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The Trench Silo

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SILAGE has long been recognized as one of the cheapest and best sources of home-grown roughage for both beef and dairy cattle. It is cheap because it can be grown in large quantities on a small acreage with comparatively little labor. It is valuable because it furnishes a nutritious, palatable, and succulent roughage at a season of the year when grass and other succulent feeds are scarce.

Upright silos constructed from wood, tile, or concrete have been used largely in the past, but the initial cost of a silo of this type is so great that it has been almost prohibitive to the small farmer. For this reason the use of silage has been confined mostly to large operators. The trench silo, which has gained prominence in some states in recent years, is easily constructed and the cost is within reach of practically every farmer. This type of silo has been used successfully in Colorado, Minnesota, Missouri, North Dakota, and other states.

Because of the economy in building a trench silo and the apparent satisfaction which it has given in other states, a silo of this type was constructed and filled with silage on the Alabama Experiment Station farm in the fall of 1930. The results have been so gratifying that it was thought advisable to prepare this publication for the benefit of Alabama farmers who might be interested in a silo of this type.

Cost.—Very little, if any, cash outlay is necessary to build a trench silo. There are seasons of the year when men and mules are idle on practically every farm; labor at such a season should cost very little. All the implements needed with the exception of the slip scrape, are to be found on the average farm. The slip scrape may be purchased for about $12 and may be used to advantage for terracing and other work. Even if a reasonable wage is charged for man- and mule-labor, the cost of digging a 50-ton silo should not exceed $20 to $25.

Equipment for Construction:

(1) Two mules
(2) Turn plow
(3) Slip scrape
(4) Pick and shovel

Size and Capacity.—The size and capacity of the silo should be determined by the number of cows to be fed. A cow should receive about 35 pounds, or one cubic foot, of silage daily. Multiply the number of cows to be fed by the number of days during which feeding is to be done, and this will give the number of

cubic feet of silage needed. For example: if 30 cows are to be fed for 120 days, 30 x 120 = 3,600 cubic feet of silage.

Table 1 gives dimensions of silos for different herds and different length feeding periods. For instance: a trench silo for a herd of six cows should be six feet wide at the top, four feet wide at the bottom, and five feet deep. If the feeding period is to be 75 days it should be 18 feet long; 100 days, 24 feet long; 125 days, 30 feet long, etc. The capacity is sufficient to allow one cubic foot of silage per animal daily. The dimensions are governed by ease of construction and the amount of silage which must be fed daily to prevent surface spoilage.

TABLE 1.—Suggested Dimensions for Trench Silos*

Number of cows	Width of trench at top	Width of trench at bottom	Depth of trench	Length of trench based on number days feeding period			
				75 da.	100 da.	125 da.	150 da.
	feet	feet	feet	feet	feet	feet	feet
6	6	4	5	18	24	30	35
8	6	4	5	24	32	40	48
10	6	4	5	30	40	50	60
12	7	5	6	25	34	42	50
14	7	5	6	29	39	49	59
16	8	6	6	28	38	48	58
18	8	6	7	28	37	46	56
20	9	7	7	27	36	45	54
24	10	7	7	31	41	51	61
28	12	8	7	30	40	50	60
32	12	8	8	30	40	50	60
36	12	8	8	34	45	57	68
40	12	8	8	38	50	63	75
44	13	9	8	38	50	63	75
48	14	10	8	38	50	63	75
52	14	10	8	41	55	68	82

*Slide slopes for stiff red clays of State.

It is well to keep in mind when determining the dimensions of a trench silo that it is better, if possible, to get added capacity by increasing length and width rather than with greater depth. The cost increases rapidly with increased depth, because the soil becomes more difficult to remove the deeper one goes. The side pressure also becomes greater with increased depth, causing the sides to cave worse when the trench is empty.

Feeding from a trench silo should start at one end. Each day the covering should be removed from that part of the silage which is to be fed during the day. Beginning at the top of the silage and extending to the bottom, a block of silage 3 or 4 inches thick should be removed from the entire face of the silo daily.

Location.—For best results the trench silo should be constructed on a hillside where there is good drainage and a clay subsoil. If possible, it should be located near the barn but this is not absolutely necessary. On some farms the land near the barn may not be suitable for a silo of this type. In such a case

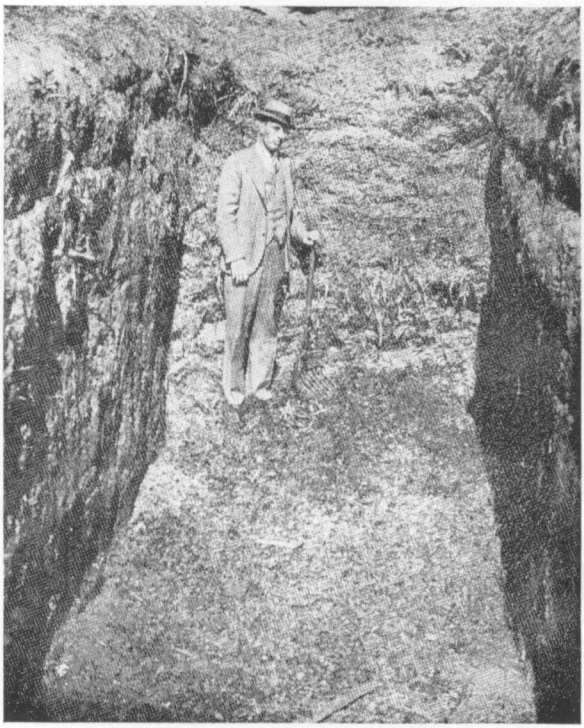

FIGURE 1.—Trench silo on Alabama Experiment Station farm.

there is no reason why it should not be built in a pasture some distance from the barn. The silage can be hauled to the barn daily and fed, or troughs can be built near the silo and the cows fed there any time during the day.

Construction.—Measure off the area according to the size of silo desired. Plow the land within the area and remove the loose dirt with a slip scrape. Slope the ends of the trench gradually to the surface so the team can walk in and out of the trench. The slope of the side walls must be sufficient to prevent the soil from crumbling into the silo when empty. The side slopes shown in the table are satisfactory for the tight red clays of the State. For "crumbly" soils, such as sand, the walls must be reinforced with concrete, masonry, or planking. When planking is used, this should be cut and dried and then

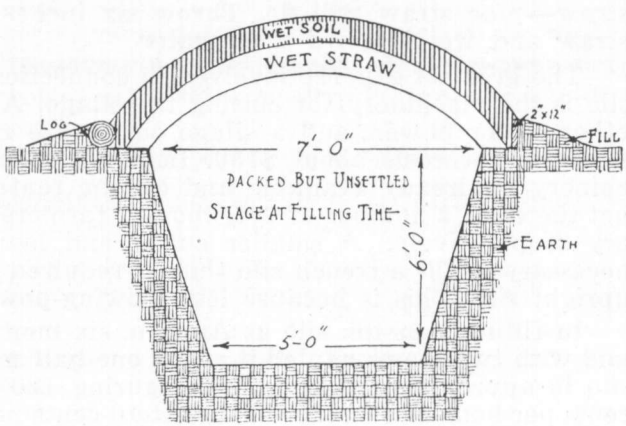

FIGURE 2.—Cross-section of trench silo.

painted with hot creosote before erection. The walls should be smooth so the silage will pack tightly against them without air pockets.

The silo should be protected from surface water by a ditch or terrace, and a drainage ditch should be dug from the lowest point in the silo to the surface on the hillside. Tile or hollow pipe should be placed in the ditch to provide proper drainage. The tile should have at least three inches fall per hundred feet. Place a bucket which has had a number of holes punched in the bottom, over each end of the drain pipe to act as a strainer. This will prevent the pipes from becoming clogged with silage and will keep rabbits and rats from entering the silo. Considerable labor will be saved in getting the silage out of the silo if the slope at the lower end is such that a wagon can be backed into the trench; otherwise, it will be necessary to lift out the silage in baskets or sacks.

A silo of this type may be made permanent by the use of concrete or masonry for floor and walls. Concrete walls should not be less than six inches thick, and should be reinforced by embedding woven wire fence in the concrete. A mixture of one cubic foot cement (one sack), three cubic feet clean sand, and six cubic feet gravel should be used. When this type of silo is constructed, the earth sealed above the silo may be protected by a removable cover or roof. A cross-section of this construction is shown in Figure 3.

Filling the Silo.—Corn and sorghum are both good silage crops. Sorghum is slightly less valuable pound for pound but it will, on the average, make from 50 to 60 per cent more tonnage per acre. When the grain is in the late dough stage, cut the crop, run it through a silage cutter, and store in the silo. Tramp the silage well around the edges and cover with six inches of straw—pine straw will do. Throw six inches of soil over the straw and wet it down with water.

The greatest expense involved in connection with the trench silo is the machinery for cutting the silage. A tractor, or some other motor power, and a silage cutter are required. A small silage cutter costs about $150. In many communities the machinery is already available and can be rented. Where this is not the case, a number of neighboring farmers can buy machinery cooperatively. A smaller cutter and less motor power is necessary to fill a trench silo than is required in the case of an upright silo. This is because less blowing-power is needed.

In filling a 28-ton silo at Auburn, six men cut the sorghum and with two teams hauled it about one-half mile and filled the silo in approximately 12 hours. Figuring 120 man-hours at 15 cents per hour and 60 mule-hours at 10 cents per hour, the labor cost of filling the silo was $24. When the cost of operating a tractor for six hours at $1 per hour was added to this item, the

total cost of filling the 28-ton silo was $30, which is a little more than $1 per ton.

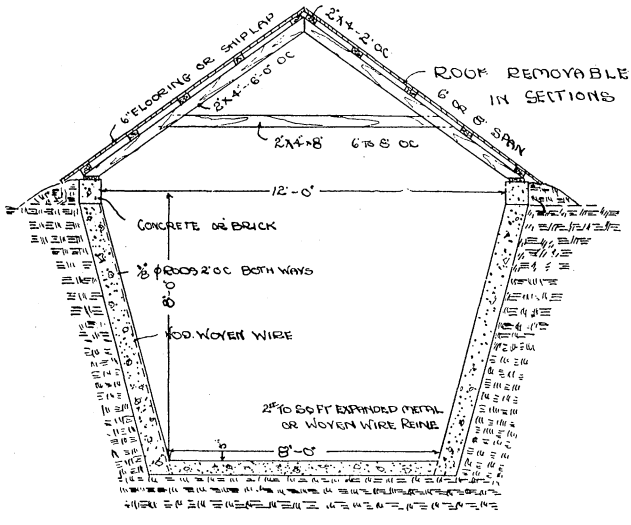

FIGURE 3.—Cross-section of trench silo with permanent walls and roof.

Quality of Silage. — The trench at Auburn was filled October 17 and opened November 19. During this time the rainfall was 8.47 inches which is somewhat above the average for this season of the year. Despite this fact, when the silo was opened it was found that much of the pine straw between the clay and silage was dry. The silage was green and fully equal in quality to the silage taken from a concrete silo. The cows relished the silage throughout the winter. The total spoilage, most of which occurred next to the straw cover and in uneven parts of the wall, amounted to 256 pounds. An additional 535 pounds were lost from dirt contamination.

SUMMARY

1.—The trench silo is easy to build and is inexpensive, requiring mainly man- and mule-labor.

2.—The trench silo can be built to suit the needs of any number of cows. A cow should consume about 35 pounds, or one cubic foot of silage daily.

3.—A long, shallow trench is cheaper than a short, deep one. Where increased capacity is desired, it should be obtained by increasing length and width rather than by greater depth.

4.—A trench silo will preserve silage satisfactorily. Silage taken from a trench silo at Auburn was considered equal in quality to that removed from a concrete silo.

5.—The cost of filling a trench silo is less than that for an upright silo, because the power to lift the ensilage and blow it up a long pipe is not necessary.

6.—The essentials in making good silage are proper drainage and air exclusion.

SORGHUM AS A SILAGE CROP

What shall I use to fill my silo?—Gooseneck sorghum, sometimes called Texas seeded ribbon cane, will produce larger yields than corn and is almost equal in feeding value.

How much seed per acre?—Approximately one peck per acre should be sufficient if planted in three and one-half foot rows. Sorghum seed weigh about 50 pounds per bushel.

What kind of land shall I plant in sorghum?—Bottom land with plenty of available moisture will give the greatest tonnage of sorghum.

What kind of fertilizer is needed?—Barnyard manure is excellent if available, or from 200 to 400 pounds of nitrogenous fertilizer applied at the time of second cultivation will give excellent results.

When shall I plant sorghum?—The first half of May will be satisfactory.

How shall I cultivate sorghum?—Cultivate like corn. Little thinning will be needed.

At what stage shall I cut sorghum for silage?—When the seed are in the late dough stage and some of the leaves are turning brown.

How many acres will I need?—From two to three tons of silage per cow should be provided. Sorghum will yield from 8 to 10 tons per acre on good land.