

MAY, 1928

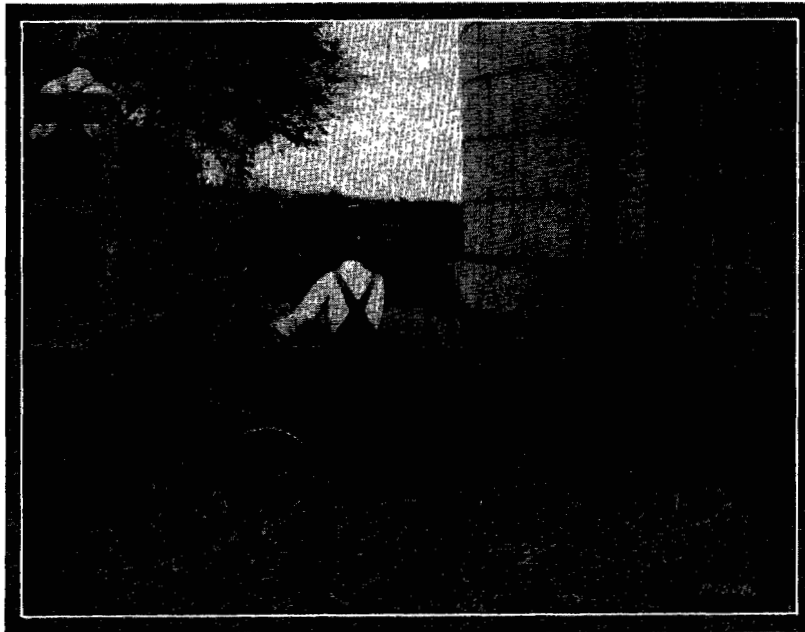
(Circular 95 Revised)

CIRCULAR 139

# AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE  
MANHATTAN, KANSAS

DEPARTMENT OF DAIRY HUSBANDRY



FILLING A SILO WITH KANSAS ORANGE SORGO. AN ELECTRIC MOTOR IS SUPPLYING THE POWER

## FILLING SILOS<sup>1</sup>

J. B. FITCH

The rapidity with which silos have been adopted on Kansas farms in the last few years has made it necessary for many farmers to fill their silos and care for the silage without previous experience. Through the advice of other silo users they have had more or less success in securing good silage. As their knowledge of making silage

1. Contribution No. 59 from the Department of Dairy Husbandry.

increases with years of silo experience the quality of silage will generally be improved, as will also the efficiency of the filling operation.

It is the object of this circular to answer some of the most common questions which arise at silo-filling time. Such methods will be treated as have been found by experimental evidence and by practical use to be most successful in producing good silage.

#### TIME TO CUT THE SILAGE CROP

It is desirable to cut the crop for the silo at a time when it contains the maximum food nutrients in a condition that will make good silage. Years ago corn was cut for the silo in a very green condition, before the ear and stalks had matured, and a very sour silage, high in moisture, was obtained. Of late years the tendency has been to allow the corn crop to stand until more mature. The proper time to cut corn for the silo is about a week or ten days before it is ready to put up in the shock; the ear should be well dented and the lower leaves on the stalk dry, but the stalk itself still full of sap. Corn in this condition contains the maximum food nutrients and at the same time sufficient moisture to cause it to pack well in the silo. It is advisable to let the corn approach maturity before cutting it, even if water will have to be added at filling time, as is often the case when a few days of hot winds dry the leaves and stalks very rapidly. In the case of short, immature corn the practice is to let the corn stand in the field just as long as it will continue to grow. This corn is generally very dry, and water must be added when the crop is put into the silo. Corn should not be allowed to get so dry that the leaves shatter badly.

As in the case of corn, the sorghums were formerly cut in a green condition and a very acid silage resulted, due to a greater amount of sugar in the sorghums. The sorghums should be cut for the silo when the heads are mature and when the seeds are so hard that they cannot be crushed between the thumb and finger. Late-planted sorghums often reach the frost date before maturing. Light frosts do not materially affect the sorghums, which should be allowed to stand until frosted rather than put in the silo in an immature condition.

#### METHOD OF CUTTING THE SILAGE CROP

The most convenient method of cutting silage crops is by means of a corn binder. When large silage cutters are used, with a short haul from the field, the binders should be started a day before filling is to begin. With smaller outfits a half day's start with the binder is sufficient to keep the silage cutter busy.

Much of the hard labor in loading the wagons in the field can be saved by using low racks or underslung racks on the wagons. This will make it possible for each driver to build his own load in the field and the labor of unloading at the cutter will be about the same.

#### SIZE OF SILAGE CUTTER

The desirable size of silage cutter depends upon the number of silos one has to fill and upon the men and teams available. A large cutter run to its fullest capacity reduces to the minimum the cost per ton of silage. Cutters varying in size from 16 to 20 inches will keep five or six teams busy hauling from a short distance. Additional teams will be needed for hauling from a greater distance. For smaller cutters the number of teams depends upon the size of the cutter and the power furnished. When four to six teams are used, two or three men will be needed in the field to assist the drivers in loading. With large cutters and a large force of help, 80 to 100 tons of silage can be put up in a day. Where labor is scarce, smaller outfits are used over a longer period of time. This gives the silage more time to settle during the filling process, and it can also be packed better than where large outfits are used. With the larger cutters time is saved in feeding the machine because the bundles need not be cut, while with the smaller machines cutting the bundles is necessary to prevent the cutter from choking. One man is needed at the cutter to feed and operate it properly. With a large cutter one man in addition to the teamster is needed on the load to pitch to the cutter. In the case of a small machine each teamster can throw off his own load.

#### POWER REQUIRED FOR CUTTER

Sufficient power should be furnished to run the cutter to its capacity. The power required is generally specified in horse power for gas and steam engines, and should be followed carefully. The power necessary depends upon the size of the cutter used and the method of elevating the cut material into the silo. The common method is that of blowing the cut material up a pipe and into the silo by means of a powerful fan.

In some cases a continuous chain carrier is used to elevate the cut material into the silo. The use of the carrier lessens the power required to about half of that necessary when the blower is used. This means that on such an outfit for filling silos money can be saved because a lower-power engine can be used. The open carriers have been objected to on account of the lighter materials, such as leaves

and husks, blowing out. This difficulty can be overcome by use of covered carriers. The carriers are probably more cumbersome to transport than the blower. Where adequate power is available, the blower is to be preferred.

#### CUTTING SILAGE

For the most efficient packing of the silage, the knives on the cutter should be sharp and should be set to cut the material into pieces one-half to three-fourths of an inch in length. When the cut material goes into the silo it is customary to have some provision for holding it together until it falls to the level of the silage in the silo. The common method is to use a distributor, which consists of sections of galvanized-iron pipe reaching from the top of the silo. These sections are three to four feet long, fit into each other, and can be taken off as the silo is filled. By guiding the distributor around the silo, considerable forking of silage will be saved. A good distributor can be made by sewing together sacks with the bottoms removed, through which the cut material can pass from the top of the silo. In the absence of some sort of distributor, a chute should be made by which the cut material, before falling, will be delivered to the center of the silo. A man with a fork then distributes the material evenly over the surface of the silage.

#### ADDING WATER

To make silage it is necessary that the air be excluded. To exclude air the cut material must be of sufficient weight to pack well. When the crop is dry it comes into the silo in a very fluffy condition, and, as it cannot be packed tight enough to exclude all the air, air pockets are formed which cause moldy spots in the silage. When the material is too dry, water should be added to it as it goes into the silo. When corn is cut at the proper time it is near the danger line of moisture. It takes experience to tell whether or not water must be added, but perhaps the best guide is to notice how the material comes into the silo. It should be moist enough to pack firmly under one's foot when tramped, and water should be added to the dry, fluffy material until this condition is reached. While silage that is too wet is not desirable, it is hard to injure silage from adding water to it. Excessive dryness, on the other hand, causes spoiled silage. In case of doubt, therefore, water should be added. The common practice and most desirable method of adding water to silage material is to run a stream of water into the blower. In this

way each particle comes in contact with the water and the moisture is evenly distributed throughout the silo. Where it is impossible to add water to the blower, the water can be added in the silo. It should be well distributed in the silo, because a great amount of water added in one place is apt to run down through the silage and leave dry places at the surface. It is impossible to state the amount of water to add to silage. The material itself is the determining factor. Silage near the top of the silo should receive more water than that lower down. This will make greater weight for the silage near the top of the silo, where it does not have much weight on it.

#### PACKING SILAGE

In the last few years it has been proved that the importance of packing or tramping silage has in the past been overestimated. Several agricultural experiment stations and many users of silage have demonstrated beyond a doubt that silos can be filled satisfactorily without any tramping. The silo fills more rapidly where it is not tramped and it is necessary to refill in order to get the full capacity of the silo, but the saving made by eliminating tramping will be much more than the extra cost of refilling the silo. In filling the silos of the department, good results have been secured by tying two sections of the distributor so that the cut material will fall in the center of the silo, thus allowing the silage to pile up and roll down on the sides of the pile. No one is needed in the silo until the top is reached, when it may be necessary to fork some of the silage in order to get the silo full.

Silos can be filled with crops in normal silage condition without tramping, but a refill is necessary to get full capacity of the silo. When crops are very dry and large amounts of water must be added, tramping is more essential.

#### GAS IN SILOS

It is well to remember that during the process of fermentation that goes on in the silo a gas is given off for the first few days after filling. This gas may prove dangerous to those who breathe it. It is heavier than air and covers the surface of the silage to a depth of a foot or more after the silage has stood overnight, or when the blower is not running and where no drafts of air enter the silo. This gas is most frequently found in pit silos. Silo doors should not be put up until needed, and in pit silos and silos inclosed in barns it is a desirable precaution to run the blower or cutter a few minutes

before the men enter the silo, in order that a circulation may be started and the gas mixed with air. In case of doubt as to the presence of gas, a lighted lantern may be lowered to the surface of the silage. If the light goes out the gas is present and a circulation should be created in the silo before a person enters. Within a week after the silo is filled this gas will generally have disappeared and no trouble will be experienced in the feeding of the silage.

#### **REFILLING THE SILO**

Silage will gradually settle in the silo for a few days after it is filled. The amount of settling depends upon the rapidity of filling the silo and the amount of tramping. It is desirable, where the silage settles much, to arrange for refilling in order to increase the capacity of the silo. This refilling may be done two or three days after the first filling. The top few inches of spoiled silage may be thrown off, the additional silage added, and the top sealed. Many farmers who do not have a roof on their silo are increasing the capacity by placing wire fencing on posts at the top of the silo and then filling this additional height. When the silage settles it will generally make the silo about full and the wire may be taken down.

#### **SEALING THE SILO**

It will be noticed, following a day's filling, that the surface of the silage has become very hot. This heat is mostly in the surface foot in contact with the air. If filling is continued the action will be stopped, but if a day or so intervenes before filling is started again this surface will probably be spoiled and should be thrown off. When this surface is allowed to stand for some time it will spoil to a depth of from six to eight inches. Underneath this rotted layer the silage will be good. This covering acts as a natural seal for the silage. The depth to which silage will spoil on top depends upon the amount of tramping it has received and upon the moisture in the silage. When the silo is full, as much as ten barrels of water should be added and the silage then thoroughly tramped. For a day or so following this it is a good plan to tramp the silage each day, especially around the wall of the silo. After this the silage will not settle much, and it is best not to break through the seal by walking on it. When this method is employed, six to eight inches of spoiled silage will probably be lost.

Many plans are used for reducing this spoiled silage to a mini-

mum. As the spoiled material will probably not represent a loss of more than one or two tons of silage, a farmer cannot afford to spend much time and money to reduce it. The loss may be lessened by husking out the last few loads of corn or heading the last loads of sorghum that go into the silo. Straw may be run through the cutter and spread over the surface of the silage, and when thoroughly wet and well tramped will make a good seal. After the top of the silage has been thoroughly wet down and well tramped, a layer of oats on this will sprout rapidly because of the heat underneath, and will form a layer over the surface of the silage. A thin layer of salt sprinkled over the top of the silage after it is wet down and well tramped will cut down the amount of spoiled silage. Another method used is to cover the top of the silage with tar paper.

#### **WHEN TO FEED SILAGE**

Silage may be fed as soon as the silo is filled, but for the first few days will be nothing more than cut corn. In a short time, however, the change to silage will have been completed and a uniform feed will be found throughout the silo. If one begins to use the material from the silo immediately after it is filled, no seal is necessary, and silage is saved. After opening a silo it is necessary to feed about two inches from the surface daily to keep the silage from spoiling.

Any spoiled silage which occurs in the silo should be discarded. Cattle will sometimes eat spoiled material, but bad results often occur from this source. In feeding horses one must be extremely cautious in this regard, as horses are much more susceptible to disorder from spoiled silage than are cattle.

#### **MIXING CROPS IN THE SILO**

Many farmers who are raising both corn and sorghum mix these crops in the silo. In some cases loads of the different crops are run through the machine alternately, or it is arranged that a load of each feed shall be at the cutter at the same time. This mixing does not increase the value of either feed, and generally means more work, in that material must be hauled from two fields at the same time. As a matter of fact, the sorghums are generally not mature enough to go into the silo until some time after the corn crop has been cut.

USE OF STOVER FOR SILAGE

Many farmers are following the practice of refilling their silos in early winter with corn stover or with some kind of sorghum stover. When properly handled such stover silage makes a very good feed. It is more palatable than stover and nothing is wasted. The greatest difficulty in putting stover into a silo is to get sufficient moisture on it to make it pack well. It will take from 75 to 100 pounds of water for each 100 pounds of stover for proper packing. This means that a large amount of water must be available at filling time. Sufficient water cannot be added through the blower, and it is necessary to add additional water to the cut stover as it goes into the silo. Sorghum stover generally will take less water than corn stover, but the amount of water needed depends upon the condition of the stover.

