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SUMMARY of a ONE-YEAR TEST on COST of PRODUCING, HARVESTING,
STORING, and FEEDING CALEY PEA SILAGE
Black Belt Substation, 1954

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Droughts and other adverse weather conditions during the last several years have focused the attention of livestock producers on the importance of having a reserve of stored feeds.

During a normal spring, many Black Belt livestock farmers have a surplus growth of Caley peas. At that time of year, the weather is frequently unfavorable for haymaking. New methods of harvesting and handling silage crops have brought about renewed interest in silage. It is natural, therefore, that Black Belt farmers have raised questions as to the cost of harvesting Caley peas during the spring and storing as silage. In order to help answer some of these questions, a test was conducted at the Black Belt Substation in 1954. Results are herein reported.

It is pointed out that fertilizer, fuel, labor, and other costs in this test may vary with those in other localities. However, the results of this study provide a basis on which costs of producing, harvesting, storing, and feeding Caley pea silage can be determined on a given farm.

Production Costs

The Caley peas used in this experiment were harvested in the early bloom stage from a field where they were grown with Johnsongrass. The peas had been grazed during the winter.

Total preparation, seeding, and fertilization costs were charged one-third against Caley peas and one-third against each of two cuttings of Johnsongrass. Included in these costs was an annual application of 500 pounds of 0-16-8 fertilizer per acre. Caley peas were seeded every 3 years, and Johnsongrass every 5 years.

Of the total production cost of Caley peas (\$6.23 per acre), one-fourth was charged to grazing, and three-fourths to silage. The peas yielded 3.29 tons of silage per acre. The production cost charged to silage was \$4.67 per acre, which represents \$1.42 per ton.

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Harvesting Costs

The moisture content of the silage at harvest time was 79.2 per cent.

Two-Man, One-Tractor Method

One of the harvesting methods used required one tractor, one forage harvester, one wagon equipped with unloading attachment, a forage blower, and two men.

One of the men operated the forage harvester. When the wagon was loaded, he uncoupled the tractor from the harvester, coupled to the wagon, pulled the load to the silo, uncoupled from the wagon, and coupled to the blower. The second man, who remained at the silo, helped couple and uncouple from the wagon and blower, sprinkled metabisulfite preservative on top of the load, and leveled and packed silage between loads.

Data on this method of harvesting are given in Table 1.

Table 1. Cost of Harvesting Caley Pea Silage by the Two-Man, One-Tractor Method, Black Belt Substation, 1954

Machinery and labor used	Hours of operation and costs for harvesting 111 tons		
	Hours of actual use	Total cost	Cost per ton
1 32-horsepower tractor	113	\$136.73	\$1.23
1 Forage harvester	60	232.80	2.10
1 Forage blower	22	78.87	.71
1 Wagon	113	18.08	.16
Labor at 50 cents per hour	226	<u>113.00</u>	<u>1.02</u>
Total		\$579.48	\$5.22
Total per ton of dry matter		\$ 25.10	

The major advantages of this method of harvesting were the relatively low investment in machinery and the small amount of manpower required. New cost of equipment, not including the tractor, was \$2,635 (harvester, \$1,585; blower, \$750; and wagon, \$300). The silage making capacity, however, was relatively low. Only 1.85 tons were handled per hour. This resulted in a cost per ton of \$5.22, based on 60 hours of forage harvester use. The cost per ton of dry matter was \$25.10. Labor required to harvest a ton of silage was 2.04 man hours.

This procedure appeared better adapted to farms requiring 60 hours or less of harvester use per year. However, the high cost per ton and the time element are disadvantages of this method of harvesting Caley pea silage.

Three-Man, Three-Tractor Method

The second method of harvesting required three tractors, a forage harvester, two wagons, a forage blower, and three men. One of the men operated the harvester. A second man shuttled the two wagons between the field and the silo. The third man remained at the silo to help unload, apply preservative, and distribute and pack the silage.

Data on this method of harvesting are given in Table 2.

Table 2. Cost of Harvesting Caley Pea Silage by the Three-Man, Three-Tractor Method, Black Belt Substation, 1954

Machinery and labor used	Hours of operation and harvesting costs					
	60 harvester hours (226 tons)		150 harvester hours (564 tons)		Total cost	Cost per ton
	Hours of actual use	Total cost	Cost per ton	Hours of actual use		
1 32-HP tractor (pulling forage harvester)	60	\$ 73.20	\$0.32	150	\$180.00	\$0.32
1 32-HP tractor (pulling wagons)	60	61.80	.27	150	151.50	.27
1 26.5-HP tractor (pulling blower)	15	12.34	.05	37.5	30.68	.05
1 Forage harvester, 48-inch cut	60	232.80	1.03	150	262.50	.47
1 Forage blower	15	87.38	.39	37.5	84.82	.15
2 Wagons	60	19.20	.09	150	48.00	.08
Labor at 50 cents per hour	180	<u>90.00</u>	<u>.40</u>	450	<u>225.00</u>	<u>.40</u>
Total		\$576.72	\$2.55		\$982.50	\$1.74
Total per ton of dry matter		\$12.26			\$8.37	

This harvesting procedure showed several advantages. The harvesting cost per ton, based on 60 hours of harvester operation, was \$2.55; based on 150 hours of harvester use, it was \$1.74. This amounted to a cost per ton of dry matter of only \$12.26 and \$8.37 for 60 and 150 hours of use, respectively. The harvesting capacity of this method was high, with 3.76 tons per hour being placed in the silo. Labor requirement was only 0.80 man hour per ton. The major disadvantage of this method was that three tractors were required. Investment in equipment other than tractors was \$2,985.

This procedure appeared well adapted to farms on which the harvester will be used 75 to 100 hours or more per year. The more the harvester is used, the less the total cost per hour.

Preservative Costs

In both harvesting procedures, 8 pounds of sodium metabisulfite preservative were applied to each ton of silage. This represented a cost of approximately 90 cents. On a dry matter basis, this increased the cost per ton by \$4.33.

Storage Costs

The silage was stored in an upright silo with a capacity of approximately 136 tons of Caley pea silage. New cost of the silo was \$2,164. Depreciation, taxes, and interest on investment were calculated at 3 per cent, 0.52 per cent, and 3 per cent, respectively, of the new cost. Total depreciation, taxes, and interest charges amounted to \$141.20 per year. The annual cost per ton of silage was \$1.04; this did not include a charge for silo maintenance.

Feeding Costs

The cost of feeding silage to dairy cows was based on the amount of labor required to throw silage from the silo into a silage cart and to fork it from the cart into feed troughs near the silo. Cost of labor was figured at 50 cents per hour.

Two men fed 3,000 pounds of silage in 48 minutes (22 minutes to pitch from the silo and 26 minutes to cart to troughs and feed). Thus, 1.6 hours of labor were required to feed 1.5 tons--1.07 man hours per ton. This amounted to a labor cost of 54 cents per ton. The silage contained 74 per cent moisture when fed.

Summary

A summary of the costs of producing, harvesting, preserving, storing, and feeding Caley pea silage is given in Table 3.

Table 3. Summary of Costs of Producing, Harvesting by Two Procedures, Preserving, Storing, and Feeding Caley Pea Silage,
Black Belt Substation, 1954

Cost item	Cost per ton of silage		
	One-tractor method		Three-tractor method
	60 hours	60 hours	150 hours
Production	\$1.42	\$1.42	\$1.42
Harvesting	5.22	2.55	1.74
Preservative	.90	.90	.90
Storage	1.04	1.04	1.04
Feeding	.54	.54	.54
Total	\$9.12	\$6.45	\$5.64
Total per ton of dry matter*	\$43.34	\$30.50	\$26.61

* Costs are based on actual dry matter content of the crop at two stages (20.8 per cent at harvesting time and 26 per cent when fed).

The following summarization may be made:

1. Costs of producing, preserving, storing, and feeding Caley pea silage totaled \$3.90 per ton of silage, or \$18.24 per ton of dry matter.
2. Harvesting cost per ton was less with the three-tractor than with the one-tractor method.
3. Only 0.80 man hour of labor per ton of silage was required with the three-tractor method of harvesting, compared with 2.04 man hours with the one-tractor method.
4. Harvesting costs per ton decreased with additional hours of harvester use.
5. With the three-tractor method at 150 hours of harvester use, the preservative represented 16.0 per cent of the total cost of the silage.

Appendix

Procedure for Calculating Machinery Costs

Machinery costs presented in Tables 1, 2, and 3, with one exception, are based on information included in the publication "Crop Machines Use Data", AE Data 2, published June, 1949, by the American Society of Agricultural Engineers, Saint Joseph, Michigan, revised January, 1953. Repair costs on all tractors were figured at 70 per cent of new costs, rather than at 35 per cent.

The general procedure for calculation of machinery costs was as follows:

A total of 525 hours of general farm use per year was assumed for tractors. The 60 and 150 hours of use for harvesting were in addition to general use. Depreciation costs per hour per \$100 of new costs were derived on basis of these hours of annual use, 7,500 hours of life, and 15 years until the equipment is obsolete. This figure multiplied by the number of hundred dollars of new cost gave the depreciation cost per hour. Repairs, interest, housing, taxes, and insurance were calculated by a similar method. In addition, operating costs per hour, which included fuel, oil, and lubrication as well as time for lubrication, adjustments, sharpening knives, etc., were determined on basis of actual use. Costs per ton were calculated by dividing the total costs of harvesting silage (based on hours of use of machinery and equipment and cost per hour) by the total tons harvested.

Depreciation rate on the forage harvester was assumed to be the same as that for a combine.

