CIRCULAR No. 8 JULY, 1916

University of Arizona College of Agriculture
EXTENSION SERVICE
STANLEY F. MORSE, SUPERINTENDENT
TUCSON, ARIZONA

# PIT SILOS AND HOW TO MAKE THEM

By

A. L. PASCHALL, AGRICULTURAL AGENT, COCHISE COUNTY
Extension Service and U. S. Department of Agriculture

Fig. 1.—Delegates from local farmers' organizations to the County Convention of the Cochise County Farm Improvement Association inspecting a pit silo on the dairy farm of Vanneman & Adams, near Douglas.

Cooperative Extension Work in Agriculture and Home Economics, University of Arizona College of Agriculture and U. S. Department of Agriculture, Cooperating.

## BOARD OF REGENTS

EX-OFFICIO

HIS EXCELLENCY, GEORGE W. P. HUNT..... Phoenix
Governor of Arizona

THE HON. CHAS. O. CASE..... Phoenix
Superintendent of Public Instruction

APPOINTED

FRANK H. HEREFORD..... Tucson
President of the Board and Chancellor

LEWIS D. RICKETTS, PH. D..... Warren
WILLIAM SCARLETT, A. B., B. D..... Phoenix
RODERICK D. KENNEDY, M. D..... Globe
WILLIAM V. WHITMORE, A. M., M. D..... Tucson
RUDOLPH RASMESSEN..... Tucson
FRANK J. DUFFY..... Nogales
WILLIAM JENNINGS BRYAN, JR., A. B., Secretary..... Tucson

---

RUFUS B. VON KLEINSMID, A. M., Sc. D,
President of the University

## COLLEGE OF AGRICULTURE

ROBERT H. FORBES, M. S., PH. D..... Dean
Director, Agricultural Experiment Station

## AGRICULTURAL EXTENSION SERVICE

STANLEY F. MORSE, B. A. S..... Superintendent
*State Leader, County Farm Advisor Work

GEORGE W. BARNES, B. S..... Livestock Specialist
LELAND S. PARKE, B. S..... *State Club Leader
E. W. HUDSON..... *Egyptian Cotton Specialist
FOSTER T. PARKER..... Secretary
ADELE CLEMENTS..... Stenographer

COUNTY FARM ADVISORS

ARTHUR L. PASCHALL, B. S. A..... *Cochise County
..... Maricopa County
CHARLES R. FILLERUP, B. P. I., D. B.... *Navajo-Apache Counties
ALANDO B. BALLANTYNE, B. S..... *Graham-Greenlee Counties
.....

---

*In cooperation with U. S. Department of Agriculture.

# PIT SILOS AND HOW TO MAKE THEM

## INTRODUCTION

While in a few localities of the Southwest intensive crops like fruits and vegetables can be profitably produced, yet, owing to the small local markets, distance from large markets, high freight rates, and lack of organized effort to produce and market standardized products of the proper quality in large quantities such crops can not be depended on as being generally profitable, except where local conditions are favorable. However, a system of farming which includes the production of home supplies, producing feed crops in a systematic rotation and feeding these crops to live stock on the farm, thus making the live stock the money crop and returning the manure to the soil, has proven to be the most successful farming practice for the average farmer. Any cropping system which continually takes from the land more plant food than is returned will deplete the soil. In feeding crops to live stock 75 to 85 per cent of the fertilizing value of the crop is retained on the ranch in the form of manure. This, with the occasional plowing under of green manure crops (which may be previously partly pastured off), keeps up and even increases the fertility of the soil. Besides, the 15 to 25 per cent of plant food consumed and retained by the animals will usually bring greater cash returns and larger net profits than the entire crop sold as a crop. Of course, there are exceptions to this rule, such as the farmer who understands *how* and carries the "how" into practice, who makes a specialty of producing extra good seed of standard crops which are in demand; and certain "money crops" may occasionally be raised at a fair profit. On the other hand some farmers may feed such low grade or poor scrub stock that there is no profit in feeding it or any demand for such stock; or they may let disease take away their profits.

Live-stock farming enables the farmer to better employ his labor and capital, prevents waste, brings about the profitable utilization of by-products of crop production, enables and induces him to put into practice scientific methods in systematic crop rotation, which is the basis of successful farming, and makes farming more profitable and enjoyable. The leading industry of the Southwest for many years has been cattle production, and this is still mainly true. However, the increasing population and its greater distribution have caused the western grazing ranges to be cut up into smaller farms, and the old-time fine grazing ranges have been largely reduced by

prairie dogs and similar animals, destructive insect pests, and by overgrazing.

According to the latest and most reliable estimates the population of the United States has increased about 10 per cent in the last six years and the number of food animals (cattle, hogs, sheep, goats) have decreased in almost like proportion; yet at no time has there been an oversupply of these animals. The production of feed crops and the raising and feeding of cattle on the farms in the West have not been commensurate with the decrease occasioned by cutting up the big ranges into farms and the decrease in cattle caused by the diminishing carrying power of the ranges that are left.

## SILOS AND STOCK FARMING

The Southwest is, therefore, primarily a stock-raising region. Feed can be cheaply produced and the stock requires no expensive housing. Live-stock farming (especially cattle raising), the production of feed crops, making silage and feeding cattle on the farms, has already proven to be the most successful system of farming. Practically all of the farmers in this region are newcomers—that is, have been here but a few years. It generally requires two to three years for a farmer to get his farm into shape and grow feed for cattle-feeding. However, many farmers have been here a longer time than this and are now beginning to accumulate stock to which to feed crops. One question often asked is whether if silos were put in, where or how would the farmer secure cattle to feed the silage If a farmer has no feed or must feed expensive food, then he can not feed stock profitably, but if he has an abundance of cheap feed, he will generally find stock to which to feed it. If a farmer has a sufficient amount of good silage on hand, he can generally either buy cattle, feed cattle on shares, or sell silage to cattle owners whose cattle will be fed on his farm. Cattle owners who have been depending altogether on natural range for feed are also beginning to grow feed crops. For these people pit silos are strongly recommended. They will find them of particular value for carrying cattle over the very dry years when other feed is scarce.

Several excellent publications have been issued on silos (including underground silos), how to construct them, silage and the feeding of same, such as Bulletin 12 of the Santa Fe Railway agricultural department, by H. M. Bainer; Bulletin No. 200 of the Colorado Station; Bulletin No. 145, "Handling Silage," by the Nebraska Station, "Underground Silos," by R. S. Trumbull, agricultural agent, E. P. & S. W. Ry., etc. Besides, the value of feeding silage is very generally known. This circular is not intended as a general treatise on the subject of silos and making and feeding silage, but is intended rather as a compilation of the experiences of farmers in Cochise and Santa Cruz Counties who have put in silos and fed silage to stock. To this valuable information is also added the results obtained from several of the experiment stations in other States as well as the knowledge obtained from experiments conducted in this State and

the experience and observations of the writer. In order to collect the information for this circular, a questionnaire was sent to each of the thirty-eight silo owners in Cochise and Santa Cruz Counties. The following table is a compilation of the replies to the main questions sent out Thirty-five of the silos are in Cochise County, of which twenty-nine are in the Sulphur Spring Valley. Thirty of the silos are pit, or underground, and eight are built above ground.

## PIT SILOS

| Builder | | Date built | Dimensions | Capacity tons | Cement used lbs. | Cost of material | Cost of labor | Total cost |
|---|---|---|---|---|---|---|---|---|
| Name | Address | | | | | | | |
| WilhelmHattje... | Douglas... | July, 1915 | 10½x26 | 44 | 6,000 | $80.00 | $110.50 | $190.50 |
| C. B. Emery..... | McAlister.. | Sept., 1915 | 10 x20 | 26 | 1,900 | 17.10 | None | 17.10 |
| M. G. Boots..... | Pearce..... | Oct. 1914 | 12 x16 | 35 | 3,300 | 50.35 | 8.00 | 58.35 |
| W. H. Boots..... | Pearce..... | 1913 | 12 x16 | 35 | 4,100 | 44 00 | None | 44.00 |
| C. E. Samson.... | McNeal.... | Aug. 1914 | 10 x19 | 23 | 800 | 7.20 | 16.00 | 23.20 |
| H. R. Fike... .. | Stark..... | Sept., 1915 | 12 x24 | 54 | 2,000 | 26.00 | 22.00 | 48.00 |
| Jas. E. Brophy .. | Lowell..... | Aug., 1915 | 12 x22 | 46 | 2,000 | 65 00 | 50.00 | 115.00 |
| Jas. E. Brophy... | Lowell..... | Aug., 1915 | 12 x22 | 46 | 2,000 | 65.00 | 50 00 | 115.00 |
| R. D. Koontz.... | McNeal.... | Mar., 1914 | 11 x22 | 37 | 1,100 | 11.00 | None | 11.00 |
| T. F. Forbes..... | McNeal.... | Mar., 1914 | 10 x21 & 7x21 | 15 | 1,600 | 18.00 | None | 18.00 |
| P. Adams..... | Douglas.... | Sept., 1915 | 12 x32 | 71 | 8,500 | 94.15 | 120.00 | 214.15 |
| F. S. Williams.... | Sonoita..... | Sept., 1914 | 10 x16½ | 18 | None | None | None | ..... |
| P. A. Dillman.... | Whitewater. | 1915 | 8 x 8 | 7 | ..... | 6.60 | ..... | 6.60 |
| A. Millard..... | McAlister... | Aug., 1915 | 10 x27 | 42 | 1,200 | 13.80 | ..... | 13.80 |
| Charles Boots.... | Pearce..... | 1915 | 12 x22 | 44 | 1,000 | (†) | (†) | (†) |
| Charles Boots... | Pearce..... | 1914 | 12 x15 | 30 | 5,500 | 60.00 | 10.00 | 70.00 |
| E. S. Boyer..... | Light..... | 1915 | 12 x25½ | 55 | 3,500 | 35.00 | 75.00 | 110.00 |
| W. M. Jenkins... | Cochise..... | Sept., 1915 | 12 x24 | 54 | 1,900 | 21.00 | None | 21.00 |
| M. Manning..... | Sonoita . .. | July, 1915 | 10 x20 | 26 | 400 | 10.20 | 25.00 | 35.20 |
| S. S. Hardenbrook | Willcox..... | Aug., 1915 | 12 x20 | 40 | 1,200 | 16.20 | 20.00 | 36.20 |
| R. E. Samson.... | McNeal.... | Aug., 1914 | 10½x20 | 28 | 3 bbls. | 19.20 | ..... | 19.20 |
| R. E. Samson.... | McNeal.... | Aug., 1915 | 10½x20 | 28 | 4 bbls. | 12.00 | ..... | 12.00 |
| C. E. Benton..... | McNeal.... | (†) | (†) | (†) | (†) | (†) | (†) | (†) |
| W. H. Benton.... | McNeal.... | (†) | (†) | (†) | (†) | (†) | (†) | (†) |
| W. A. Sheppard.. | Douglas.... | (†) | (†) | (†) | (†) | (†) | (†) | (†) |
| C. M. Watkins... | Pearce..... | (†) | 12 x27 | (†) | (†) | (†) | (†) | (†) |
| Mrs. Abram..... | Naco..... | (†) | (†) | (†) | (†) | (†) | (†) | (†) |
| Boyd..... | Light..... | (†) | (†) | (†) | (†) | (†) | (†) | (†) |
| F. C. Carver..... | Sonoita..... | (†) | (†) | (†) | (†) | (†) | (†) | (†) |

## ABOVE-GROUND SILOS

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| C. D. Clapp..... | Pearce..... | Oct., 1915 | 12 x20 | 40 | 4,320 | 45.00 | $70.00 | $115.00 |
| Warren Ranch... | Bisbee..... | 1906 | (‡) | (‡) | (‡) | (‡) | (‡) | (‡) |
| Warren Ranch... | Bisbee..... | 1906 | (‡) | (‡) | (‡) | (‡) | (‡) | (‡) |
| Cananea Cat. Co.. | Duquesne... | 1914 | 21½x32 | 240 | metal | ..... | ..... | 1000.00 |
| Mrs. L. L. Fike... | Naco..... | Aug., 1915 | 14 x28 | 86 | 2,000 | 91.00 | 270.00 | 371.00 |
| Robt. Jordan..... | Light..... | 1914 | 12 x 30 | 68 | 3,000 | 36.30 | 15.00 | 51.30 |
| John Rock..... | Tombstone. | 1915 | 12 x 30 | 68 | (†) | (†) | (†) | (†) |
| F. W. Watkins.. | Pearce..... | 1915 | 12 x27 | 60 | (†) | (†) | (†) | (†) |

PIT SILOS

| Cost per ton capacity | Hours unpaid labor | Thickness of plastered coat | Proportion of cement to sand | Height of collar feet | Engine H. P. | Crop used | Used water | Will put in another silo and what kind? |
|---|---|---|---|---|---|---|---|---|
| $4.30 | 48 | ... ..... | 1–6 | 6 | 6 | Milo, corn, feterita, sudan. | Yes | Yes; pit. |
| .66 | 250 | ¾-inch..... | (a) 1–4<br>(b) 1–2 | None | 2 | Kafir, corn | Yes. | Yes; 2; pit. |
| 1.66 | 80 | 2½-inch ... | 1–4 | 5 | 6 | Corn, cane.. | Yes | Yes; pit. |
| 1.25 | No acct | . ..... . | 1–5 | 1 | 6 | Corn, cane.. | Yes. | Yes; pit. |
| 1.00 | 130 | 1-inch..... | 1–3 | 3½ | ..... | Kafir..... | Yes. | Probably, pit |
| .88 | 80 | ..... | (a) 1–4<br>(b) 1–3 | 5 | 5 | Corn..... | Yes. | Yes; pit. |
| 2.50 | 30 | 1-inch..... | 1–2 | 4 | 6 | Cane..... | Yes. | Yes, 2; pit. |
| 2.50 | 30 | Same..... .. | ..... | ..... | ..... | ..... | ..... | .. 0 |
| .30 | No acct | ½ to ¾-in... | 1–3 | 1 | 2 | Corn, sorghum. | Yes. | ? |
| .40 | No acct. | ¾-inch..... | 1–3 | 1 | 2½ | Corn, sorghum. | Yes. | Yes; pit. |
| 2.90 | ..... | ¾-inch and brick. | 1–3 | None | 6 | Milo..... | Yes. | Yes; pit. |
| ..... | 60 | Not plastered | ..... | ..... | ..... | Corn, sorghum. | No.. | Yes; pit. |
| .95 | No acct. | 1-inch..... | 1–3 | None | 1½ | Corn, shallu | No. | |
| .33 | 240 | ¾-inch..... | 1–5 | 2 | 2½ | Corn, kafir. | No.. | Yes; pit. |
| ..... | ..... | ¾-inch..... | 1–3 | 6½ | ..... | ..... | ..... | |
| 2.35 | 60 | 5-in. (form). | 1–6 | 5 | 4 | Corn..... | No.. | Probablynot. |
| 2.00 | 30 | ½ and 8-in.. | 1–3 & 1–6 | 14½ | 4 | Milo, kafir.. | Yes. | ? |
| .40 | 400 | ½-inch..... | 1–3 | 2 | 6 | Kafir..... | Yes. | Probably, pit. |
| 1.35 | ..... | Not plastered | Collar 1–8 | None | 4 | Corn ..... | Yes. | |
| .90 | None | ⅜-inch..... | ..... | ..... | 4 | Kafir..... | No.. | Yes; pit. |
| .70 | ..... | 3-inch..... | 1–8 | 5 | 15–30 tractor | Kafir..... | Yes. | ? |
| .43 | ..... | Same..... | ..... | ..... | ..... | ..... | ..... | |
| (†) | (†) | (†) | (†) | (†) | (†) | (†) | (†) | |
| (†) | (†) | (†) | (†) | (†) | (†) | (†) | (†) | |
| (†) | (†) | (†) | (†) | (†) | (†) | (†) | (†) | |
| (†) | (†) | (†) | (†) | (†) | (†) | (†) | (†) | |
| (†) | (†) | (†) | (†) | (†) | (†) | (†) | (†) | |
| (†) | (†) | (†) | (†) | (†) | (†) | (†) | (†) | |
| (†) | (†) | (†) | (†) | (†) | (†) | (†) | (†) | |

ABOVE-GROUND SILOS

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $2.90 | 134 | 5-in. (form).. | 1–6 | 10 | 6 | Corn, kafir., | Yes.. | |
| (‡) | (‡) | (‡) | (‡) | (‡) | 12 | Corn, cane, & alfalfa. | No.. | No. |
| (‡) | (‡) | (‡) | (‡) | (‡) | (‡) | (‡) | (‡) | |
| 4.16 | ..... | Metal..... | ..... | ..... | 12 | Corn ..... | Yes.. | Yes; same. |
| 4.30 | ..... | 8-inch wall... | 1–4 | 22 | 7½ | Corn, cane.. | Yes.. | Yes; pit. |
| .75 | 96 | 12-in adobe and ½-inch plastered. | 1–3 | 25 | 6 | Corn, kafir. | Yes. | No. |
| (†) | (†) | (†) | (†) | (†) | (†) | (†) | (†) | |
| (†) | (†) | (†) | (†) | (†) | (†) | (†) | (†) | |

†No report.

‡Adobe, set in cement and ceiled inside with flooring.

*Pit silos.*—The cost per ton capacity ranges from 30 cents to $4.30; counting cost of unpaid labor at 20 cents per hour, the cost would range from $1.20 to $4.52 per ton capacity.

Average cost per ton capacity for material alone.. $0.85
Average cost, including cost of labor and farmer's time, at 20 cents per hour..... 1.70

A silo should be at least twice as deep as it is wide. The deeper the silo, the better the silage will pack.

*Above-ground silos.*—For the four owners who reported, the average cost per ton capacity, including labor, is $3.67. It will be noticed that the cheapest above-ground silo, per ton capacity, is an adobe silo. In order to make the best adobe silo, the adobes should be made slightly wedge-shaped, so as to fit properly in a circular wall, and the walls should be 20 inches thick. The adobes should be set in cement or Douglas plaster; a mixture of 1 to 3 or 4 of cement and sand is about the proper proportion. If the adobes are well made and properly protected by a roof and reinforced with strong wire or iron bands, a substantial silo should be the result. The two large adobe silos at the Warren Ranch, near Bisbee, were made this way (except that they were not reinforced) seven years ago and are still in good condition. One of these silos holds about 250 tons and the other holds about 180 tons.

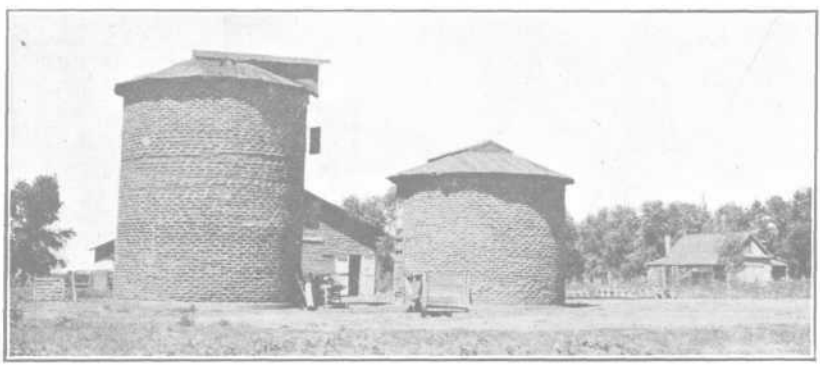

Fig. 2.—Adobe silos on the Warren Ranch, near Bisbee, made of 20-inch adobe bricks set in cement.

Although the above table and notes give the experiences of the farmers and actual silo users, yet it is not the final word as to the cost of the two forms of silos. Most of the pit silos are excessively high in cost on account of the inexperience of those who put them in, there being no experience in the various localities to guide those putting them in. Many of the farmers made mistakes which in correcting made their silos more expensive than they should have

been. As a general rule, borne out by the statements and experience of the farmers, the second silo put down by the farmer costs from one-half to two-thirds as much as the first.

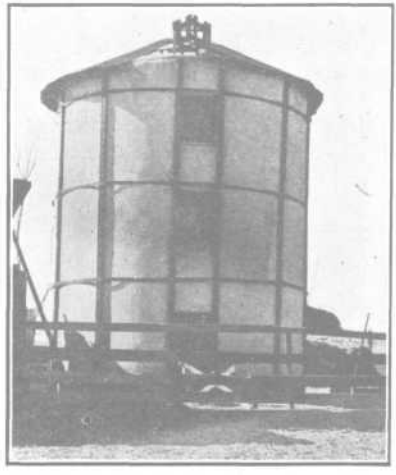

Fig. 3.—Reinforced adobe silo on the farm of John Rock, near Huachuca siding. Inside dimensions 12 x 30 ft; 6 ft. underground and 24 ft. above. The adobe wall was plastered on inside and outside and reinforced with 2 x 6 inch timbers and iron bands, which makes a substantial silo. It holds 68 tons and cost about $200, or $2.94 per ton capacity.

## CHEAPNESS OF PIT SILOS

Following is an example of how cheaply a good pit silo can be constructed. This is a 10 by 20 pit silo belonging to Mr. C. B. Emery, of McAlister (the second one listed in the table) 19 sacks of cement, at 90 cents, $17.10.

Mr. Emery did the work at odd times, with the assistance of his family, and there was no cash outlay for labor. Two coats of cement were used, the first one being about one-half inch thick, of a mixture of one part cement to four parts coarse sand and gravel. The second coat was about one-fourth inch thick, of one part cement and two parts fine, clean and sharp sand. As soon as the second coat of plaster had sufficiently hardened, a coat of pure cement and water (about the consistency of thin cream) was painted on.

Mr. Emery got past a four-foot caving sandy stratum by the use of cement and water. The method used was as follows: Moisten the sand; dig down for six inches, or to where there is danger of caving; spray or dab on the sand wall a mixture of cement and water of the thickness of cream; when this dries sufficiently to hold the sand together, dig another six inches to one foot and follow the same process until the sand stratum is gone through,

The plastered coat should be put on as soon as possible, before the sandy wall gets dry.

On April 22, 1916, the writer conducted a silo meeting on the farm of Mr. Emery. Fifteen neighboring farmers were present, most of whom expressed their intention of putting in pit silos this year, after seeing how well and cheaply Mr. Emery's was put in and hearing Mr. Emery tell how he constructed the silo, kind of feed used, how put in and how his cows liked the silage and increased in milk flow when he commenced feeding it. Mr. Emery's silo has a smooth wall and demonstrates that efficient pit silos can be cheaply made when mistakes are avoided and the farmer uses his own labor during odd times.

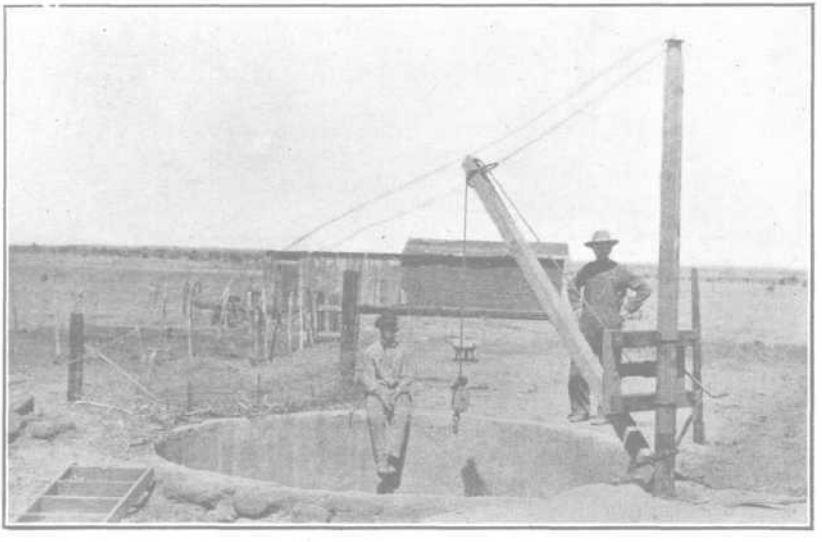

Fig. 4.—A 12 x 24 ft. pit silo on farm of W. M. Jenkins, near Servoss, capacity about 52 tons. Cost, $21, or 40 cents per ton capacity, not counting the labor, which Mr. Jenkins and his son did at odd times. This also illustrates a home-made swinging derrick for removing the silage. Such a device can also be used for hoisting the dirt.

## WHAT SOME SILO USERS STATE

"For cows, same amount of silage is worth twice as much as dry feed. Silage is easier fed. The ground is ready for fall plowing quicker. Will probably put in two more silos this year."—C. B. Emery, McAlister.

"We feed nothing but silage to our cattle and they are fatter and in better condition than ever before on cured feed."—Mrs. Wm. Hattje, Douglas.

"Silage and alfalfa hay make good feed for dairy cows. I am feeding 20 pounds of silage and 17 pounds of alfalfa hay; am getting good results."—P. Adams, Douglas.

"Silage is a great deal more liked by the stock than dry feed and puts on the fat better."—M. G. Boots, Pearce.

"I would not try to compare silage with dry feed for fattening cattle."—Wm. H. Boots, Pearce.

"Coarse roughage can be made palatable to stock by making silage of it, in which form all will be consumed profitably."—C. E. Samson, McNeal.

"Silage is better than cured feed and will go farther, is cheaper to put up, and leaves the ground ready for plowing earlier in the fall, or for winter crops."—H. R. Fike, Stark.

"Without the two silos this year my stock would be in poor condition, whereas now they are all in fine shape. I am going to put in more pit silos as fast as I can. I would not be without them for four times the cost."—James E. Brophy, Bisbee.

"No comparison between silage and cured feed for milch cows. Only year we had enough milk, cream, and butter was when we had silage to feed. Cattle ate all of silage, but ate but little of dry, hard feed. None of silage spoiled except a little on top. Will put in enough pit silos to hold all silage crops I can produce."—T. F. Forbes, McNeal.

"Costs less to make feed into silage than to cure it. Silage will feed two to three times as far as same feed cured. Forty to fifty pounds per day makes full feed for fattening steer or cow. Cattle fatten well on good silage alone. Used squaw corn for silage. Silage kept well, was well packed."—Chas. Boots, Pearce.

(Note.—Mr. Boots buys, fattens and butchers for market.)

"Sixty to seventy-five per cent of milo is wasted when fed as cured feed. No waste when fed as silage. Costs about the same to put in silo as it does to cure. Kafir makes best silage. Every farmer should have a silo, or silos."—Ed. G. Boyer, Light.

"I am more than repaid for the pit silo the first year. Silage is at least double the value of cured feed. Cattle did well on no other feed but silage. Used kafir. On account of very dry year kafir made no grain. Silage spoiled around edge of silo on account of not being well packed."—W. M. Jenkins, Cochise.

"One ton of silage is equal to 2½ tons of dry feed. Used kafir for silage. Silage kept well. Expect to put in another pit silo this year."—S. S. Hardenbrook, Willcox.

"Sumac sorghum makes excellent silage for beef stock but not as good as corn and kafir for milch cows. My second silo required much less time and cement to make."—R. E. Samson, McNeal.

"The silage paid for the silo, cost of growing crop and filling the silo, the first year. Fed to milch cows; cows increased milk flow rapidly when fed silage; forty pounds per day per cow. Crop can be put in silo as cheaply as it costs to cure it. No waste in feeding silage, while with cured feed there is two-thirds to three-fourths waste. Silage and bean hulls and bean straw make excellent ration for cows."—C. D. Clapp, Pearce.

"Kafir makes the best silage of any crop I have tried. Silage kept well with the exception of some spoiled around the edge on

Fig. 6.—A good field of corn, but an expensive and wasteful method of saving it; worth three times as much in a silo.

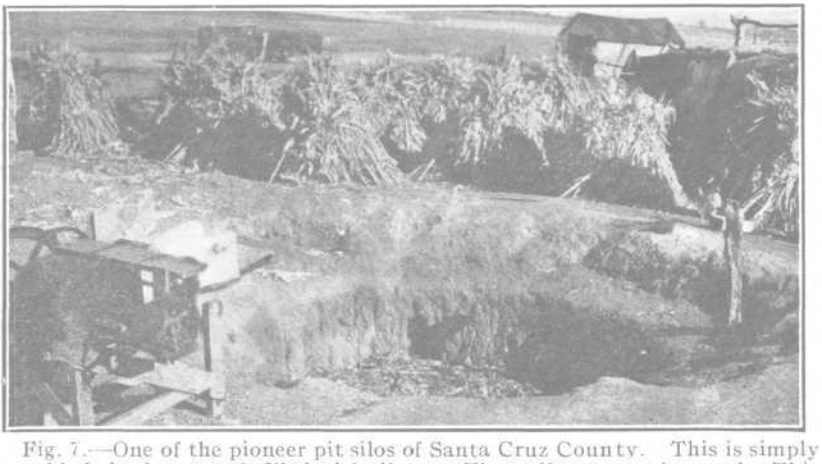

Fig. 7.—One of the pioneer pit silos of Santa Cruz County. This is simply round hole in the ground, filled with silage. The wall was not plastered. This practice is not recommended. The silage does not keep well, lets dirt into feed, and wastes more than it costs to plaster.

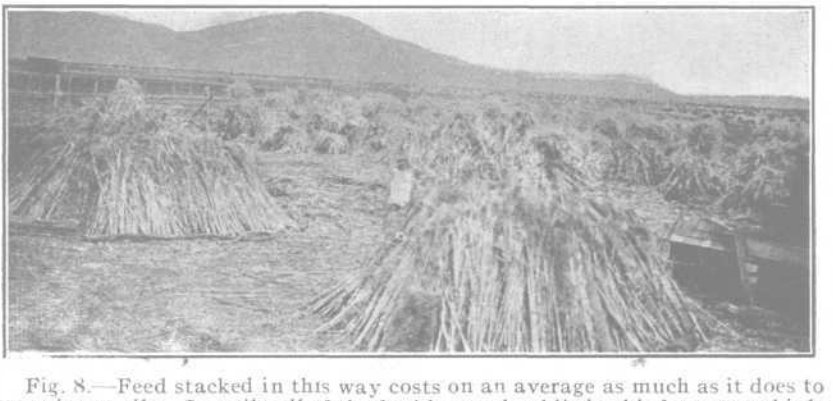

Fig. 8.—Feed stacked in this way costs on an average as much as it does to put it into a silo. In a silo all of the feed is saved, while in this form two-thirds is lost; besides, it is not as good feed as silage. This farmer has decided to put in a pit silo for the next crop.

Fig. 9.—Harvesting corn and grain sorghum for the pit silo, using a home-made sled cutter, the rear wheels and support of which were taken from a riding cultivator.

Fig. 10.—An expensive and wasteful method of feeding. From one-half to three-fourths of the feed is lost when cured and fed in this manner. The farmer who did this will probably put in a pit silo this year.

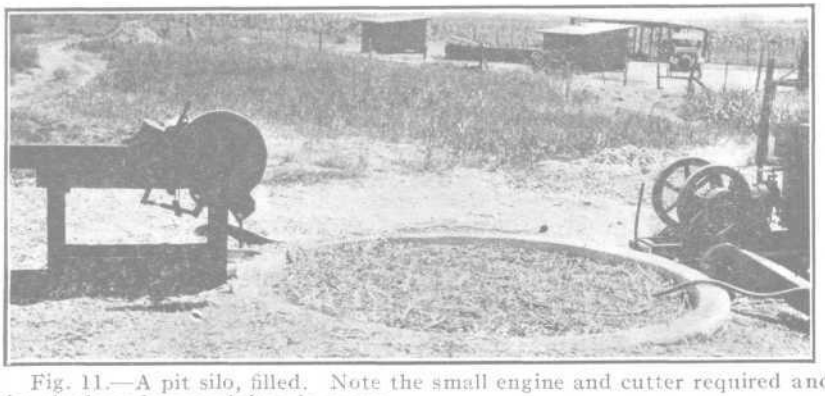

Fig. 11.—A pit silo, filled. Note the small engine and cutter required and also the hose for supplying the water.

account of not being well tramped when being filled and after filled, until stopped settling."—W. A. Sheppard, Douglas.

Fig. 5.—Making sorghum molasses in the Sulphur Spring Valley. The pulp or bagasse can be made into silage by grinding finer or cutting and putting into silo. This can be done with one operation. Enough water should be added to take the place of the extracted juice.

## ADVANTAGES OF SILOS AND SILAGE

According to the foregoing statements from farmers and the experience in other regions, the advantages of silos may be briefly summed up as follows:

1. In the form of silage, all of the feed is consumed by stock, while 60 to 85 per cent is lost in curing and in feeding cured roughage.
2. Feed is preserved in most succulent, palatable, and digestible form, providing "canned" pasture when open grazing can not be obtained, and also supplementing pasture crops.
3. Silage is especially valuable for dairy cattle, keeping up an abundant milk flow when milk and butter prices are highest; is best substitute for good pasture for both beef and dairy stock.
4. Well made silage is not only nutritious but keeps the stock in healthy condition—the same as fruits and vegetables do for people in winter and spring.
5. A great amount of excellent feed is stored in a small space. Less barn room is required. Money invested in properly constructed silos is the best investment on the farm.
6. Economy in producing, harvesting, storing, and feeding. More convenient to feed than cured feed.
7. Leaves the ground clear for fall plowing and planting to fall crops.
8. Enables the farmers to make best use of feed crops when endangered by frost or drought or proper curing is prevented by rains. Alfalfa hay, and wheat hay, as well as regular silage crops, have been preserved in this way when otherwise would have amounted to little as feed, or would have been moulded and lost.

9. Silos enable the farmer to put up feed during years of good crops to feed during years of poor crops or crop failures. This arrangement is especially valuable in the dry-farming region, where excellent feed crops can be produced during years of good rainfall, while in the dry years little feed can be produced.

10. The silo and use of silage bring about a better system of farming, induce crop rotation and diversification; enable the farmer to better distribute and utilize his labor and capital; encourage and bring about a greater amount of livestock on the farm; keep up the fertility of the soil and make farming safer, more profitable and enjoyable.

## ADVANTAGES OF PIT SILO

Where the water table is not too near the surface and where the ground formation is such that a pit silo can be put in, this kind of silo has many points in its favor, some of which may be briefly summed up as follows:

1. Cheapness: The pit silo is the cheapest form, costing from one-fourth to one-third the price of an above-ground silo of the same capacity. Pit silos can also be put in by the farmer during odd times when perhaps his labor would not count for much elsewhere, or he can hire cheap labor for the work of digging.

2. There is no danger of its being blown over or of drying out, cracking, falling in, or burning if properly constructed.

3. Being underground, the cemented or plastered coat does not dry out as rapidly and is cured more easily than above ground and hence is more tough and durable.

4. Being underground and of uniform temperature, the silage "cures" and keeps better and has less waste when silage is properly put in.

5. Can be placed wherever most convenient for filling and feeding.

6. Saves in filling and feeding:

*a*. Requires one-half or less power to fill than above-ground silo. Takes as much power to elevate silage in above-ground silo as it does to cut feed.

*b*. Saving in cost of silage cutter. Blower costs as much as, and generally more than, the cutter.

*c*. Engine and cutter can be easily and cheaply hauled from place to place—from one silo to another.

NOTE—It costs but little more to get silage out than from above ground silo

7. Especially valuable for farmers with small means and for farmers in dry-farming regions where there are occasional crop failures and the farmers need to carry feed over from one year to the next. Thus in 1914, there were excellent crops produced, while during the fall, winter, and spring of 1915–16 feed was scarce as a consequence of the dry year of 1915. If farmers had put the roughage which they produced in 1914 into silos, they could have made good profits, and this would also have meant a big saving to the cattle owners and the resources of the region.

## WHERE PIT SILOS ARE FEASIBLE

In dry-farming and in irrigated regions where water is obtained by pumping, the pit silo may safely be dug to within two feet of the highest ground-water level. Under ditch irrigation in the irrigated valleys, pit silos may be put in on ridges or other elevated places where there is no danger of seepage of water into the silo.

In localities where the underground formation is of a very hard cemented nature, or of solid rock, where digging is extra expensive and where a regular and smooth wall can not be made, and also wherever large boulders or a caving formation are encountered, pit silo construction is difficult and may not be advisable.

## HOW TO MAKE A PIT SILO

1. *Selection of site.*—Should be placed as conveniently as possible for filling and for feeding. The less the hauling of silage the less the expense of handling. The Nebraska Station (Bul. 145) found that it cost an average of 58 cents per mile to haul a ton of silage. Reduce the cost by reducing the hauling mileage.

2. *Starting.*—First, according to Trumbull, "level off the ground and drive a stake at the center of the location where the silo is to be built and saw off the stake a few inches above the ground. Nail one end of a board across the top of the stake for a marker. Measure

Fig. 12.—Putting in a pit silo. Demonstration on farm of E. N. Smith, Cochise. At such a demonstration the farmers gather in the forenoon and help the owner with the work, while the women prepare luncheon, thus combining business with pleasure. Note trench for underground concrete collar. Some farmers mix the concrete and fill the trench while others dig on the inside. Conducted by County Farm Advisor under auspices of Cochise Farm Improvement Association.

off on the board the distance of the radius of the silo, i. e., one-half the diameter. At this point drive a large nail or spike through the board for a marker. At a point six inches or more beyond this, drive a second spike in the same manner. By revolving the board, two circles are described. Between these two circles dig, with a tiling spade, a trench at least 18 inches deep, keeping the inside wall perpendicular and as smooth as possible, so as to make the inside of the collar likewise smooth and perpendicular." Fill in the trench with concrete (1 to 7). This forms the underground collar. The above-ground collar is placed upon this. If the ground is not too porous, the above-ground collar may rest upon the solid ground without having an underground collar of concrete

3. *The above-ground collar.*—(*a*) If collar is made of concrete, outside and inside forms are necessary. Four inches is thick enough, and some are made 2½ inches thick. If more than four feet high, the collar should be reinforced by placing wire between the forms when concrete is being put in. The inside diameter of collar must be the same as that for the balance of silo.

(*b*) Adobe wall for collar is all right, if properly made. Should be 15 to 20 inches thick and plastered on both sides. When this form of collar is used, forms are not necessary and the collar may be made after balance of silo is completed, thus making excavation easier. The device used for keeping inside of wall smooth and perpendicular may be used for keeping collar same way, allowing slightly larger diameter for the plastering

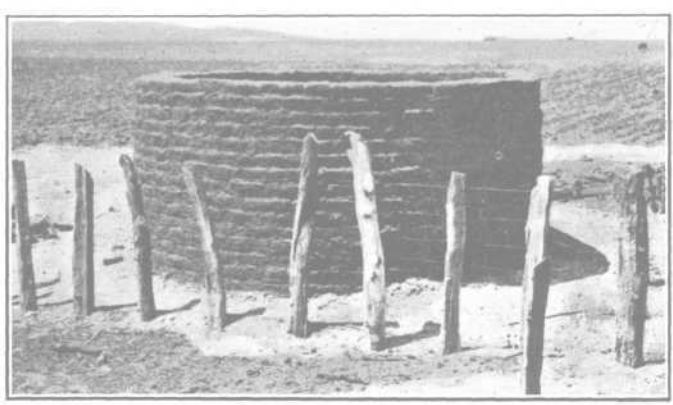

Fig. 13.—An adobe above-ground collar for pit silo. This wall is about five feet high. It is to be plastered. Chas. Boots, Pearce.

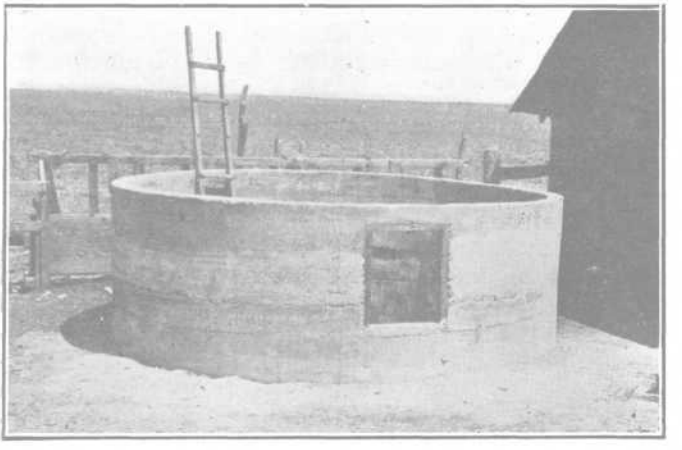

Fig. 14.—A four-foot concrete collar for pit silo. The door is provided so that the silage may be removed easier, before using the hoist.—Chas. Boots, Pearce.

4. *Keeping wall smooth and perpendicular.*—Most of the excess expense in putting in pit silos is caused by *not* keeping the walls smooth and straight. In some of the more expensive pit silos listed in Table I, the walls were made crooked and had large cavities which were filled with cement. It is very difficult to make a wall straight once it has become crooked. Uneven walls also cause air pockets and spoiling of silage.

The following diagram illustrates perhaps the best and most simple way for keeping the wall in proper shape. This is the method used by Mr. C. B. Emery, and the principle is the same as used by others.

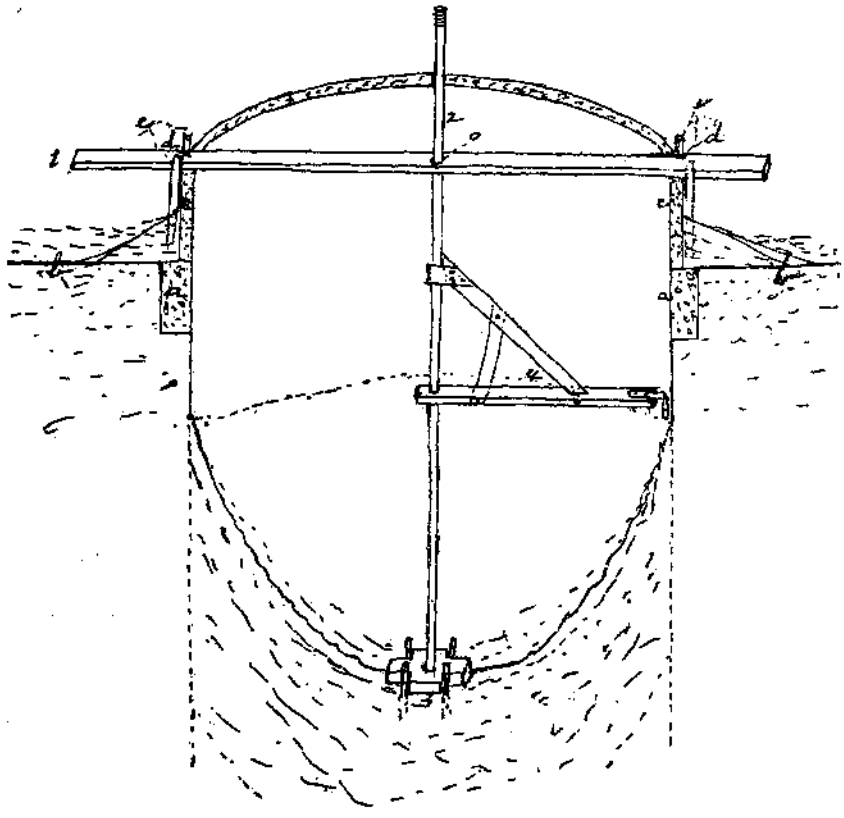

Fig. 15.—Cross section of partly constructed pit silo, showing method of construction and device for keeping the wall smooth and perpendicular. *a* represents underground cement collar, 6 inches thick and 18 inches deep; *b* is ground level; *c* is above-ground concrete collar, 3½ feet high, 4 inches thick. 1 represents the 2 x6 inch cross piece, with hole in center through which the upright 2 is passed and held in place. Notches at *d* into which the stake *e* works, hold the piece 1 in place. A plumb bob is suspended from the center hole o in piece 1 and the center foot block 3 is set in place and made secure by means of stakes, the pit having first been dug to a depth of 5 feet, roughly. The upright 2 is now passed through the hole at *o*, through the eyes of the guide 4 and into the foot block 3. The guide 4, with knife secured on end, revolves and shaves the wall or indicates where irregularties are. When the wall has been smoothed to the level of the foot block 3 these inside devices are removed, the wall properly plastered as explained on page 20; the excavation is again done roughly to a depth of 5 feet, the wall smoothed and plastered as before, and so on until the silo is completed. This is the arrangement used by C. B. Emery.

5. *How to get past a sandy caving stratum.*—This has been described already in the account of Mr. C. B. Emery's silo. Be sure to control this before the sand has started to cave.

Fig. 16.—A pit silo construction demonstration held on farm of E. C. Russell, Mt. View district, near Willcox. Arranged by the Mt. View Farm Improvement Association and conducted under direction of the County Farm Advisor. Such demonstration-picnics are very enjoyable and encourage putting in more silos. The neighborhood farmers not only help each other in this way, but also gain information and find out how easily and cheaply such silos can be put in, and learn how to avoid costly mistakes. Both work and ideas are exchanged. The knife for smoothing the wall as here shown is in an inverted position.

6. *Plastering the wall.*—Plaster on a thin coat (one-half inch) of 1 part cement and 3 or 4 parts clean sharp sand, dampening the dirt wall before plastering. The second coat (one-fourth inch thick) must be put on as soon as the first coat is dry enough to hold it. If first coat is allowed to become too dry, the second coat may not adhere well. For second coat use 1 part cement to 1½ parts fine, clean and sharp sand.

It is essential that the wall be "whitewashed" or painted two or three times with a mixture of pure cement and water about the consistency of medium thick cream, applied before the second coat of plaster is thoroughly dry. This closes the pores of the plaster and makes the wall stronger.

Many good pit silos are made by using only one coat of plaster which is "whitewashed" as above directed; biut two coats are better. In case only one coat of plaster is used, the mixture of cement and sand should be richer, about 1 to 2½

ESSENTIAL POINTS TO REMEMBER IN MAKING A PIT SILO

1. Be sure that the wall is smooth and perpendicular.
2. Use good cement, clean sand, and have them properly mixed. Mix well before adding water.
3. Plaster onto a damp wall.
4. Put on a second coat of plaster as soon as first one is dry enough to hold it.

5. Use two or three paintings of pure cement and water, applied to wall as soon as plaster is hard enough not to be smeared or injured by brush.. Make the "paint" about the consistency of cream.

6. Dampen the wall every day for a week, and also better to cover top with canvas or something to prevent too rapid evaporation. This will prevent too rapid curing and the result will be a stronger wall.

Pockets made in wall by boulders may be filled with adobe mud instead of cement.

## ESSENTIAL POINTS IN MAKING SILAGE

1. *Crop condition.*—If possible, have crop for silage at proper stage of maturity. Too young or immature silage will sometimes sour due to detrimental acids being formed According to the best authorities, corn and the grain sorghums should be in the "hard dough" stage of ripeness while the sweet or saccharine sorghums (such as sumac or red top, orange, honey, Texas seeded ribbon, amber) should be more matured, the seed being fairly well dried. This, of course, is not always possible, as in case of a dry year in dry-farming, when the crop does not make much of any grain, or for a late crop caught by an early frost.

2. *Harvesting*—For large acreages the row binder is an economical machine. Where one farmer has not a sufficient acreage to warrant purchasing a row binder, several neighbors or the farmers of the community may buy one or more binders cooperatively; or one farmer may own a binder and do custom work. In localities where small grains are grown and where the grain binder is already in use, silage crops may be planted so that they can be harvested with such a binder. The home-made sled cutter, while somewhat crude and necessitating more labor than the binder, can be cheaply made and will do good work. (See Fig. 9.)

Where labor is plentiful, and also for small acreages, small hand tools are generally used. The common corn knife is generally used, however, a better tool is a short-handled weeding hoe. The handle is cut down to about 24 to 28 inches long and the blade is sharpened. With such a tool a man can cut more rapidly than with a corn knife and less back-tiring stooping is necessary.

3. *Filling.*—The crop should be hauled to silo as rapidly as cut, so that as much drying as possible will be prevented. A small amount of water, about equivalent to a heavy dew or about equal in weight to the silage, should be added, especially if the silage is somewhat dry. Much inferior or spoiled silage, reported by the farmers and observed by the writer, is due to the crop being too dry when put in the silo. Water should be added to silage while being cut or while being put in the silo and not put altogether on the top after silo is filled. The best length of silage is one-half to three-fourths inch.

4. *Packing.*—The silage should be well distributed over the surface of the filled area while being filled, so that the coarse and

fine will be well mixed. The centre should be kept slightly higher than the sides. Water should also be well distributed, so that the silage will settle and pack evenly. One man for each two to four tons per hour filling should be kept busy in the silo. *It is very essential that the silage be well packed, especially around the edge.* Most of the farmers who reported spoiled silage state as the principal cause that the silage was not well packed. Good tramping should also be done once a day for a week after filling.

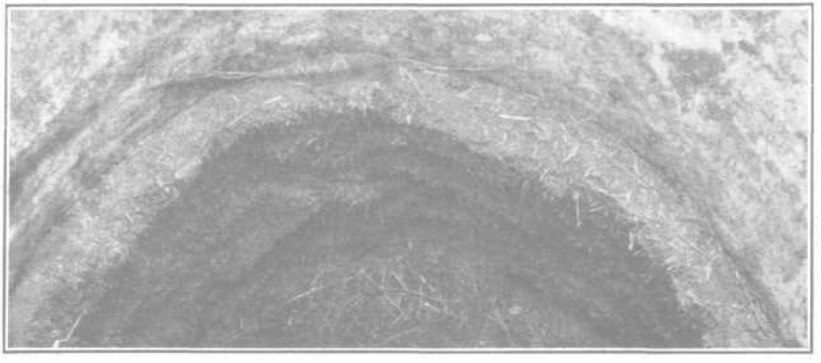

Fig. 17.—Spoiled silage stuck to the wall of silo, caused by insufficient packing and uneven, rough wall, which prevented silage from settling well and allowed air spaces

5. *Summary.*—

*a*. Have silage crops at proper stage of maturity.

*b*. Cut silage into short pieces, one-half to three-fourths inch.

*c*. Use water, if at all dry, well distributing same.

*d*. Keep silage well mixed and distributed over surface of filled area.

*e*. Pack, tramp; be sure that silage is well and evenly packed, especially around edges.

Several feet of poultry netting may be placed around the top of silo and filled to top with silage so that the silo will be full when silage settles, as it will settle several feet.

A wagon with low, wide-tire wheels and low, long silage or hay rack on bed, is best for hauling crop from field to silo.

## SILAGE CROPS

Corn is universally considered the best crop for silage. Where this crop grows well, makes a large tonnage and a good amount of grain, it is no doubt the best crop. However, there seem to be some varied opinions concerning this matter. Several of the farmers reporting, who have used corn and other crops for silage, state in some cases that milo is better than corn and some state that kafir makes the best silage. The results largely depend upon the stage of maturity, condition when put in silo, how put in and which crops or crop will yield the most actual stock food per acre. Whichever

crop produces the largest amount of grain in proportion to the total weight of plant will make the best silage, when considering the non-saccharine crops, while the value per acre is determined by the total amount of food values.

Corn has been greatly improved during the last few years and it is being more and more bred up and adapted to the Southwest; however, kafir and milo will usually outyield this crop under dry-farming. Kafir, on account of its large yields of grain, large and succulent stalks, abundant leaves, and big tonnage per acre, is considered the best silage crop.

The sweet sorghums (sumac, orange, amber, etc.) also produce big acre yields and are considered by some farmers to be the best silage crops—especially orange, honey, and sumac sorghums. These crops will generally outyield in total tonnage either corn or milo. If harvested at proper stage and properly put up, on account of the large amount of nutritious saccharine matter these crops are considered by many cattle feeders to make the best silage for beef stock.

The following are the leading silage crops for the Southwest:

*Kafir*: Dwarf black-hull white; *cane:* sumac, red-top or club, orange, and honey; *corn:* Sacaton June; *milo* and *feterita, Egyptian wheat* or *shallu.*

Other crops, such as sugar beets, sweet clover, sweet potato vines, Russian thistles, etc., have also been used for silage to advantage.

Cornstalks and grain sorghum from which the grain has been harvested are also used for silage. In using such, however, sufficient water should be added and the silage well packed. The writer saw a trench silo in the Salt River Valley which had been filled, the contents fed to beef stock and then refilled with stalks of milo from which the grain had been harvested, but on account of not adding sufficient water and not packing well this silage did not keep well. While the dry and semi-dry stalks when put into the silo with sufficient water make much better feed than the cured fodder, they arenot so palatable as when harvested at the proper stage; besides, there is generally no economy in removing the grain. One of the advantages of making silage is that the whole crop is harvested with one operation. However, there may be exceptions to this, as when the grain is needed for poultry or for horse and pig food, to supplement pasture crops; or, in growing selected seed for the market, when feed is also needed.

## ENGINE AND CUTTER

It will be noticed that according to Table I, most of the silage for pit silos was cut with small engines, sizes ranging from 1½ to 6 horsepower. The cutters used are also small, costing from $30 to $50. An eight-tons-per-hour cutter and a 6-horsepower engine make a satisfactory outfit for filling pit silos. A carrier on the cutter is not necessary for filling pit silos.

## REMOVING THE SILAGE

Different appliances are used for removing silage from pit and semi-pit silos Several of these are in use by farmers in this region. The following forms are recommended

### †A SIMPLE HAND HOIST

Figure 18 illustrrates a very simple yet practical hand hoist. This hoist can be built as shown for pit silos, or it can be used in semi-pit silos by placing the crossbeam in place and setting the inclined chute into the door after the silage has been fed down sufficiently to need being hoisted.

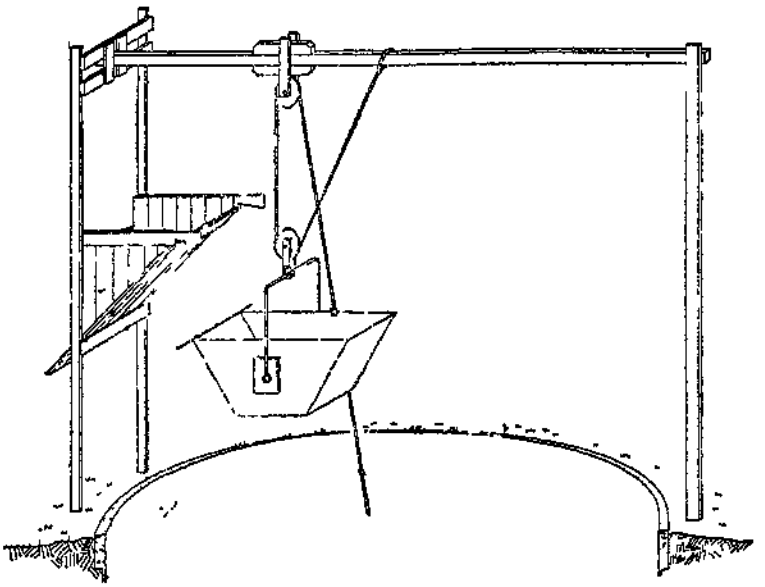

Fig 18 —A simple home-made hand hoist for pit and semi-pit silos

"The method of operating the hoist is to fill the box, which should be made of thin wood or galvanized iron, pull down on the rope, which will hoist the box with silage until the rod attachde to the front end of the box catches under the hooks at the sied of the chute, then by continuing the pull on the rope the box will tip up and the silage will run out, down the chute and into the cart, wagon, or onto the ground.

"The blocks which hold the upper pulley are made to slide on the crossbeam so the box can be adjusted to the proper distance from the chute. The end of the rope which is attached to the crossbeam is set back 15 to 20 inches behind the block. This keeps the ropes from twisting, thus insuring the box rising in the proper

†Illustration and description from Nebraska Station Bulletin 145.

position for the rod to catch beneath the hooks on the chute. It is essential that the lower pulley be rigidly attached to the bail of the box, but that the bail be free to swing as the box tips.

"If the silage is inclined to stick to the chute at the point where the box strikes it, the tipping rod can be lowered about two inches below the edge of the box so the lip of the latter will lap over the chute, thus insuring a smooth passage for the silage.

"With this hoist, one man will easily raise 75 pounds of silage (4 cubic feet) at a time, and because it automatically dumps itself, he will have to climb into the silo only once each feeding, no matter how many times the box needs to be filled and emptied."

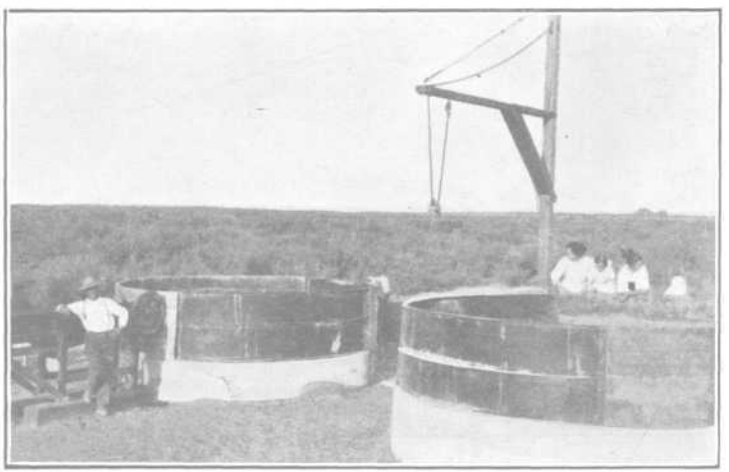

Fig. 19.—Two pit silos on the J. E. Brophy ranch, Sulphur Spring Valley. Metal forms were used in making these silos. These forms were placed on the top of the silos, as illustrated, for holding the silage so that the silos would be fuller after settling. A ring of poultry wire netting would also serve this purpose when forms were not handy. The swinging derrick is used for hoisting the silage from both silos. Two other silos could be put in on the opposite side of the derrick and thus the one derrick could be used for all four silos.

## POISONOUS GAS IN PIT SILOS

When silage is going through the fermenting process, especially during the first few days when the silo may be partly filled, and sometimes when the silo has been partly emptied, a poisonous gas, known as carbon dioxide, is sometimes present. Therefore, before entering a partially filled pit silo it is advisable to test the air. This can be done by lowering into it a lighted lantern. If the light continues burning, the air is safe for a human being. When the presence of poisonous gas is indicated, it is possible to mix the gas with pure air by swinging the hoisting bucket or feed carrier about in the

lower part of the silo for a time. If proper precautions are taken, there is no danger from any accumulation of poisonous gas.

Tracks, carriers and chain or concentric blocks for hoisting large quantities of silage may be secured from barn equipment companies.

## FEEDING SILAGE

While silage is primarily a feed for cattle, it is also valuable food for other forms of live stock. In fact it is good for all kinds of live stock.

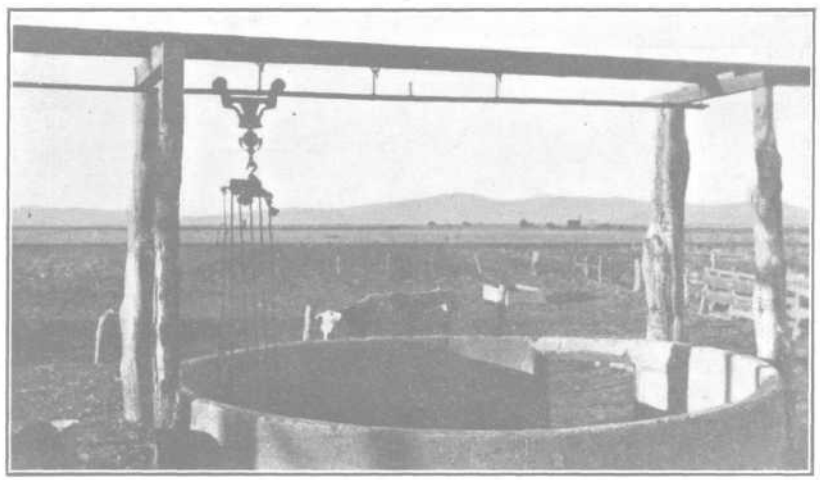

Fig. 20.—A pit silo, with above-ground concrete collar, equipped with overhead carrier and double pulley for hoisting.

*Cattle.*—Several farmers have reported that they have fattened beef ready for the market, cheaply with silage alone. Silage with a good proportion of grain, such as crops producing 35 to 50 bushels of grain per acre, can be depended upon to produce fine beef; however, this can be better done when some concentrate, especially cottonseed meal, is fed with the silage. Feeding tests, particularly with dairy cows, have shown that this is best and most economical. cattle receiving silage and concentrates will eat on an average about 40 pounds of silage a day.

One farmer stated that he has obtained excellent results from milch cows by feeding bean straw (hulls and stems left after threshing out beans) and silage—all the cows will clean up at each feed. Another farmer (dairyman) reported good success from feeding 20 pounds silage and 17 pounds alfalfa hay to each milch cow. In this case the silage had but little grain. With a larger percentage of grain, the alfalfa could have been reduced.

*Horses.*—Care should be exercised in feeding silage to horses, seeing to it that no mouldy silage is fed and that they become ac-

customed to it gradually. They will consume only a few pounds at a feed.

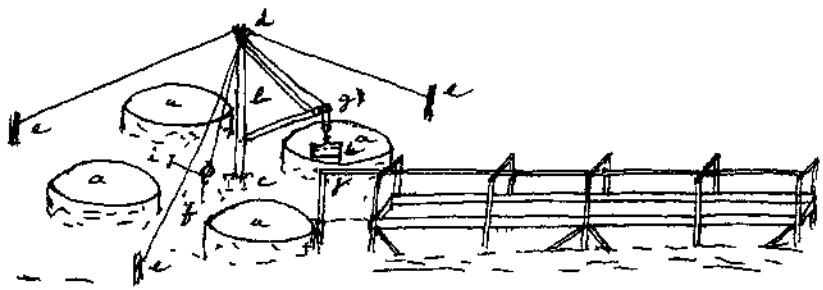

Fig 21 —A convenient way of arranging pit silos, derrick and feeding trough, with overhead carrier. The four pit silos *a* are arranged in a square, so that the one swinging derrick *b* can hoist silage from any one of them The derrick is held in position by a concrete foot block *c* and three guy wires, fastened to a ring *d* at top and to stakes *e* A rope is passed around a tackle block which is hooked to a "dead man" *f*, passed over a pulley at top of derrick over a pulley at end of derrick arm *g* and around the pulley just over the feed box *h* The box is let down, filled, and then hoisted by horse-power by hitching horse at *i* The box of silage is then snapped on to the track *j* and carried along over the feeding trough This arrangement saves labor

For hogs, goats, sheep, and poultry, silage is also very good, taking the place of and supplementing pasture.

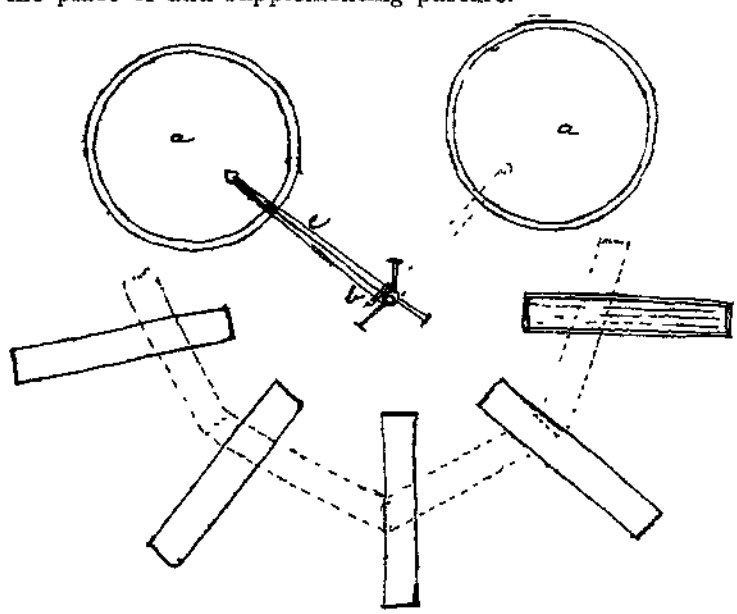

Fig 22 —Top view of arrangement of two pit silos, *a*, with swinging derrick, *b*, with which to remove the silage. The derrick or crane should have a long arm which will reach out to the feeding troughs, thus saving the expense of another handling of silage The feeding troughs may be arranged as shown by dotted lines, which, however, will not give as much feeding room The derrick, in this case, will have to be held in place by three stays—or the main post may be extended so that long guy wires may be used.

TABLE II —CAPACITY OF ROUND SILOS IN TONS

| Inside height of silo | Inside diameter in feet | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 8 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 20 | 17 | 26 | 30 | 38 | 44 | 51 | 59 | 67 |
| 21 | 18 | 28 | 33 | 41 | 47 | 55 | 63 | 72 |
| 22 | 19 | 30 | 36 | 43 | 50 | 58 | 67 | 77 |
| 23 | 20 | 32 | 39 | 46 | 54 | 63 | 72 | 81 |
| 24 | 22 | 34 | 41 | 49 | 57 | 67 | 76 | 86 |
| 25 | 23 | 36 | 43 | 52 | 60 | 71 | 80 | 91 |
| 26 | 24 | 38 | 46 | 55 | 64 | 75 | 85 | 97 |
| 27 | 25 | 40 | 49 | 58 | 68 | 79 | 90 | 102 |
| 28 | 27 | 42 | 51 | 61 | 71 | 83 | 95 | 109 |
| 29 | 28 | 44 | 54 | 64 | 75 | 87 | 100 | 114 |
| 30 | 30 | 47 | 56 | 67 | 79 | 91 | 105 | 119 |

The number of head of stock which can be fed from a silo of given capacity will depend, of course, on the amount of silage fed per day and the number of days that the stock is to be fed The diameter in relation to the number of stock to be fed should be such that not less than two, and preferably three, inches of silage are fed from the surface each day An easy rule (given by Nicholson) to use to determine how wide to build a silo is to find how many cubic feet of silage will have to be fed each day to remove the necessary two or three inches from the top. A cubic foot of silage weighs about 40 pounds or about the amount that one would feed a beef animal. Taking the square of the diameter of the silo and multiplying it by 0.7854 and dividing that amount by 6 will give the smallest number of head of mature stock or its equivalent that must be fed daily from the silo at the rate of two inches per day, or dividing by 4 will give the least number that can be fed by feeding three inches per day. For example, if the diameter is 10 feet, by squaring it we get 100, and this multiplied by 0.7854 gives us 78 54. Then dividing by 6 we get approximately 13, the smallest number of head that can be fed from a 10-foot diameter silo at the rate of 2 inches per day. If we divide 78.54 by 4 we get approximately 19, the smallest number that can be fed at the rate of 3 inches per day. The height of the silo will determine the numberof days that the silage will last, feeding at the rate above mentioned. By multiplying the number of feet high, or deep, by 6 we get the number of days the silage will last if fed at the rate of two inches per day. By multiplying the height in feet by 4 we get the number of days it will last if fed at the rate of 3 inches per day. Many farmers make the mistake of building the silo too wide for the number of head of stock to be fed. If the foregoing rule is followed, there need be no trouble in this line.