

**B-186**

# **SILAGE**

## **FOR THE DAIRY HERD**



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## CONTENTS

	Page
Silage As A Feed.....	3
Cost of Digestible Nutrients.....	4
Year's Supply For The Herd.....	4
Good Silage Crops.....	5
Harvesting Silage Crops.....	6
Types of Silos.....	6
The Upright Silo.....	6
The Trench Silo.....	6
The Box Silo.....	7
Temporary Silos.....	8
Filling Silos.....	8
Feeding Silage.....	9
Give Silage A Chance!.....	10

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# SILAGE FOR THE DAIRY HERD

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The dairy cow is primarily a converter of roughages. She can do this job more efficiently than any other animal. Yet, it is too often the case that this converter of roughages—the dairy cow—is made to function on less desirable and more costly feeds. Without the roughages she needs, she cannot utilize maximum efficiency. With a little planning, most dairymen can provide her with these feeds, enabling her to make the greatest returns.

Good grass is her cheapest and best feed. Grazing must be supplemented with silage and hay to supply all the forage for every day of the year. Concentrates or grain feeds should be balanced with the available forage and fed according to her production.

**A full silo is good feed insurance.** If pastures get short or a drouth strikes, silage will keep the cow producing. During bad weather and winter months, silage will keep up production and lower the feed cost. A dairyman who does not plan for silage in his feeding program may be losing a great opportunity to increase his profits. With good plans for using silage and with adequate facilities for storing and feeding it, the drudgery and hard labor required otherwise is no longer a trouble maker. Silage can be planned for use in the feeding program as conveniently and easily as any other feed. And most important of all, **silage is the cheapest, best substitute for good pasture.**

## SILAGE AS A FEED

If good grass could be available the year round, it would not be necessary to provide the

herd with silage. First of all, **dairymen should develop improved pastures, both supplemental and perennial, to the maximum and then provide the necessary amount of silage to fill in the gaps.**



One ton of silage, costing \$4. or \$5. is equal in feeding value to about 500 lbs. of 16% grain mix, costing \$17. or \$18.

The analyses of pasture, silage, and hay crops show that:

- \* Silage is high in water content, as is pasture. Hence, its value as a succulent feed and as a substitute for pasture.
- \* Most silage is somewhat lower in protein than good pasture due to the more mature stage of harvesting. On a dry basis, though, silage is at least the equal of the same crop as hay and it will maintain its protein in storage much longer than hay.
- \* Silage compares very favorably with pasture in total digestible nutrients. On

a dry basis, both will more than equal hay.

- \* Silage is not much higher in crude fiber than good pasture. Both pasture and silage have a definite advantage over hay in this respect.
- \* Legume silage, pasture, and hay are high in calcium.

In addition to the above comparisons, it should be pointed out that:

- \* Because pasture and silage are succulent feeds and low in crude fiber, they are digested with less energy than hay. Therefore, they have a higher net energy value than hay. This simply means that the cow uses less of the total digestible nutrients in pasture and silage for the work of digestion than is required in the case of hay; thereby leaving more nutrients for body maintenance and milk production.
- \* The vitamin content, especially Vitamin A, is higher in pasture and silage than most hay and remains at a higher level during storage in silage.
- \* Dairy cattle on good pasture and silage are usually in a higher state of health than when these feeds are not available.

#### COST OF DIGESTIBLE NUTRIENTS

The best feeds for the dairy cow are also the cheapest feeds. The information in the table below is based on pasture cost of production figures, silage valued at \$5.00 per ton, alfalfa hay costing \$30.00 per ton, and concentrate or grain mix costing \$3.50 per 100 pounds.

##### Cost of 100 Lbs. Digestible Nutrients From Various Sources

Improved Pasture .....	\$0.40
Silage .....	1.40
Alfalfa Hay .....	3.00
Concentrate Mix .....	5.40

The dairy cow can produce approximately 139 pounds of 4% milk from each 100 pounds of total digestible nutrients. This 139 pounds of milk can be produced with 40 cents worth of pasture, \$1.40 worth of silage, \$3.00 worth of alfalfa hay, \$5.40 worth of concentrate mix, or

the proper combination of the four feeds. **When pasture is not available, silage is the next cheapest feed.**



It would require twelve 60-pound bales of good alfalfa hay, costing \$8. to \$10. or more, to equal the feeding value of one ton of silage.

#### YEAR'S SUPPLY FOR THE HERD

With all the planning for supplemental and perennial pastures, it is not possible to have good, green, succulent grazing the entire year.

If a dairy cow is fed hay along with silage, she will eat about 10 pounds of hay and 30 pounds of silage per day. If no hay is fed, she will eat about 50 pounds of silage per day. On this basis, three tons of silage will be needed per cow per year. Over most of Texas a reserve of three tons of silage will be needed to take care of dry years. This means that when a good crop is made, six tons of silage should be stored for each cow.

The table below can be used as a guide for determining the year's supply of silage for the dairy herd.

Size of Herd	Minimum Supply	Good Insurance	Cu. Ft. Storage Space Needed
10 cows	30 tons	60 tons	1,800— 3,600
20 cows	60 tons	120 tons	3,600— 7,200
30 cows	90 tons	180 tons	5,400—10,800
40 cows	120 tons	240 tons	7,200—14,400
50 cows	150 tons	300 tons	9,000—18,000
50 cows up	3 tons per cow	6 tons per cow	60 cu. ft. per ton

The greatest need for silage by a dairy herd is during seasons when pasture is not available. The drop in milk production during





The quality of the silage is determined by the quality of the feed that goes into the silo.

those times would more than offset the cost of putting up the required amount of silage suggested above.

### GOOD SILAGE CROPS

Many good silage crops can be grown in Texas. These crops include corn, grain sorghums, sweet sorghums, legumes, and grasses. There is little difference in the feeding value of most silage crops. As a rule, dairymen are justified in planting the crop that will produce the greatest tonnage per acre.

Sorghum varieties in tests at Nacogdoches in 1949 (Progress Report 1220) made the yields given in the table above. The land for the tests was idle the previous year. The crop received 500 pounds of 0-12-12 fertilizer at the time of planting, and 200 pounds of nitrate of soda as a sidedressing on June 13.

Sorghums will usually make a higher yield than corn. Over the state as a whole Honey Drip, Atlas sorgo, Hegari, Sumac and corn have been the most dependable silage crops. It is likely that grasses and legumes, though lower yielding than the sorghums and corn, will gain in popularity for silage crops as improved pastures are developed. The management of these pastures, such as mowing, will afford dairymen an additional source for silage.

Less skill is required in making grass or legume silage by the wilting method than in making good hay. No moisture tester is necessary. Under ordinary conditions the crop may be cut in the afternoon and stored the next day.

### SORGHUM YIELDS

Variety	Tons Per Acre
Honey Drip	21.22
Atlas	15.72
Hegari	12.07
Straight Neck	12.10
Orange	12.87
Gooseneck	12.82
Sagrain (Schrock Kafir)	10.66
Darso	9.21
Black Amber	10.59
Early Hegari	9.01
Sumac (Red Top)	8.71
Bonita	6.60
Sweet Sudan	7.73
Plainsman	7.19
Caprock	7.42
Common Sudan	7.84

It should just be wilted. If the material rattles on handling, it is getting too dry. However, loads of feed having dried excessively can be alternated in the silo with loads of fresh cut material with excellent results. Probably the most desirable tools for harvesting grass and legumes are a mower, a side delivery rake, and a field harvester with a windrow attachment.

It is recommended that preservatives be used only where the wilting method is impractical. With fresh cut legumes add 50 pounds of molasses or 150 pounds of ground grain per ton and with grass add 30 pounds of molasses or 100 pounds of ground grain per ton. Very immature, green lush crops require more preservative.

Grass silage requires less packing than corn and sorghums because the material settles tightly. Upright and box silos may require extra reinforcing before filling with grass or legumes.

The principal value of grass silage is in saving a crop that might otherwise be lost during damp periods and in storing surplus pasture.

Mixtures of grasses and legumes are even more satisfactory than either crop alone.

## HARVESTING SILAGE CROPS

Dairymen should remember that the quality of silage is determined by the quality of the feed that goes into the silo. Under normal conditions the silage crop should be harvested in the following stages:

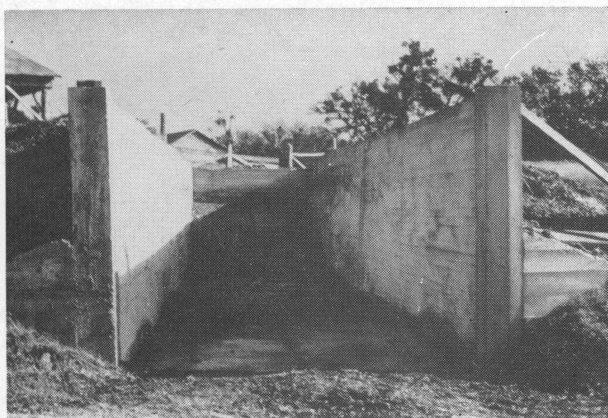
Sorghums—softdough stage  
Corn—dough stage  
Grasses—before bloom  
Legumes—early bloom  
Grass and legumes combination—  
Same as legume

True, it may be necessary to harvest a crop in a less desirable stage in order to save the feed and certainly this should be done under abnormal conditions.

A field harvester, that cuts and chops the crop in one operation and delivers it into a trailer or truck, will harvest the crop with the least amount of labor. On the other hand, when ample labor is available, just as good a job can be done with a row binder to cut the feed in the field and an ensilage cutter located at the silo. Due to the great amount of labor required to feed silage which was stored in bundles, it is recommended that the feed be chopped if at all possible.

## TYPES OF SILOS

Several types of silos which will be satisfactory if they are properly constructed and located are described in the following paragraphs:



A concreted trench silo makes excellent storage facilities.



Upright silos are recommended for a permanent silage program.

### The Upright Silo

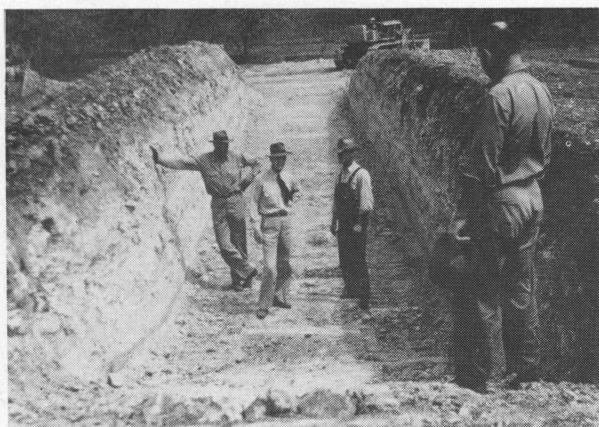
The standard upright silo is one of the best types for a permanent silage program. Although it may have a higher initial cost, the yearly investment probably will not be much higher than the temporary types due to its durability. Upright silos may be made out of solid concrete, concrete staves, concrete blocks, tile, brick, metal, and wood.

Complete details for the construction of the upright silo and other types may be found in Farmers' Bulletin No. 1820. This bulletin may be obtained through the local County Agricultural Agent or from the Extension Dairy Husbandmen at Texas A. and M. College.

### The Trench Silo

The trench silo is one of the cheapest and best methods of storing silage. With a field harvester the trench is easier and cheaper to fill than is an upright because a blower is not necessary. Certain precautions must be taken if the trench is to be used. In most sections of Texas, it is necessary to have sufficient slope of the site to permit ample drainage from the open end of the trench. The floor of the trench itself should slope from three to six inches per 100 feet in length. The location should allow the maximum convenience in feeding silage to the herd.





A trench silo built to provide good drainage.

If the soil is inclined to cave or slough off, concrete or masonry walls may be added which, along with a concrete floor, would turn the trench into an excellent type of permanent silo. Drainage water from the slope above should be diverted from the silo.

The table below sets forth the size of trench silos required to meet the needs for dairy herds of different sizes.

#### The Box Silo

In sections of Texas where the land is more or less level and there is trouble in keeping water out of the trench silo, it may be desirable to build the equivalent of a trench above the ground.

This type of silo can be built in two ways. One method is to build two parallel levees of dirt six feet or more in height and spaced the

desired distance apart, depending upon the size of the herd. This plan is quite popular on land with slope when used with a partial trench. In other words, part of the silo may be above and part below the ground level.

The second method is to build a box silo out of posts and lumber and lined with a specially prepared paper. This plan may be advisable where lumber is readily available.

The walls should be at least six feet high and six feet apart. They may have some slope outward from the ground or they may be vertical. The posts should be three feet apart if one-inch lumber is used for siding or four and one-half feet apart if two-inch lumber is used.

Dressed shiplay is the best for siding, however, rough sawed lumber may be used provided it is placed so the inside of the wall will not be so rough as to break the paper.



A well built box silo provides efficient storage.

Size of Herd	Amount of Silage Stored	Depth ft.	Top Width ft.	Bottom Width ft.	Length ft.	Sliced to Feed	
						Width	Depth
						Average	
10 Cows	Minimum Supply 30 tons	6	8	6	45	2 ft.	8 in.
	Good Insurance 60 tons	7	8	6	75	2 ft.	8 in.
20 Cows	Minimum Supply 60 tons	7	8	6	75	2½ ft.	1 ft.
	Good Insurance 120 tons	8	10	6	110	2 ft.	1 ft.
30 Cows	Minimum Supply 90 tons	8	12	8	70	3 ft.	1 ft.
	Good Insurance 180 tons	8	12	8	130	3 ft.	1 ft.
40 Cows	Minimum Supply 120 tons	8	14	10	75	3 ft.	1 ft.
	Good Insurance 240 tons	8	14	10	150	3 ft.	1 ft.

Note: For herds over 40 cows in size, build additional trench silos as required or increase the dimensions if the site will permit such changes. The size of the equipment to be used in digging the trench and packing the silage will necessarily be considered in determining the silo size. Instead of building one large silo, such as the 180-ton trench, it may be more desirable to build two 90-ton silos or one 120-ton silo and one 60-ton silo.

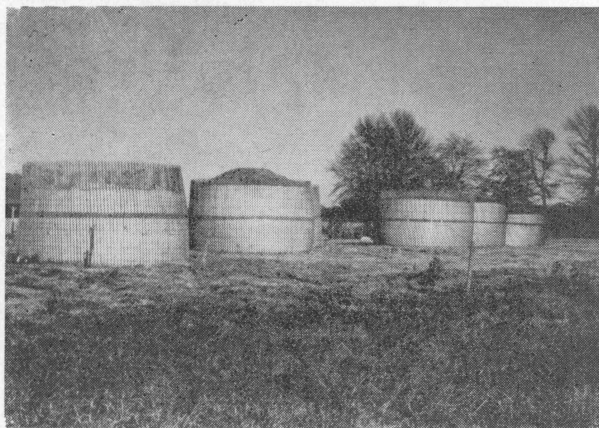
Paper designed for this purpose is recommended for covering the inside of the wall. Place the top edge of each strip of paper under the lower edge of the strip above it. Use big-headed galvanized nails one inch long for tacking on the paper. See that the nails are secure in the lumber, so they will not drop into the silage and perhaps be swallowed by a cow. Some dairymen prefer to place the paper vertically on the walls.

No. 9 galvanized steel wire, or the equivalent in strength, should be used to tie the posts together at the top. Planks such as 2x4's may be used instead of the wire. With sloping walls, it is also necessary to brace the walls from the outside. It should be remembered that if the walls give, there will be a large percent of spoilage.

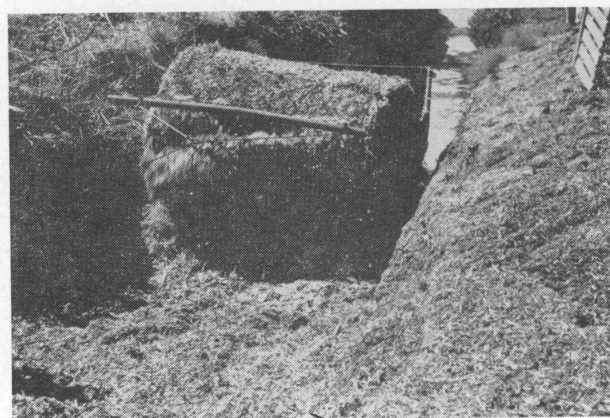
The size of the box silo needed may be figured similarly to the table given for trench silos. If vertical walls are built, use the average width given for trench silos in determining the capacity needed in a box silo.

### Temporary Silos

Temporary silos may be made of picket fence or welded wire. If properly constructed, these silos will make excellent silage. Detailed instructions for building temporary silos can be obtained from dealers handling silo paper and they should be followed carefully to prevent undue spoilage. The silo should never be built higher than the distance across it and the twine holding the rings together should be cut as soon as the silage begins to settle.



Fence and other temporary silos may have a place in the silage program.



Unloading the chopped feed in a trench silo by using a false wire floor.

Even though most dairymen will want to plan for more permanent storage facilities, temporary silos quite often fill a need in the silage program. They are used by dairymen who are not ready to make the investment required for more permanent facilities but still want to have the advantage of feeding silage to their herds. Also, these silos are used sometimes to take care of an overflow crop beyond the capacity of the permanent storage facilities.

### FILLING SILOS

When the field harvester is used, several types of vehicles are satisfactory for hauling feed from the field to the silo. Trucks or trailers are faster and usually more satisfactory. If dump trucks are not available, a false floor of wire can be used. Any heavy gauge netting wire is satisfactory if it is reinforced with wood slats. The wire should be about two inches narrower than the inside of the bed and should be long enough to extend past the rear end about six inches, lay across the floor, and lap up over the front-end-gate. A pull bar of 2-inch pipe or 2x4's doubled and bolted together works satisfactorily on the front end of the wire.

In unloading the chopped feed, the truck or trailer may be driven through the trench, backed into the silo, or it may be unloaded from the side of the trench. The primary advantage of unloading from the side is less loss of time usually brought about by the difficulty of pull-

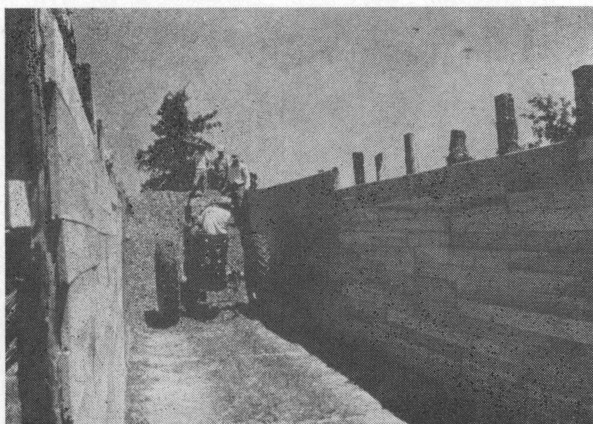


ing the load over the chopped feed. To unload the feed, a cable or chain is attached to a tractor and the other end is hooked around the pull bar on the wire floor. The truck or trailer is held fast and the chopped feed is rolled backward with the tractor. If a silage blower is used at the silo, the feed will have to be rolled off gradually and fed into a conveyor leading to the blower.

The most important step in filling a silo and making good silage with the least amount of spoilage is packing. **Unless the chopped feed is packed thoroughly, the percent loss due to spoilage will be great.** Spots of spoiled silage through the silo indicate poor packing. It will usually be desirable to have a man in the silo to spread the dumped feed with a seed fork. In the case of trench silos the tractor used for unloading can also be used to pack the feed. In other types of silos except the upright where one can refill after settling, it will be necessary to do a lot of packing by tramping. Unless the feed is packed properly, the dairyman will be dissatisfied with the results.

With a normal crop the addition of water will not be necessary. About the only time water will need to be added is when the chopped feed is so dry and spongy that it will not pack satisfactorily.

As the filling job is completed, the chopped feed should be well rounded at the top to allow for settling. If good packing is carried on to completion, it will not be necessary to cover the top with dirt or other material. Some dairy-



Packing is one of the most important jobs in filling a silo.



The ensiling process will require six to eight weeks.

men prefer to use bundle feed to shingle the top. This offers some protection in the dry sections of the state and also aids in packing the top part of the feed. If the silage is to remain in storage for several years as a reserve supply, a covering of some kind would be desirable.

## FEEDING SILAGE

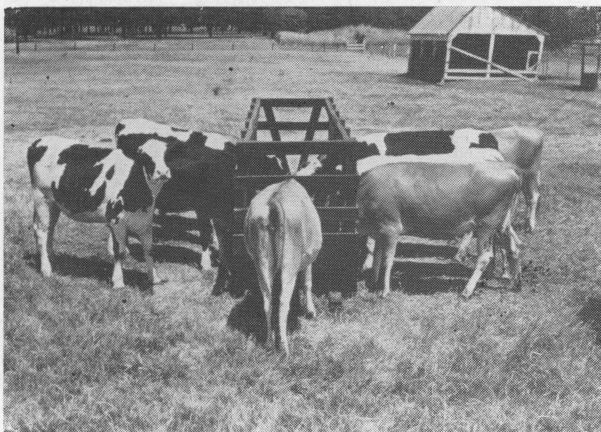
The ensiling process will require about six to eight weeks before the feed is ready to use. A good way to check on the readiness of the silage is to dig down into the feed with the hand and if the temperature at arm's length is not much more than body temperature, then, the feed is about ready to use.

Dairymen should keep this period of six to eight weeks in mind when they plan their silage program. Quite often the weather conditions are such that they will need a substitute for pasture before their silage is ready to feed. This will be no problem if the maximum supply has been stored in previous years. There is one other thing dairymen can do when there is a need for it. **Enough of the silage crop can be left standing in the field to permit the feeding of a silage or green crop during the time the stored feed is making silage.** Some dairymen use their silage harvesting equipment daily to bring this feed from the field to the cows.

There are many ways of planning a convenient way to feed silage. For feeding a small herd, simple equipment such as a tub or basket,

or a cart may be used to remove the silage from the silo. Dairy cows will eat about 30 pounds of silage per day with hay and about 50 pounds without hay. It is usually desirable to feed silage after milking to avoid off flavors in the milk.

If 20 or more cows are to be fed, a pickup truck or a tractor and trailer are convenient for hauling silage to the feed troughs. A feed trough similar to Plan 345, available through the local County Agricultural Agent, will cut silage waste down to a minimum.



A good trough for feeding silage. Blueprint No. 345.

## GIVE SILAGE A CHANCE!

Some factors frequently responsible for poor quality silage in a locality are listed below:

- \* Bad locations for the silos.
- \* Use of trenches where not adapted.
- \* Improper silo construction.
- \* Use of poor silage crops. The silage taken out of a silo is never better than the crop ensiled. However, silos do preserve feed better than most other forms of storage.
- \* Make-shift tools and methods of harvesting and filling. Silo filling is an essential annual operation on dairy farms and should be regarded as such from the beginning.

Silage is a valuable asset on any dairy farm, but it needs a fair chance to prove that "IT DOESN'T COST. IT PAYS."



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**See Your Local County Extension Agents  
For Other Publications Related To Dairying**

**BREEDING**

- L-58 Artificial Insemination of Dairy Cattle
- D-317 Breeding and Calving Record

**FEEDING**

- B-69 Feeding and Care of the Dairy Herd
- C-238 Balanced Dairy Feeding
- C-286 A Forage Program for the Dairy Herd
- No. 345 Cattle Hay Rack (Blueprint)
- No. 356 Mineral Trough (Blueprint)

**MANAGEMENT**

- B-59 Dairy Barn Plans
- B-158 External Parasites of Livestock and Their Control
- B-178 Raising Dairy Calves
- C-218 Are Your Cattle Grubby?
- C-287 Control of Stomach Worms and Liver Flukes in Cattle and Sheep
- C-284 Developing Dairy Heifers
- C-290 A Milking Procedure for the Dairy Herd
- L-63 Mastitis
- L-77 Anaplasmosis of Cattle
- L-82 Wheat Poisoning of Cattle
- L-117 Coccidiosis in Cattle and Sheep
- No. 366 Calf Barn (Blueprint)
- No. 373 Hay Storage and Loafing Shed (Blueprint)

**MILK AND  
MILK PRODUCTS**

- B-141 Cottage Cheese and Processed Cottage Cheese
- C-210 Better Milk for Better Meals
- C-228 Neufchatel Cheese
- C-234 Home Pasteurization of Milk

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