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September 1957

some pointers on . . .

HARVESTING, STORING AND FEEDING THE 1957 SORGHUM CROP

Harvesting

When to harvest. In most sections of the state late summer rains have been adequate to maintain normal growth of grain sorghum. The plants have remained green and generally have developed good stalks which will remain erect with a minimum of lodging until the crop can be harvested.

New growth in most fields will make it necessary to delay harvest until after frost. A freeze of 27 degrees or lower will kill the top growth and after a few drying days the moisture content should be 13 per cent or lower -- safe for storage.

Most of the crop is far enough advanced so that combining can be done in the normal manner. It is important to harvest as soon as the grain can be stored. Unsettled weather can cause delays and may result in serious losses from lodging. Cracked grain and pieces of wet stalks in combined grain lead to spoilage and insect problems in storage, and interfere with air circulation if the grain is to be dried in the bin.

Chemical field drying for feed grain. Several chemicals are available at major agricultural chemical dealers which may be used on grain sorghum to help reduce moisture in the grain and dry the upper leaves and stalks. Some of these, however, are toxic to livestock and must not be applied on fields where the grain will be used for feed.

If spraying is considered necessary to dry grain sorghum that is to be used for feed, either magnesium chlorate or chlorate-borate mixture should be used. These do not have label approval for use on grain sorghum because there has been no widespread demand for their use on feed grain until this fall. These chemicals are presumed safe since they have been approved for use on dry edible beans, lima beans, red beans, and soybeans.

Extension Service
University of Nebraska College of Agriculture
and U.S. Department of Agriculture
Cooperating

W.V. Lambert, Director
Use magnesium chlorate at 6 quarts per acre if a liquid product is used or 20 pounds per acre if the soluble powder is used. Another product which can be used is a mixture composed of sodium chlorate and soluble borate. This latter chemical is usually referred to as chlorate-borate mixture. It should be used at a rate of 2 to 3 gallons per acre if in liquid form or 20 pounds per acre if the soluble powder is used.

Both magnesium chlorate and chlorate-borate are applied in water using as much volume per acre as possible. A good liquid detergent added at the rate of .1 to .2 per cent by volume will improve the wetting and spreading properties of sprays. On feed grain, spraying may begin when the moisture content reaches 30 per cent or less. Harvesting may begin 7 to 10 days after spraying.

Chemical field drying for seed production. The two most effective chemicals tested for drying grain that is to be used for seed have been pentachlorophenol (PCP) at 6 quarts per acre and dinitrophenol (DNBP) at 3 pints per acre. They should be diluted in No. 2 diesel fuel at a minimum of 5 gallons per acre if applied by airplane or 8 gallons per acre if applied by high clearance ground equipment.

PCP and dinitro are poisonous compounds and have label approval for use on seed crops only. Thus, they should be used only by the certified seed grower or the hybrid sorghum seed producer.

In hybrid sorghum production the spray should be kept off the male rows either by cutting them prior to spraying, or by using a directed spray that keeps most of the chemical away from the male rows. The male rows could be fed to livestock if the treated grain did not constitute more than 10 per cent of the total grain ration fed. Such an amount would be 200 or 300 times as dilute as the recognized poisoning level. The forage will be safe to graze 4 to 6 weeks after spray treatment. Both PCP and dinitro are somewhat repellent to livestock as indicated by actual grazing trials.

On seed production fields, spraying may begin when the moisture content of the grain reaches 25 per cent or less. Best results are obtained when clear weather and warm temperatures follow treatment. A period of 7 to 10 days should elapse between treatment and harvest in order to realize maximum benefit from the chemical treatment. Harvesting should begin as soon as safe moisture is reached, however, regardless of time following treatment.
Operating the combine. Clean grain will result only if the combine is adjusted properly and run at an appropriate speed considering its capacity and the grain yield. Sorghum seeds crack easily. Therefore, the cylinder speed should be reduced below that used for wheat, but the rest of the machine should run at normal speed. All of the concave bars used for wheat may not be needed and the spacing should be increased.

To keep material from matting on the chaffer and sieves, they must be properly adjusted and the machine must not be overloaded. If matting occurs, grain will be carried over the back end of the machine.

To avoid pieces of wet stalks in the grain, carry as little material as possible in the return. Carrying too much material will mean that some pieces will eventually be broken into pieces small enough to go into the grain. Putting a piece of sheet metal over the chaffer extension may be necessary to reduce the amount of material going around in the return. Loss of a small amount of grain may be better than getting pieces of wet stalks in the grain tank. Where the grain from the combine can be run over a cleaner before storage, experience has shown that the moisture content is reduced 3/4 to 1 1/2 per cent.

The operator's manual for the combine gives recommended speeds and adjustments for cylinder, concaves, chaffer, sieves and fan. It also contains information on lubrication and maintenance.

Storing

Grain moisture and cleanliness are perhaps the two most important factors to consider in storing sorghums. For best results, grain should be dried to 12 per cent moisture content or left in the field until this moisture level is reached. It must be 13 per cent or less to qualify for government loan.

Grain sorghum with a moisture content of 15 per cent can be safely stored until late March or early April. Such grain should be clean and will keep safely only as long as the storage temperature is below 50°F. In case the weather turns warm for several weeks during the winter, the grain should be examined for possible signs of heating.

Careful combining and cleaning of the grain will contribute to safe storage. Recommendations given under Operating the Combine above should be observed.
A drying system will permit earlier harvesting of sorghums and thus help reduce field losses. Higher quality grain can be obtained by earlier harvesting. A combine will do a thorough job of threshing with a grain moisture of 22 to 25 per cent. At this moisture range the threshed grain appears quite dry, but close inspection will show that much of it has some green color.

For drying, either heated or natural air systems can be used. When heated air is used, the grain should be dried before it is put into storage. Some form of batch or continuous drier could be used. Warm grain must be cooled before being placed in storage. A careful check of moisture content is advisable to insure that the grain has been dried to at least 12 per cent moisture. Temperatures used for drying with heated air will depend on the grain use. To prevent germination damage, seed should not be exposed to air over 108° to 110° F. Market grains can be safely dried with air temperatures up to 140° F. Feed grain can be dried with air temperatures of 160° to 180° F.

Natural air drying systems are also proving very popular. Storage bins can be adapted with a lateral duct system for a nominal cost. Details on construction are available through County Extension Offices. Fans for drying should deliver 3 cubic feet of air per minute per bushel for satisfactory drying, with a static pressure of 2½ inches. With these requirements a 6-foot depth of sorghum can readily be dried. With moisture contents of less than 20 per cent, depths up to 8 feet can be handled. Time for drying will depend on the initial moisture content and weather conditions. Under normal conditions the grain should be dried in 10 days to 2 weeks. Operating costs for drying will depend on the initial moisture content of the grain. For natural air, operating costs may range from 1 to 3 cents per bushel and with heated air from 2 to 3 cents per bushel.

Aeration systems have proved beneficial for storing all farm grains. This is particularly true with grain sorghum. These systems provide a very small air flow of about 1/10 of a cfm per bushel and maintain a uniform grain temperature to prevent moisture movement within the stored grain. Aeration systems are not intended for use in drying grain. When heated air systems are used, an aeration system should be installed before grain is stored. A natural air drying system can also be used for aeration.

**Feeding**

**Pasturing Grain Sorghum Fields**

There is generally no danger in pasturing livestock in grain sorghum fields except when there is new growth from drought-stricken or frosted plants. It should be safe to pasture livestock on fields after the heads have been combined for grain or
harvested for silage. However, as a safety measure after a frost or freeze, the animals should be taken off the pasture until the leaves and stalks have been completely cured. The amount of prussic acid (a poisonous substance generally present in regrowths of drought-stricken or frosted plants) is greatly reduced to a safe level after curing.

Feeding the Grain

Grain sorghums are nearly equal to corn in chemical analysis. They are a little higher in crude protein content, but much lower in carotene content than corn. The energy content is nearly equal to that of corn.

When grain sorghums are to be used in any livestock or poultry ration, it is important to remember that this grain is very low in carotene content. For swine rations, and perhaps in poultry rations, it should be borne in mind that the lysine content is lower than that of corn.

For beef cattle. Where beef cattle have been wintered on rations consisting of 3 or 4 pounds of corn, the grain sorghum may replace all of the corn. The grain sorghum should be cracked or ground (medium texture). Its feeding value is nearly comparable to that of corn.

Grain sorghums may replace all of the corn in cattle fattening rations. If cattle have been previously fed corn in their ration, a gradual change would probably help maintain the cattle on full-feed. However, new cattle just coming into the feedlot may be started out solely on grain sorghums for the grain portion of the ration. The grain sorghum should be cracked or ground (medium texture). In cattle fattening rations, grain sorghums are 90 to 95 per cent as valuable as corn. Generally, cattle will eat more grain sorghums, and cattle fed on grain sorghum rations will produce carcasses comparable to those fed corn.

For sheep. Grain sorghums may also replace corn in fattening and wintering rations for sheep. Unless the older ewes and rams have poor teeth it is generally not necessary to grind grain sorghums for sheep. Grain sorghums are nearly equal to shelled corn in feeding value for sheep.

For swine. The grain sorghums are excellent for swine and 90 to 95 per cent equal to corn in feeding value, both for fattening pigs and for breeding stock. When growing and fattening pigs are self-fed, grinding does not usually increase its value enough to justify the expense. However, when the pigs are hand-fed, it would be advantageous to grind the grain sorghum.

For poultry. The grain sorghums are nearly equal to corn for poultry, when used in well-balanced rations. Ground grain sorghum can be used in poultry mashess in the same manner as ground corn, and the whole grain can be fed as part of the scratch grain.
For dairy cattle. Dairy cattle will generally make very good use of sorghum as grain or silage. As silage, sorghum ranks next to corn. Although usually somewhat lower in value per ton, sorghum produced during drought years may be practically equal to corn. Ground grain sorghum is approximately equal to ground corn for dairy cattle and may replace corn entirely in the concentrate ration.

Making and Feeding Grain Sorghum Silage

Grain sorghums can be made into good silage, although the forage types are usually planted for this purpose. This is probably the best way to salvage the feed value in fields planted too late to mature before frost.

The proper time to harvest grain sorghum for silage is when the grain is in the soft to hard dough stage. This applies to making silage from either the entire forage or only the heads. Allowing the grain to mature too far beyond the soft dough stage will make the seeds hard and decrease its digestibility when the silage is fed to livestock. On the other hand, if the grain is immature, perhaps in the milk stage, the silage will become rather sour and lack palatability. Furthermore, the nutritional value would be lower.

The moisture content of the chopped heads (ranging from 50 to 60 per cent) will be less than that of the chopped forage when it goes into the silo. However, it is not necessary to add any water when making silage from the heads. No preservative is necessary.

Any type of silo may be used for making grain sorghum silage. If the silage is to be fed before next summer, temporary silos would be satisfactory. However, if silage is to be made from chopped heads, reinforcements must be added to concrete or tile silos because the sorghum grain exerts more pressure on these structures than ordinary silage.

Grain sorghum silage -- either chopped heads or chopped forage -- may be fed to livestock within a few days after ensiling. However, it is best to wait two or three weeks to allow fermentation to take place.

Obtaining a Farm Storage Loan

Loans can be obtained through local ASC offices on grain sorghums even though the farmer has not complied with either his corn or wheat acreage allotment. Farm storage loans range from 1.56 to 1.92 per cent in Nebraska if the grain is stored for the full loan period, October through March. Of this amount, 14 cents is the allowance for storage.
In order to qualify for a loan, grain must be stored in an approved structure and must contain no more than 13 per cent moisture. Loans can be obtained any time up to January 31, 1958. They mature March 31, 1958.

Loans on commercially stored grain can also be obtained, provided that commercial storage space can be obtained.

Farmers who do not have sufficient storage space available should inquire at their local ASC offices in regard to loans available for the erection of new storage facilities. A large proportion of the cost of new facilities can be borrowed. The interest rate is 4 per cent and the loans must be repaid within 4 years in yearly installments. Similar loans are also available on drying equipment.

This circular was prepared by a committee of specialists in crops, livestock, farm management, and engineering of the University of Nebraska College of Agriculture.
Helpful Bulletins and Circulars

The following publications about sorghum are available from your County Extension Agent or from the Nebraska College of Agriculture:

- CC 125 Chemical Drying Sprays As an Aid for Seed Production
- CC 131 (Revised) Corn and Sorghum Silage
- EC 199 (Revised) Sorghums in Nebraska
- EC 57-1411 Formulating Laying Rations
- SB 439 Grain Sorghums As Feeds for Beef Cattle and Hogs
- "Bin Drying Allows Early Sorghum Harvest" Nebraska Experiment Station Quarterly, Fall 1954

A Lateral Duct System for Drying Small Grain or Shelled Corn. Unnumbered letter, Nebraska Agricultural Extension Service.

- USDA Leaflet 331 Drying Shelled Corn and Small Grain with Heated Air.
- USDA Leaflet 332 Drying Shelled Corn and Small Grain with Unheated Air

Farmers Bulletin 2009 (USDA) Storage of Small Grains and Shelled Corn on the Farm.

Farmers Bulletin 2071 You Can Store Grain Safely on the Farm.