold as cash grain? If fed to livestock, what kind of livestock? What quality is needed?

2. What is the average weather risk during the harvest season? What should be the planned harvest rate to minimize this risk?

3. What are the advantages and disadvantages of the existing system of harvesting, handling and storing the crop?

4. What improvement in crop handling can be provided by a new system or the revision of an existing system?

5. What investment will be required in a new system? Is adequate financing available?

There will be seasons when all we can do is make the best of a less than desirable crop production and/or harvesting situation. Chances for success will be improved, however, by employing those cropping practices which are more likely to produce a vigorous crop and increase its chances for maturity before frost.

It is improtant, too, that you make plans for timely harvesting of crops. Timely operations can cut costs, reduce field losses and improve grain quality.

PREVENT STORED GRAIN INSECTS

By Bob Roselle
Extension Entomologist

Nebraska grain is normally free of stored grain pests in the field. Infestations after grain is in storage usually start from insects in the bin, or grain stored nearby. To prevent new grain from becoming infested, the following are recommended:

1. Use well-constructed storage facilities. Avoid storing grain in buildings that have old grain, hay or plant residues in other portions of buildings. Avoid double-walled bins as insects can live between walls for long periods of time and are difficult to control.

2. Clean storage bins thoroughly by removing all old grains or grain debris left over from previous storage. Vacuum sweeping is the best way to clean bins.

3. Kill or cut weeds that surround storage sites.

4. Apply a residual spray to empty bins before new grain is to be stored. Methoxychlor, premium grade malathion, or pyrethrins can be used on internal and external surfaces of grain bins before grain is stored. Dilutions are:

Methoxychlor 25% emulsifiable concentrate	1 qt. to 2 gal. water
Premium grade malathion 57%	½ pt. to 2 gal. water
Pyrethrins 6%	1 1/3 pts. to 2 gal. water

Spray surfaces about 2 weeks before grain is stored. Cover all surfaces with spray but do not allow runoff. Allow bin to dry completely before storing new grain.

5. Store only dry, clean grains. High moisture grain is highly susceptible to insect infestations.

6. Use protective treatment on new grain as it is placed in storage. One pint of premium grade malathion in 2 gal. of water, or 1 qt. 6% pyrethrins in 2 gallons of water can be applied to each 1000 bushels of grain.

7. Surface treatments to protect against Indian meal moths can be applied after storage. Use 9 ounces of 6% pyrethrins in 2 gal. water per 1000 square feet of grain surface.

8. Inspect grain at 30-day intervals for evidence of insect activity. This is especially important during the summer and fall months when grain temperature is higher. If infestations are found, fumigation may be required.

9. Keep grain cool. Cold grain is less susceptible to insect reproduction.