

Producing and Dehydrating

Sweet Potatoes for Livestock Feed

By

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In Brief . . .

Past reports have indicated that sweet potatoes are a desirable source of carbohydrate feed for livestock. The sweet potato is capable of producing high yields on Oklahoma's sandy soils which will not favorably produce other carbohydrate feeds. Therefore, the objective of tests reported here was to determine if sweet potatoes can be profitably grown in Oklahoma to replace some of the corn and oats which most livestock rations contain.

Results indicate:

- Sweet potatoes on sandy soils can be expected to produce an amount of feed equivalent to that produced by corn on the more fertile river bottom soils.
- Dehydration of sweet potatoes is a convenient and economical method of reducing bulk and producing a stable product for storage.
- Approximately $3\frac{1}{2}$ pounds of field harvested sweet potatoes are required to produce one pound of dehydrated product.
- Fuel and labor cost for dehydration can be expected to average between 11 and 12 dollars per ton. Additional costs for bagging, handling, storage, and depreciation on equipment would increase the total cost to approximately one cent per pound or a total cost of \$20 per ton.

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Oklahoma requires large quantities of carbohydrate concentrates to support her livestock industry. Corn, oats and grain sorghum are usually relied upon for this type of feed. However, the sweet potato, a high-carbohydrate crop, is capable of producing high yields on sandy soils which are less favorable for corn and oats. Therefore, tests were conducted between 1944-1950 inclusive to determine if this high-carbohydrate crop can be profitably grown as a feed to replace some of the corn and oats which many livestock rations contain. This bulletin reports results of those tests.

Results of other Studies

The carbohydrate content of the sweet potato in relation to its food (and feed) value was investigated at an early date. Keitt (2)* of South Carolina has shown that the sugar and starch content of sweet potatoes varies with varieties, seasonal conditions, and the time of harvest.

Interest in sweet potatoes as a livestock feed has been widespread in the southern states as indicated by work conducted in Louisiana (3) as early as 1923. In these early tests, the potatoes were fed to hogs in the fresh state with varying and often discouraging results.

Tests conducted in Alabama in 1941 and 1942 did much to encourage and broaden the interest in sweet potatoes as feed for livestock. In these studies, Ware (6) stated that, in the southern states, about three times as much feed can be produced by an acre of sweet potatoes as can be produced per acre of corn. Ware (7) also suggested the use of specially prepared drying surfaces for sun drying. Equipment for shredding sweet potatoes for drying was described by Kummer (4) of Alabama.

At this Station, Darlow and others (1) showed that dried sweet potatoes are a palatable feed under most circumstances and that they may be used to replace up to one-half of the corn in a steer fattening ration, providing the cost in relation to corn is favorable.

Growing and Dehydrating Trials

Trial One

Potatoes were produced on the Vegetable Research Station near Bixby. They were largely "strings and jumbos" of the Porto Rico variety and were dug in October and November. An old concrete road-bed provided a suitable surface upon which the sliced potatoes were spread in layers varying from one to two inches in depth. They were turned two or three times and were bagged when the moisture content reached approximately ten percent. This usually required 24 to 48 hours. It required approximately three pounds of harvested potatoes to produce one pound of dried product. The sweet potatoes had an average yield of more than 250 bushels (12,500) pounds per acre, thus producing in excess of two tons of dried feed per acre.

Considerable discoloration resulted from this method of drying but palatability was evidently not affected. Rainy weather during the period of dehydration resulted in considerable spoilage and loss. Percent chemical composition of the dried product was as follows: water, 9.34; ash, 5.71; protein, 5.66; fat, 1.31; fiber, 3.64; nitrogen free extract, 74.34; calcium, .27; phosphorus, .20.

Feeding trials comparing dried sweet potatoes with corn produced favorable results (5). Fattening steers fed rations containing sweet potatoes in place of one-half the corn gained as rapidly, attained apparently as much finish, and were appraised at the same price as steers fattened on ground shelled corn. Results were not as satisfactory when sweet potatoes completely replaced the corn.

Trial Two

At Bixby, 22,000 pounds (440 bushels) of sweet potatoes were produced for dehydration. They were hauled to a point near Fairfax and dehydrated with a modified alfalfa dehydrator. Yield after dehydration was at the rate of 7,000 pounds per acre. Considerable trouble was experienced in attaining volume production of dehydrated potatoes without caramelizing, burning, or charring.

The potatoes were palatable, and feeding results similar to those reported above were obtained.

Trial Three

This phase covered a period of three years. A commercial dehydrator was purchased and used for dehydration.

During the first year, 14 acres of sweet potatoes were grown, yielding a total of 31,845 pounds (15.9 tons) of the dehydrated product. One hundred bushels were lost due to cold weather and rot. This indicates an average yield of 2,275 pounds of dehydrated sweet potatoes per acre.

In a one-day test, 4,496 pounds of potatoes were dehydrated by a crew of four men, using 15,000 cubic feet of gas. Gas cost per ton of dehydrated sweet potatoes on this basis was \$2.33.

During the second year, 83,295 pounds of sweet potatoes were dehydrated, using the same dehydrator. Yield was 18,350 pounds of dried feed. This is a ratio of 4.53 pounds of fresh to one pound of dried product. In different lots, ratio variations were 4.2 to 1, 4.7 to 1, and 4.6 to 1.

During the next year, 32,945 pounds of sweet potatoes were dehydrated, yielding 9,403 pounds of dried feed—a ratio of 3.5 to 1. In other lots, ratio variations were 2.87 to 1, 3.52 to 1, and 4.22 to 1.

Gas consumption was 50,000 cubic feet at 35 cents per thousand, making a fuel cost of \$3.72 per ton of dehydrated sweet potatoes. On this basis, cost was ten cents for each 56 pounds of dried potatoes or the equivalent to one bushel of corn.

The commercial dehydrator used was rated at a capacity of approximately 600 pounds of dehydrated potatoes per hour. No time studies were made, but on this basis it would have taken 54 hours and 54 minutes to dehydrate the 32,945 pounds of potatoes. Four men hired at \$5 per day to operate the dehydrator would add \$8.33 per ton to the cost. This would be equivalent to 23 cents for an amount of dehydrated potatoes weighing as much as a bushel of shelled corn (56 pounds). Total labor plus fuel would be \$12.05 per ton or 33 cents for each 56 pounds. Additional costs for bagging, handling, storing and depreciation on equipment would increase the total cost to approximately one cent per pound or a total cost of \$20.00 per ton.

Trial Four

This phase lasted two years. During the first year, 141,000 plants including new high-yielding varieties as well as some old established varieties were distributed among 18 persons who cooperated by growing potatoes on their farms. Twelve of these cooperators brought potatoes to be dehydrated for livestock feed. All 12 reported favorable results in feeding.

During the next year 60,224 pounds of sweet potatoes were dehydrated, yielding 17,195 pounds of dried feed. This is a ratio of 3.64 pounds of fresh to 1 pound dried product. Ratio variations in different lots were 1.75 to 1, 3.95 to 1, and 4.57 to 1. Gas consumption was 70,000 cubic feet at 35 cents per thousand, making the fuel cost per ton of dehydrated sweet potatoes \$2.85. The fuel cost for dehydration was eight cents per bushel on a corn-weight basis.

Labor cost was \$8.34 per ton or 23 cents for an amount of dried sweet potatoes equivalent to a bushel of corn. Total labor plus fuel was \$11.19 per ton. Total labor plus fuel was 31 cents per equivalent corn bushel.

Summary and Conclusions

Results of these and other tests indicate that:

- Dried or dehydrated sweet potatoes are an acceptable feed for cattle.
- Sandy land which is undesirable for most carbohydrate feed crops may be used for sweet potato production.
- Cost of producing dehydrated sweet potatoes is high compared to that of corn.
- When corn prices are high, sweet potatoes may be very well substituted for at least half of the concentrated ration.

On the basis of these results, it would seem that many of the sandy soils in Oklahoma could be used to produce sweet potatoes for livestock feed.

These same soils may also yield a high return in high-quality potatoes for the fresh market. Therefore, growing sweet potatoes as a two-purpose crop may be a profitable use of many sandy soils in Oklahoma.

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