

# TRENCH SILOS



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# TRENCH SILOS

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**SILAGE** should be considered a substitute for green pasture.

It has about the same value in the ration of a dairy cow or beef animal as does green pasture but no greater value unless there is some grain on the feed stuff made into silage.

A silo makes it possible to have green feed when it is too dry or too cold to have a green pasture, or too wet to use the pasture. A silo should also be considered a container in which to store a surplus of feed to use when the drouthy year comes.

A trench furnishes the cheapest form of a silo from the standpoint of cash expenditure. Other advantages of a trench silo are: it may be constructed in a short time; it is less expensive to fill than an above-ground silo; it is wind proof, fire proof, and frost proof; silage may be placed and packed conveniently; silage may be removed easily; and water can be



Filling a Walker county trench with corn bundles.



Most silos are dug with a team and slip.—Harris county.

applied to the silage easily. A trench silo may be filled with bundles.

Some of the disadvantages of the trench silo are: the walls may have to be smoothed each year unless lined; laborers are exposed to the weather in removing the silage; and trouble may be encountered from rain water in the empty portion of the trench unless drainage is provided.

The advantages outweigh the disadvantages when one wishes to construct a cheap silo quickly and will take the necessary precautions in filling and covering.

### How To Construct

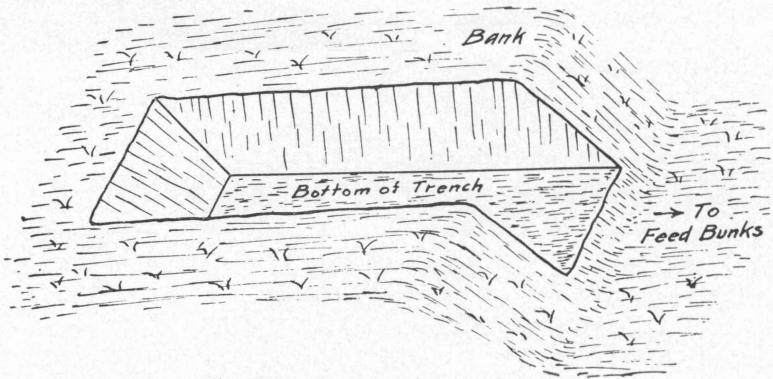
To dig a trench silo economically, a fresno and plow should be used. The plow is used to loosen the dirt and the fresno to remove it. Picks, spades, and shovels must be used to cut the walls smooth. In some silos the walls may be given the final smoothing by sprinkling them and cutting them down with a hoe.

Terracers have been found very useful in cutting down and to some extent smoothing the walls. They are also useful

in moving the dirt away from the walls so that it is easily picked up in a Fresno.

The ends of the trench should be sloped so that a team may be driven down them. The sides should be sloped to prevent caving and to prevent dirt from cracking along the wall while silage is settling.

If a slope or hillside is convenient, the end of the trench where the dirt is drawn out may be made at the brow of the slope. In this way much of the dirt may be removed without pulling it up a grade. Arrangements should be made to remove the silage without pulling it up a grade if the trench is on a hillside. Another advantage of having the trench run back into a hillside is the ease with which any rainfall may be drained out that comes while the silage is being used. Where this natural drainage of the trench cannot be obtained, farmers have in some instances found it necessary to pump the water out of the empty end of the trench so they could get at the silage to use it.



Trench silo construction in a slope.

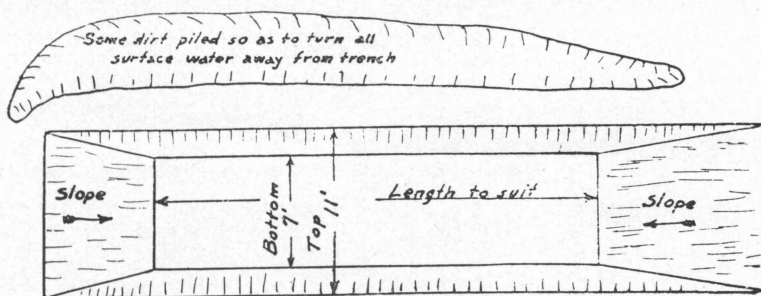
### Size of the Trench Silo

Trenches may be as small as two feet wide by two feet deep. In most soils the sides should be sloped so that they will have a slope of at least one foot to each four feet of depth, particularly to reduce the tendency for the walls to cave. If the walls cave after the trench has been emptied, they should be smoothed down before the trench is refilled.

Observations show that many trenches are made too wide for the number of animals that are to be fed from them. It should be remembered that the width of the trench will be increased from year to year if caving makes it necessary to smooth down the walls.

Make the cross section of the trench proportionate to the size of the herd of cattle that will be fed. For example, if only 10 head of cattle will be fed, a suggested cross section would be a top width of six feet, a bottom width of four feet, and a depth of five or six feet.

The length may be whatever is necessary to get the required capacity. In figuring the capacity of the trench, experience shows that a cubic foot of chopped silage weighs from 40 to 50 pounds after settling. A cubic foot of bundle silage weighs 25 to 35 pounds after settling.



Plan of trench silo.

The weight per cubic foot of the silage will depend on the sort of feed that is used and how much grain is on it, as well as upon the depth of the trench. The deeper the trench and the greater the weight of the covering, the greater will be the per cubic foot weight of the settled silage.

In figuring the required size of a trench to hold a certain amount of silage, it is well to assume some average per cubic foot weight, as 30 pounds for bundle silage and 45 pounds for chopped silage so as to be sure to get the trench long enough.

In figuring the cross section of a trench for a certain sized herd, it will be well to assume the same per cubic foot weight, as about 30 pounds for bundle silage and 45 for chopped silage, in order to avoid getting the cross section too

great for the herd, and thereby causing a waste from spoilage which results if the silage is not fed off fast enough.

To find the required size of a trench to feed a herd of a certain size for a certain period first figure the cross section (width by depth) of the trench to fit the number of animals in the herd and then figure the length of a trench required for the feeding period.

In figuring the cross section of the trench, multiply the number of animals to be fed by the pounds of ensilage to be fed each per day. Suppose 12 cattle are to be fed 30 pounds of ensilage per day, then 360 pounds of ensilage will be fed per day. Assume that the silage weighs 30 pounds per cubic foot, then 12 cubic feet of silage will be fed per day. Now to prevent spoilage, figure that a slice four inches (one-third of a foot) thick should be cut off daily. Dividing the 12 cubic feet by four inches (one-third of a foot), it is found that 36 square feet of cross section in the trench is suitable for a herd of this size.

The depth may possibly be six feet and the average width six feet to get the desired cross section of 36 square feet. Figuring that the sides of the trench are to be sloped, the bottom width may be made five feet and the top width seven feet, giving an average width of six feet.

If the depth of the trench can be, say, only four feet, then the average width desired would be 36 divided by four, or nine feet.

To find the desired length of the trench, simply multiply the number of days of the feeding period by the thickness of the slice fed per day. For example, if the length of the feeding period is 120 days, and a slice four inches thick is to be fed off each day, the required length is 480 inches, or 40 feet. To allow for heavier feeding and wastage, and to be sure that plenty of silage is available, it is well to increase this length, by assuming that a six inch slice will be fed off daily.

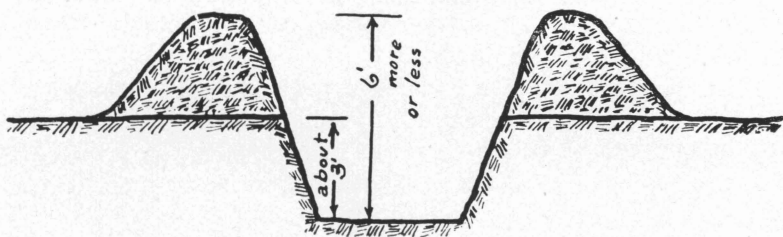
### **Construction Where Water Table Is High**

In places where ground water rises or stands up within four or five feet of the ground surface, the trench may be

dug down nearly to the water table and the walls built up around the trench with the dirt taken from it.

Where ground is flat or level and no drainage can be had, set the trench on top of the ground by constructing two parallel ridges of dirt. Put the feed in between them and then cover.

Sometimes masonry walls of concrete, brick, or rock are built along a trench to increase the total height of the trench walls. Unless such walls are strongly built, they are likely to fail. It is more practical and less expensive simply to use earth banks rather than such masonry walls.



Trench silo construction where water table is high.

### Filling The Trench

The silage is sometimes cut up with an ensilage cutter or feed cutter and is sometimes put in the silo without cutting. The advantage of putting feed in the silo uncut is the saving of the cost of cutting. A little more labor is required to get uncut silage out of the silo. There is little difference in the amount of spoilage with cut and uncut silage. If the feed is not cut up, the bands should be cut so that the stalks will pack well. Stalks should be laid lengthwise of the trench, as they will pack better than if laid crosswise.

The bundles should be laid in with the cross rows lapping as the shingles on a roof, so as to distribute the grain lengthways through the trench, as well as to make a good job of packing and to avoid any large open spaces in the silage. Experience shows that with a good job of shingling the bundles in the trench, the settling has been so slight as to indicate that no additional packing is needed.

Chopped silage may be packed as it is put in the trench by driving horses or cattle about over it, running a tractor or auto over it, or some other method. It should have some placing or scattering by hand, especially at the walls.

When chopped silage is blown into a trench from a silage cutter, some hand mixing and distributing of the silage is generally necessary to avoid uneven settling and consequent spoilage. A blowing cutter tends to separate the chopped leaves from the grain and chopped stalks; and to avoid leaving the silage in this shape, hand mixing in the trench should be used.

Where chopped silage is dumped from trucks or wagons into a trench, hand spreading should also be used to prevent uneven settling of the silage.

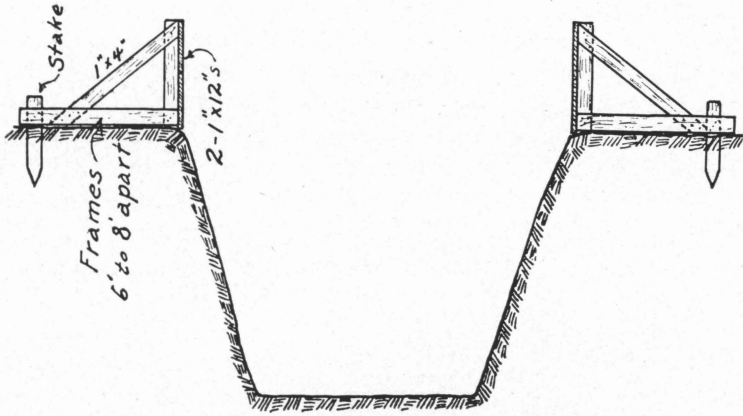
Care should be taken to avoid getting the full length of the trench or a long section of it partially filled and then running short of feed to fill the trench completely. It is safer to start filling at one end and fill a section completely before starting on another section.

It is not necessary, and in most cases it is undesirable, to keep the outer end of the section of the trench being filled, vertical. A rather steep slope to the silage may be maintained as the filling proceeds; and if the filling is stopped before the whole trench is filled, the sloping end of the silage may be covered with dirt as is the top of the filled trench. It is not necessary to remove this dirt covering from the sloped end of the silage if more silage is put into this same trench at some later date.

Since it is important that the trench be filled full to reduce spoilage, the use of temporary sideboards illustrated herewith is suggested. They make it easier to get the silage piled up so the trench will be full after settling has taken place. The sideboards may be 16 feet or more in length. After a section of the trench is filled to the top of the sideboards and rounded up, the sideboards are moved along the trench and another section filled. The filled portion of the trench should have the covering put on it the same day it is filled.

An abundance of water should be used in filling a trench silo. Plenty of water should be put on the silage next to the trench walls if the dirt is dry, even though the silage is so





Temporary side boards for use while silo is being filled.

green and juicy as to not require any water except where the dry walls draw out the moisture.

Each layer of silage should be wetted down. More water must be used if the feed is dry or partially dry, than if it is green and juicy. It is well to put as much as a barrel of water on each ton of silage, and if the feed is very dry, four or five times as much may be required.

### Covering the Silage

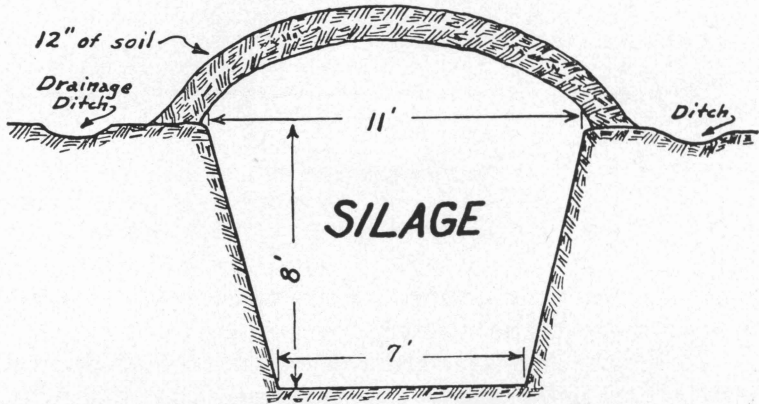
The most common method of covering the silage is to put about 12 inches of dirt over it. There are no serious objections to the use of dirt as a cover if it can be put on with a fresno. Sandy or loam soil is better as a covering than clay that will crack. The greatest losses from spoilage generally occur at the walls near the ground surface. This loss may be largely prevented by using plenty of covering carefully packed along the sides of the trench.

If the available dirt for covering is cloddy and dry so that it does not make a reasonably tight cover, the dirt should be wetted and harrowed down until a good tight covering is made.

If any sort of vegetation is placed between the silage and a dirt cover it should be green or, if not, it should be thorough-

ly wetted. Such material as dry straw or dry stalks placed next to the silage will likely cause more harm than good.

When there is any question about the kind of a cover to use, simply put on a generous amount of dirt. If the top of the covering settles below the surrounding ground level, pile on more dirt.



Cross section of trench silo after silage covering has been put on.

### Keep the Cover Airtight

Small levees and ditches should be constructed, if necessary, around the trench silo after it is filled so that water from rainfall cannot flow into the trench. There is too great a surface area, proportionately, to a trench silo for it to be economical to permit rainfall or surface runoff water to go down through the silage cover opening up air holes to spoil the silage. Watch for cracks in a dirt covering and keep them filled up.

### Removing Silage

To feed out the silage, the trench is opened at one end by scraping off a strip of the covering down to good silage. Care should be taken to keep the dirt out of the silage to be fed as an excess of dirt will injure livestock. Very little trouble has been experienced in keeping dirt out of the silage when a dirt cover is used.

If the feed was not chopped up when put in the trench, tools used in cutting off the vertical slices are a hay knife, an axe, or a tool made with a goose neck hoe with the neck straightened. A hoe not more than six inches wide is used. The handle is of iron or steel so as to add weight to the tool.

No more of the silage should be uncovered at once than can be fed out in a short time.

### Walling Sides of Trench.



Silage cutter to get silage out that has been put in the trench uncut.

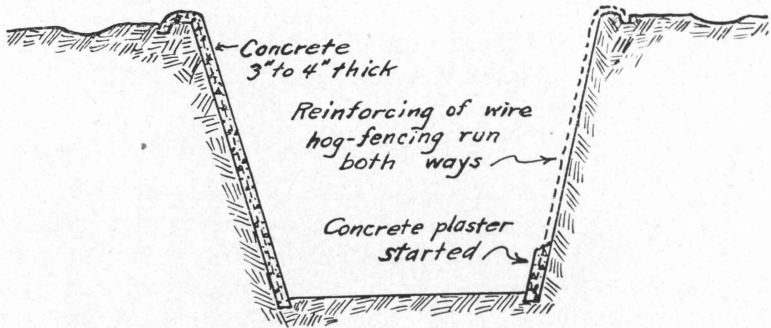
If a trench silo is to be used year after year, it may pay to wall up the sides of the trench if they tend to cave. These side walls will serve two purposes: with smooth walls, the loss from spoilage at the walls will be reduced, and the caving of the dirt will be prevented. There will be some caving of the sides of the trench in most soils as soon as the silage is removed from the trench. In parts of Texas caving is not serious, and walls are not important. In other places the caving and subsequent smoothing of the sides of

the trench before refilling it will make the trench too wide in two or three years. Where caving is very considerable, it is necessary to abandon a trench after two or three years and dig a new one or else put in walls before the trench gets too wide.

An economical concrete wall is suggested herewith. To avoid the expense of providing forms for concrete, the sides may be given a little slope and the concrete plastered on them with a trowel. A slope of about one foot to each four feet of height is suggested. It would not be economical to make the concrete walls vertical, since too much concrete and reinforcing would be required to make a wall strong enough to stand vertically.

The trench sides are first covered with two layers of wire hog fencing; one layer is run one way and the other layer the other way. One layer of hog fence and one of poultry netting

may be used. A layer of concrete three or four inches thick is then applied to the sides. The concrete plastering is started at the bottom of the wall. The wire fencing is pulled out from the dirt two to two and one-half inches, as the concrete is spilled from the shovel and worked smooth with a trowel. After a



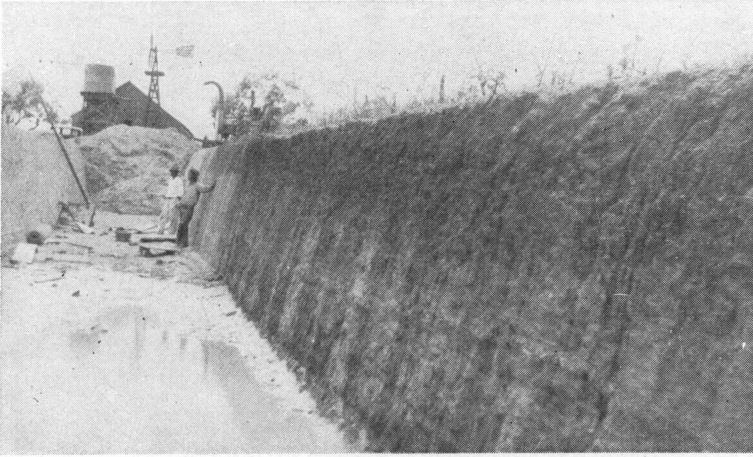
Section of trench silo to show concrete wall made without forms.

strip about a foot high is plastered along the bottom of the wall, then another strip is plastered on in the same manner and so on to the top of the wall. It is advisable to make a concrete roll at the top of the wall extending back about a foot to strengthen the concrete wall and also to prevent water from running in behind the wall. A concrete mixture of one part Portland cement, two parts sand, and four parts gravel should be used. The concrete should be as stiff as can be worked easily. The pebbles in the gravel should be of various sizes but none of them more than one and one-half inches in diameter. The usual method of curing the concrete, by keeping it damp for two weeks, should be used.

## Silage As a Feed

In most cases tonnage or yield is the most important factor to consider in growing any kind of crop for silage. Grain content, quality and maturity are other important factors.

Corn is generally considered the most desirable crop for silage from a quality standpoint; the grain sorghums, such as



Right hand side being covered with hog wire, chicken wire, and concrete,—plastered on.—Wilson county.

kafir, milo, feterita and hegari are almost as good as corn. Sweet sorghums such as red top, orange, amber and seeded ribbon cane are also good especially for dairy cattle and stock cattle. The sweet sorghums are not so good for horses and fattening beef cattle, and sheep. The sweet sorghums may be mixed with corn or some of the grain sorghums to good advantage. As a rule sweet sorghums make more tonnage than corn or the grain sorghums.

Such crops as wheat, oats, barley, sudan grass, and Johnson grass may be used for silage. However, these crops are more expensive to prepare and more difficult to pack in the silo. They should be in the stiff "dough" stage; whereas, corn and the sorghums should be as mature as possible and still have at least some of the leaves green.

Alfalfa, cowpeas, soy beans, peanuts and other leguminous crops make good silage by the addition of 50 pounds of blackstrap molasses per ton of feed. A good method by which to add the molasses is to mix one gallon of molasses with about three gallons of water. Punch holes in the bottom of a tin bucket and sprinkle each layer of the feed with the molasses and water mixture. The leguminous crops may also be mixed

with the sweet sorghums provided a cutter is used. Cropping the sweet sorghums allows the juice to come out on the legume crop. Use at least two tons of the sweet sorghums to one ton of the legume crop.

The farmers of Texas have successfully stored grain sorghum heads, threshed grain sorghums, ear corn, and mixed feeds. Feeds stored in a trench silo are safe from flood, fire, storm, rats and weevils.

In an emergency such crops as sunflowers, blood weeds, careless weeds, Russian thistles, and cotton stalks may be used to make silage. However, these crops make inferior silage. The use of 50 pounds of molasses per ton of feed will improve the quality of the silage made from these crops.

### Preparing Crops For Silo

Harvesting of feed crops for silage at the proper stage of maturity insures, in a large measure, its value as a feed. Corn, grain sorghums, and sweet sorghums should be ripe with the leaves green if possible. If not, some of the leaves should be green. The small grains, sudan grass, Johnson grass and other similar crops should be in the dough stage.

Cowpeas and soy beans should be harvested for silage when the pods are fully developed and before they begin to shatter. Peanuts should be fully developed with the tops still green.

Sufficient water must be added to all silage to insure proper fermentation and to prevent spoilage. The amount of water necessary will depend upon the maturity of the crop. The more mature the crop, the more water is required. Use at least one to three barrels of water per ton of feed depending upon its maturity. More water than this will not be detrimental. In fact, it is impossible to use too much water in a trench silo.

Silage should be piled high enough above the level of the ground to be mounded when settled. The height to pile the silage will depend upon the depth of the trench. The deeper the trench silo, the higher the silage may be piled. The silage should be piled one foot above the level for a silo three feet

deep, two feet for a trench six feet deep. In other words, pile the silage above the ground about one foot for each three feet of depth of the trench, where ordinary packing is done. Where good packing is done, the trench need not be filled quite so full.

### Silage Rations

**Dairy Cattle:** Because it is a succulent, bulky, palatable and cheap feed and is the best known substitute for green pasture, silage is particularly desirable in a ration for dairy cattle. If the silage is made from ripe feed, dairy cattle should be fed all the silage they will eat. In addition, a dairy cow should be offered some hay or other dry roughage. The cow will probably not eat much hay unless the silage has been made from a crop that was not ripe. The dairy cow will also need some concentrated feed such as cottonseed meal, ground corn, and ground oats.

**Beef Cattle:** In fattening rations, silage has proved to be a very satisfactory feed to use as a roughage. This is especially so in starting calves on feed on account of large consumption and ease of feeding. In all cases there should be a small amount of dry hay supplied daily. It is fed in large amounts at the start of the feeding period and supplemented by grain and cake and hay as the feeding progresses. Feed from two to three times, by weight, as much silage as dry hay. For fattening or "warming up" old cows or bulls, silage is an economical feed when supplemented with cake.

The breeding herd can be maintained cheaper in winter by using silage as a basis of the ration. Silage can be fed in all kinds of weather and with less waste than hay. Silage produces more milk than hay; therefore the beef cow will raise a better calf when silage is fed.

**Sheep:** Silage is an economical feed for sheep. Four to five pounds of silage for grown sheep has been fed with good results. A small amount of hay and grain should also be fed. Lambs can be fattened satisfactorily by using silage for the bulk of the roughage in the ration, although a small amount of hay should be fed at all times.

**Horses and Mules:** Silage is a safe feed when fed to horses and mules if it is of good quality. Corn and yellow milo are the best silage crops for horses and mules. If these crops are ripe, they develop very little acid. If the corn or yellow milo made a good crop of grain, the silage will contain sufficient grain. Hence, extra grain will not be necessary. However, the silage will be a better feed for horses and mules if enough cottonseed meal is mixed with it so that the animals will get about one pound of cottonseed meal per day per head. Silage is also very desirable for brood mares and colts.

**Precaution:** Moldy, decayed or frozen silage should never be fed. Sour silage, too, may cause digestive troubles. Sweet sorghums (canes) should not be harvested when in an immature stage, because immature sweet sorghums make sour silage. Mixtures of sweet and grain sorghums will help prevent this difficulty.