ECONOMICS OF SUGARBEET PRODUCTION IN IDAHO

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Summary

Sugarbeet production has become increasingly important in Idaho agriculture during the past decade. Since government acreage controls were discontinued, acreage has been restricted only by marketing quotas placed on processors and by the capacity of processing plants to handle sugarbeets. Sugarbeet acreage in Idaho has doubled since 1960. The expansion of acreage has taken place both on newly developed land and on land in the established irrigated areas.

Sugarbeet production cost studies were made in eastern Idaho for the 1965 crop year and in southwestern Idaho for the 1967 crop year. An estimate was made for the Twin Falls area on the 1968 crop. Because different areas were studied in different years, direct comparisons are not possible. However, costs have not changed a great deal over this 4-year period. The average cost per acre in eastern Idaho was $202 in 1965 while the cost for southwestern Idaho was $235 in 1967. Average yields in recent years have been about 16 tons per acre in the eastern area and about 24 tons in the southwest.

Most sugarbeet growers followed recommended practices rather closely and were doing a good job of producing beets. Apparently, inefficient producers had already gone out of sugarbeet production. For this reason it was not possible to correlate yield with production practices. Nearly all farmers used recommended quantities of fertilizer, except for potash and zinc. Some growers applied these and others did not. The use of zinc was associated with higher sugarbeet yields. Because of variations in soil and other local conditions and very similar practices, no significant values for seeding, irrigating and related functions could be measured. Early planting was associated with higher yields, particularly in eastern Idaho.

The study showed that most farmers in western Idaho plowed beet tops under for fertilizer rather than using them for feed. Only a few farmers utilized the tops for ensilage, even though considerable value may be realized in this way. Most farmers felt that they were too busy, lacked proper machinery and were too inexperienced to make beet-top silage production worthwhile. There was also a fear by some that chemicals used on the beet crop may make feeding undesirable. Farmers were realizing a value of $10 to $30 utilizing tops for fertilizer or feeding in the field.

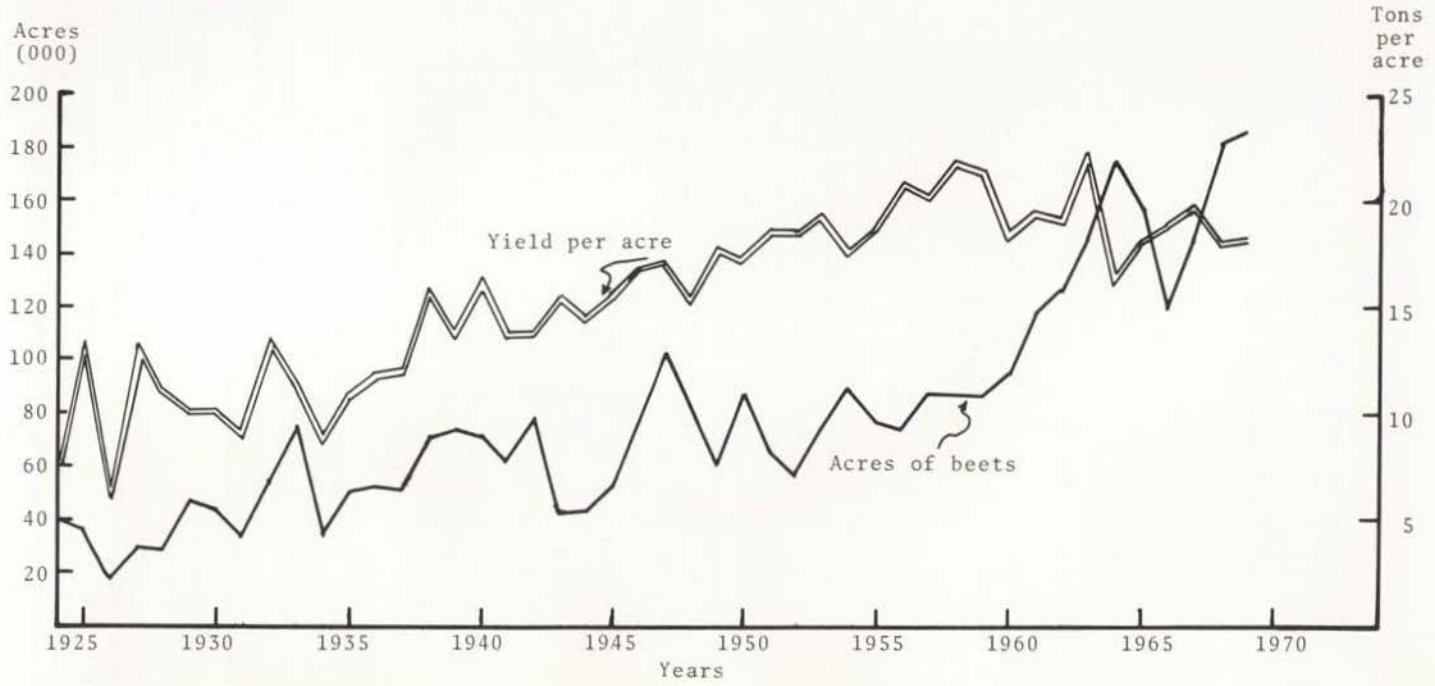

Fig. 1. Yield per acre and total acres of sugarbeets in Idaho, 1924-1968. (Source: USDA Agricultural Statistics and State Reporting Service Annual Crop Summary)

Economics of Sugarbeet Production in Idaho

R. V. Withers

The production of sugarbeets has been a significant enterprise in Idaho since the early 1900's. However, during the past decade, increasing emphasis has been placed on sugarbeets, primarily due to the termination of sugar imports from Cuba. Part of the sugar supply previously coming from Cuba was allotted to domestic sugar production. As a result, existing sugarbeet production areas expanded acreage and some areas where sugarbeets had not previously been grown initiated production with varying degrees of success.

Sugarbeet acreage in Idaho has roughly doubled since the Cuban crisis, reaching 186,000 acres in 1969 compared to 95,000 acres in 1960. Even though no new sugar factories have been constructed in Idaho since 1942, modernizing and enlarging existing plants have greatly increased processing capacity. With expansion completed in 1969, the Nampa factory became the largest sugarbeet processing plant in the nation.

Expanding sugarbeet production and associated problems brought requests for production cost data for sugarbeets in the state. As a result of the requests, a study was begun to determine sugarbeet production costs and related management problems. The objectives of the study were to obtain cost information from farmers, analyze the data and present up-to-date information which could be used for comparison of individual farms and to assist farmers in making decisions necessary to successful farm operations.

Growth and Scope of the Idaho Sugarbeet Industry

Production of sugarbeets in Idaho began in 1903 with the completion of the first sugar factory at Lincoln near Idaho Falls (3). Other existing factories were completed at Twin Falls in 1916, Paul in 1917 and Nampa in 1942 (1). Several other factories once operated in Idaho, but all except these four have discontinued operation.

Once introduced, sugarbeets soon became a major cultivated crop in Idaho, with production spreading to all irrigated areas of the state. Currently Idaho ranks second among the states in sugarbeet production, led only by California and followed closely by Colorado. The 3.4 million tons of sugarbeets harvested in 1969 will yield over 900 million pounds of refined sugar or enough for about 9 million people, roughly 12 times the current population of Idaho. Acreages and yields since 1924 are shown in Fig. 1. Note the acreage expansion since 1960.

Although yield per acre has always varied considerably, the production trend over time has been increasing. Since 1960, however, fluctuations in yield have been more violent (Fig. 1). One explanation for the greater variation in yield as acres expanded could be that more high-risk production areas were planted to beets. This, of course, is in addition to the vagaries of weather which are always present. Weather is an important factor in determining the number and distribution of surviving plants as well as the amount of growth attained during the growing season.

Distribution of sugarbeet production

Sugarbeet production in Idaho is mainly located in irrigated areas of the Snake River valley (Fig. 2). The three principal production areas are the Upper Snake River valley from Pocatello and American Falls north to Fremont county, the southcentral area from Minidoka and Cassia counties west to Twin Falls county and the southwest area from Elmore county west and north to Washington county.

The Upper Snake River area is served by Utah-Idaho Sugar Company with a factory near Idaho Falls. The southcentral area is served by the Amalgamated Sugar Company with factories at Paul and Twin Falls. Southwest Idaho is also Amalgamated Sugar Company territory with factories at Nampa and at Nyssa, Ore. The Oregon plant processes beets grown in the Payette and Weiser areas. Sugarbeets grown in Franklin and Oneida counties are processed in northern Utah.

Sugarbeet yields vary between years and areas. Growing season length is probably the major cause of yield variations between areas, although soil types, topography and precipitation could also be significant factors. The growing season in western Idaho is nearly a month longer than

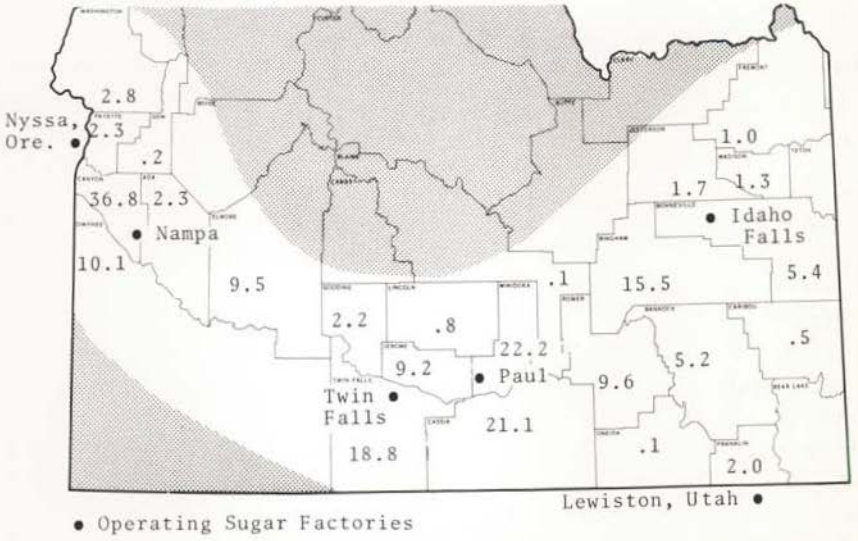

Fig. 2. Acres of sugarbeets harvested by counties in Idaho, 1968. Numbers are in thousands of acres. (Source: USDA ASCS, Idaho ASCS Annual Activity Summary, March 1969)

the season in eastern Idaho. Yields vary directly with growing season length, ranging from about 24 tons per acre in western Idaho to 16 tons per acre in eastern Idaho. The average at Twin Falls is about 22 tons per acre. Sugarbeets can usually be seeded from two to three weeks earlier in western than in eastern Idaho. Harvest dates are somewhat later in the western part of the state but the difference is only a few days. The chance of an early winter is greater in eastern Idaho, thus increasing the risk of losing part or all of the crop if harvest is delayed past the end of October.

Sugarbeets in Idaho agriculture

Sugarbeets are fourth in economic importance as a field crop in Idaho. The farm value of the state's 1968 sugarbeet crop was $47.3 million not including the value associated with beet tops which may be plowed down as fertilizer, fed to livestock in the field or fed in feed-lots as ensilage. (4).

Sugarbeets are often combined in a rotation with potatoes, grain and alfalfa. On smaller farms, machinery investment may limit the operator to sugarbeets or potatoes rather than both. Larger farmers often spread risks of disease, insect damage and price by growing both sugarbeets and potatoes.

In the irrigated areas of the Upper Snake River valley, sugarbeets, potatoes, grain and hay are the only crops grown in significant amounts. The short growing season effectively prohibits many other crops. The longer growing season in southwest Idaho permits a wide variety of cultivated crops to be grown. Table 1 indicates the diversity of crop production on the sample farms in western Idaho. Several additional crops are grown on other farms in the area which were not included in the sample. Therefore, even though sugarbeets yield lower in eastern than in western Idaho, they may be more essential to the eastern Idaho economy because fewer alternative crops can be grown there.

Table 1. Crops grown on 43 sample farms on which sugarbeets were grown, southwest Idaho, 1967.

Crop	No. of farms reporting	Crop	No. of farms reporting
Sugarbeets	43	Seed beans	3
Mixed grain	20	Lima beans	5
Wheat	19	Snap beans	3
Barley	17	Lettuce	1
Rye	1	Spinach	3
Corn for grain	4	Sweet corn	8
Potatoes	12	Peas	1
Onions	7	Seed corn	3
Alfalfa hay	25	Lettuce seed	3
Ensilage corn	15	Turnip seed	1
Alfalfa seed	13	Carrot seed	2
Clover seed	3	Onion seed	2
Dry beans	7	Apples	1

Marketing sugarbeets

Besides yield variations, another factor in determining sugarbeet profitability is price. The price received by farmers per ton of sugarbeets has been quite stable over the years when compared to prices of potatoes and some other commodities (Fig. 3). Government policies on domestic sugar quotas, import regulations and subsidy payments have, no doubt, contributed to sugar price stability.

Because all sugarbeets are grown under contract, the pricing arrangement for sugarbeets is different from most other farm commodities produced in Idaho. Each year representatives of the sugarbeet growers associations meet with sugar company officials to negotiate the contract price arrangements for the coming season. The contract specifies requirements relating to fertilizing, topping and delivering beets and describes how the price will be established and payments made to farmers. Final payment for the sugarbeets delivered is made about one year after harvest. This delay is necessary because the final payment and total price received by the grower depend on the price received by the company for sugar sold.

The Project to Study Production Costs

In 1965, production costs were studied in the areas served by the Idaho Falls and Paul factory districts. This study was encouraged by sugarbeet growers who wanted factual cost information for farm planning and for use in contract price negotiations.

A random sample was picked from a list of all growers in the Idaho Falls and Paul districts who had more than 20 acres of sugarbeets. The sample included 80 farms from which 70 usable records were obtained.

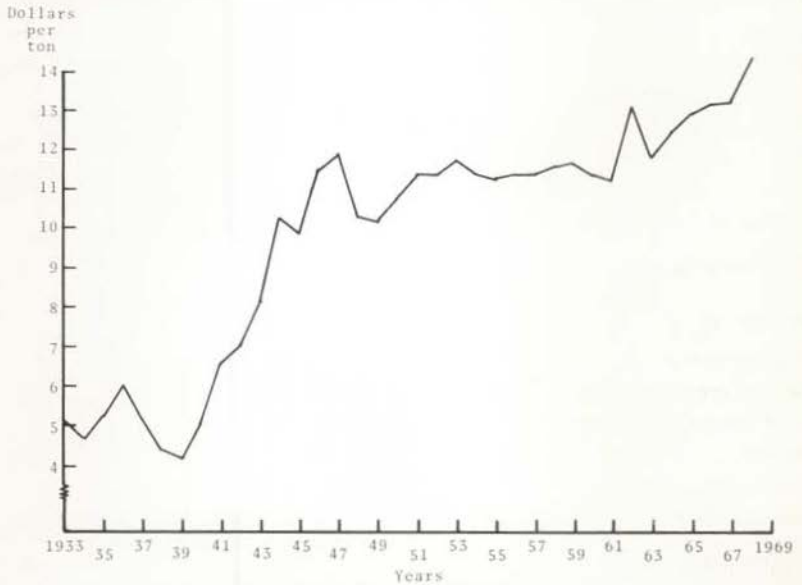

Fig. 3. Average seasonal prices for sugarbeets, not including government payments, received by Idaho farmers, 1933-1967. (Source: USDA Agricultural Statistics)

Each grower in the sample was mailed a letter explaining the project. Each was then visited by an interviewer who enumerated production costs and inventoried machinery. After harvest, a mail questionnaire was sent to obtain harvest costs and yield data. Nonrespondents were visited again or contacted by telephone so that the schedules could be completed. These data were summarized, analyzed and published (5).

The procedure was repeated in the Nampa district during the 1967 season. The sample included 43 records of which 32 were complete enough to include in the analysis. Average costs for the two areas are shown in Tables 2 and 3.

In March 1969, a panel of six farmers in the Twin Falls district met to discuss production costs in that area. Each farmer filled out a cost summary for his own farm and then the group agreed upon one figure for each phase of the production sequence (Table 4). While the result was only a rough

Table 2. Average costs for sugarbeet production on 70 farms in eastern Idaho, 1965

Item of cost	Cost per acre
Variable costs:	
Fertilizer	$ 35.38
Seed	3.19
Fuel	4.87
Grease and oil	1.09
Repairs	13.16
Water for irrigation	8.35
Trimming	18.56
Hoeing	11.34
Spraying	1.28
Ditch maintenance	.31
Sugarbeet Association dues (.02 per ton)	.32
Custom machine hire	7.55
Labor	24.18
Interest on operating expenses	4.53
Total variable cost	134.11
Fixed costs:	
Property taxes	4.41
Land interest (6 percent x $400)	24.00
Machine investment interest	11.68
Insurance	2.11
License fees	1.30
Depreciation	24.53
Total fixed cost	68.03
Total cost per acre	$202.14

estimate, it probably gives a fairly good idea of costs in that area. However, direct comparison of this estimate with costs in other areas is not possible. The Twin Falls estimates are for a different year and the procedure used was quite different.

Characteristics of sample farms

Sample farms in eastern Idaho were diversified. Most farms had livestock enterprises in addition to crops. Most common combination was a dairy or beef cattle enterprise that had one-third to two-thirds of the farm in feed grains and hay and the remainder in sugarbeets, wheat and potatoes. The average size farm was 306 acres with an average of 59 acres in sugarbeets. Most farms were irrigated by surface water from streams and reservoirs, while a few pumped water from deep wells. Sprinkler irrigation was used on less than 10 percent of the farms in the sample.

Table 3. Average costs for sugarbeet production on 32 farms in southwestern Idaho, 1967.

Item of cost	Cost per acre
Variable cost:	
Fertilizer	$ 47.34
Seed	3.09
Fuel	5.07
Grease and oil	1.17
Repairs	9.04
Irrigation water	7.16
Trimming	20.74
Hoeing	17.54
Spraying	1.57
Ditch burning and cleaning	1.94
Sugarbeet association dues	.76
Labor*	26.35
Custom operations hired	18.61
Interest on operating capital	5.59
Total variable cost	$165.97
Fixed costs:	
Property taxes	$ 6.10
Interest: Land (6 percent x 600)	36.00
Machines	9.11
Insurance	1.97
License fees	.80
Depreciation of machinery	15.49
Total fixed cost	$ 69.47
Total cost per acre	$235.44

*Even though part of labor could be considered a fixed cost, it was all included in one category.

Characteristics of farms in western Idaho were similar except that fewer livestock were kept and a wider variety of crops was grown. The average farm size was 300 acres, with an average of 90 acres in beets. Fewer farm acres were devoted to hay and feed grains and more intensively cultivated crops were raised in the western region.

Table 4. Estimated sugarbeet production costs in Twin Falls County, Idaho, 1968*.

Sequence of operations	Acres per hour of labor	Cost per acre
Fall		
Fertilizer applied		$ 35.00
Manure (avg. 10 T/acre)		10.00
Plow (3 bottom)	1.5	5.00
Disk or harrow	3	2.00
Spring and summer		
Roller harrow	3	2.00
Level	3	2.00
Spike harrow	6	.75
Plant (apply weedicide) ($3 for seed) ($8 for material)	1.5	14.00
Irrigate	1	2.00
Row harrow	2	3.00
Cultivate (6 row)**	2	3.50
Flex-tine harrow (5 sections 2 times)	5	3.00
Thinning or trimming		20.00
Cultivate (3 times)	3	6.00
Hoeing		10.00
Irrigate (12 times)	4	6.00
Harvest and haul (2.50/ton)		60.00
Miscellaneous (ditch burning, labor dues, association dues, telephone,insurance, etc.)		8.00
Land Cost: Taxes, $6.40; Interest, $600 x 6% $36; Water, $2.25		44.65
Total cost per acre (excluding management)		$236.90

*These costs were derived from rough estimates made by a panel of six better than average sugarbeet growers in Twin Falls County, March 26, 1969. Yield average is 24 tons per acre.

**May use Treflan after first cultivation.

Variable costs for southwest Idaho

Fertilizer requirements for sugarbeets are quite heavy. Farmers in the sample applied part of the fertilizer dry in the fall and side-dressed nitrogen in the spring or early summer after the crop was established. The contract with the sugar company states that no nitrogen can be added after July 15, as this tends to reduce the sugar content of the beets and make processing more costly. Most farmers hired custom application of fertilizer. This cost about $1.50 per acre dry and $2 to $3 for side dressing. Usually from $30 to $50 worth of fertilizer was applied in southwest Idaho and somewhat less in the lower yielding areas of the east. In eastern Idaho, the sugarbeet enterprise was more often related to livestock feeding and thus more barnyard manure was used for fertilizer.

A yield of 20 tons of beets per acre removes 85 pounds of phosphoric oxide and 157 pounds of nitrogen if the tops are removed (Table 5). If the tops are incorporated into the soil, only 66 pounds of nitrogen and 34 pounds of P_2O_5 will be removed by the crop. However, as with other crops, additional nutrients are lost through leaching and runoff. Fertilizer applications in southwestern Idaho ranged up to 300 pounds of nitrogen, 200 pounds of P_2O_5 and 100 pounds of K_2O. The average application by farmers in this sample was 196 pounds of nitrogen, 160 pounds of P_2O_5, 30 pounds of K_2O and about 5 pounds of zinc or other trace minerals for a total application of 391 pounds of plant food per acre at an average cost of 11.25 cents per pound. Many farmers did not use K_2O or trace minerals, but the average application of these elements by farmers using them was about 60 units of K_2O and 10 units of trace elements.

Most southwestern Idaho farmers planted 2 to 3 pounds per acre of monogerm seed. This seed cost 75 cents per pound in 1967. Some planted monogerm pelletted seed at a rate of 8 to 12 pounds per acre. This cost 50 cents per pound. The average cost per acre for all seed was $3.09. A few sugarbeet growers had to replant beets due to poor stands resulting from wind or frost damage. Replanting costs were not included in these calculations.

Tractors were powered primarily by diesel fuel, especially on the larger farms. Gasoline was used in some tractors and most of the trucks. Diesel fuel cost $1.78 per acre and gasoline amounted to $3.29 per acre with diesel at 19 cents and gasoline at 23 cents per gallon. Grease and oil came to $1.17 per acre.

Table 5. Plant nutrients removed from soil per ton of beets

	Nitrogen (lb.)	P_2O_5 (lb.)	K_2O (lb.)
Beets	3.30	1.70	6.70
Tops	4.53	2.56	8.43
Total	7.83	4.26	15.13

Source: Maynard, E. J., and K. D. Knaus. 1959. Beets and meat. Third revised edition, Great Western Sugar Company, Denver, Colo.

Machinery repairs amounted to $9.04 per acre. This includes parts and hired repairs. Time spent by the farm operator repairing and reconditioning machines was included in the labor category.

Most irrigation water used came from streams and reservoirs, but a considerable amount was groundwater, pumped to the surface for irrigation. Pumping costs were considerably higher than the average water assessment for surface water. The average cost per acre for all types of water was $7.16 with a range from about $3 to $20.

One expense of much concern to sugarbeet growers is trimming and hoeing cost. "Trimming" is the term used for thinning when the sugarbeet stand has been reduced previously by mechanization and the job can be done with long handled hoes. This cost will eventually be reduced by use of chemical weed control and better mechanization. In the meantime, farmers have found it advantageous to use hand labor for this process. The sugar company usually arranges to have laborers come into the area to be hired out by the farmers. The amount the farmer pays is determined by sugarbeet wage requirements, the condition of the field and the bargaining position of both parties. The average cost per acre in southwest Idaho was $20.74 for trimming and $17.54 for hoeing.

Spraying for insects and plant disease varies by years. In some years this expense could amount to $10 or more per acre, according to farmers interviewed. The average in 1967 was only $1.57 per acre, which indicates that sprays were used by a small proportion of growers.

Cost of ditch burning and cleaning also varies considerably depending on type of ditch, soil, size and shape of fields, and type of irrigation. The average for 1967 was $1.94 per acre of sugarbeets.

Sugarbeet Growers Association dues are taken out of the check by the sugar company in a checkoff system. Three cents per ton of beets delivered

Table 6. Labor used per acre of sugarbeets on 40 farms in Southwest Idaho, 1967.*

Item	Hours per acre
Preseason repair	1.0
Land preparation	2.8
Planting	0.5
Pre-emergence and post-emergence harrowing	0.6
Cultivation (4-5 times)	2.0
Irrigation (12 times)	6.3
Harvesting	7.2
Miscellaneous (spraying, managing, marketing)	0.5
Total	20.9

*Contract labor for trimming and hoeing and custom fertilization is not included.

Table 7. Typical custom rates paid by sugarbeet growers in southwest Idaho, 1967.

Item	Unit	Rate*
Spreading dry commercial fertilizer	acre	$ 1.50
Side dressing	acre	2.50
Trimming	acre	21.00
Hoeing 2x	acre	17.00
Harvesting:		
Topping and loading	ton	1.50
Hauling	ton	.90

*These rates are average for the area. Much variation existed depending on conditions of weather, soil, location and type of equipment used.

were deducted for association dues in 1967. For the average yield of 25.4 tons per acre the dues amounted to 76 cents per acre.

A total of 20.9 hours of labor was required per acre of sugarbeets grown. Hand labor hired for trimming and hoeing and labor used for custom fertilizer application were not included in this total (Table 6). About 17.6 hours of this was non-custom labor having a value of $26.35 when figured at $1.50 per hour. The other 3.3 hours consisted of labor included with custom operations and was included in the custom charge.

Custom rates for various operations are given in Table 7. These rates tended to vary somewhat depending on conditions and customs in a particular community and on the type of equipment used.

Total variable costs including all labor was $165.97 per acre of sugarbeets. At $14 per ton for sugarbeets, a farmer would need to produce 12 tons per acre just to pay variable costs. This is the minimum yield necessary to justify production in any given year.

Fixed costs for southwest Idaho

Fixed costs are those items that are not affected within the production year by variations in output. These include taxes, interest, insurance, depreciation and land rent or interest.

The average property tax per acre for southwest Idaho cropland was $6.10. This includes not only the tax on the land but also the share of machinery and buildings represented by one acre of sugarbeets. Taxes varied by land value and district.

Interest was charged on all investment used in the production of sugarbeets including machinery, equipment, and land. Land was charged at the rate of 6 percent annually for $600, or $36 per acre. This assumes that money could have been invested elsewhere at 6 percent if it had not been tied up in land. This amount could have easily been increased. However, there is some

question as to the amount that should be charged for the land, because at the same time interest is being charged on the investment, the land has been appreciating in value each year. This increase in land value is taxed at the time land changes hands. On the other hand, if the operator did not own the land, he had to pay a rental fee for its use. Machinery investment was also charged the 6 percent rate and amounted to $9.11 per acre. Money invested in operating capital was charged 7 percent for 6 months and amounted to $5.59 per acre. Although interest in operating capital is a variable cost, it was included here with the other interest costs for comparison purposes.

Insurance including liability was $1.97 per acre. Crop insurance was not included in this study but is an item of cost where purchased.

License fees for motor vehicles averaged $.80 per acre. This item would probably be higher for farmers who harvest their own sugarbeets and do not need to hire extra trucks.

An item of some significance is machinery depreciation. Because of the large investment in machinery and equipment, depreciation is high for the typical beetgrower. He must produce all of the output he can so that this depreciation is spread over more units. The average depreciation per acre chargeable to sugarbeets in southwest Idaho was $15.49. Farms with 100 acres of sugarbeets had $10,000 to $20,000 worth of equipment allocated to that enterprise.

Total fixed cost per acre was $69.47. The total cost per acre was $235.44, which means a farmer should produce at least 17 tons of beets per acre in southwest Idaho if he expects to cover his production costs, assuming a $14 return per ton. This does not include whatever value he can derive from the beet tops.

Variation in Yield and Cost

Considerable variation was observed in yield per acre and production costs. Some of the factors that are thought to affect yield variations are availability of plant food, planting date, soil type, soil preparation, irrigation practices, weed control, trimming and hoeing time, insect control and harvesting date.

Most of these are management problems and are difficult to measure accurately due to the differences between farms and farm operators.

One factor that was compared to yield was planting date. According to sugar company representatives, early planting is likely to result in larger yields than late planting. Observations of planting dates and yields tend to substantiate this claim. In western Idaho in 1967, farmers planting before March 20 obtained an average yield of 25.9 tons per acre while those planting March 20 or later averaged 24.0 tons per acre. This difference was significant at the 10 percent level, but not at the 5 percent level. Other variables which were not measured apparently masked part of the effect of varying the date or planting.

The relationship between planting date and yield was more pronounced in eastern than in western Idaho. In eastern Idaho, yields averaged 16.2 tons per acre for beets planted between March 31 and April 9; 15.7 tons for those planted between April 10 and 19, and 14.2 tons for those planted between April 20 and 29.

While these statistics do not definitely prove the advantage of early planting, evidence is quite strong that early planting helps, especially in eastern Idaho where the growing season is quite short at best.

Multiple regression analysis was used on western Idaho data for various factors thought to affect the yield per acre. Variables tested against yield besides planting data were pounds of nitrogen, phosphoric oxide, potash and zinc; number of irrigations, and type of seed. Only the use of zinc and nitrogen measured statistically significant even at the 10 percent level. While the other variables definitely do affect yields, practices on the sample farms were fairly uniform so that the effects of varying the different production factors could not be suitably measured. All of the variables measured accounted for only 45 percent of the variation in yield of sugarbeets per acre.

The above analysis is good evidence that most of the growers now producing significant quantities of sugarbeets are careful to follow recommended practices. All growers applied adequate nitrogen and phosphorus and about half used either potash or zinc or both. As was previously indicated, farms using zinc had significantly higher yields. This may mean that the zinc itself was responsible or that zinc was applied by farmers who tend to be more conscientious about doing things on time and in the best fashion. More research is needed on the effects of zinc.

In another analysis in which all plant nutrients were lumped together, those farms using the greatest quantities of fertilizer also had significantly higher yields of sugarbeets. However, sugar content data were not obtained so that it is not known whether farms with the greatest yields also had greatest production of recoverable sugar.

Use of Beet Tops

While sugar is the most valuable product coming from the sugarbeet enterprise, important by-products are also produced. Beet pulp, which is usually dried, is an excellent feed for livestock. It is fed in combination with grain and alfalfa hay.

Another significant product is the beet top. Beet tops are the green leafy part of the beet growing above the ground, and usually include a slice of the crown of the root. The tops are removed in the harvest operation or just prior to lifting and loading.

Beet tops are handled in a variety of ways. The most common way is to beet the tops off with a beater ahead of the harvester and plow them down as soon after harvest as possible. Considerable fertilizer value is realized in this way. According to Maynard and Knaus (2), the value of the tops from a 15-ton per acre yield of beets would be $18.64, assuming 13 cents per unit for nitrogen, 9 cents for P_2O_5 and 5 cents for K_2O.

A second method of utilizing sugarbeet tops is to pasture them in the field following harvest. Beet tops make good feed for sheep and cattle when supplemented with other feeds. Beet tops fed alone often result in digestive disturbances and are not as effective as when fed in combination with other feeds. It is quite common for a farmer to pasture his own livestock on beet tops or to rent his field out to others, especially to lamb feeders. Rental rates for the field of tops can be figured per ton of beets, per head of livestock fed times the number of days or some rate per pound of gain.

One consideration in favor of pasturing as opposed to plowing down the tops is that pasturing will return as manure up to 80 percent of the fertilizer value of tops in addition to realizing the feed value of the tops. For a 15-ton crop, the feed value had been estimated to be equivalent to 690 pounds of corn plus 2,250 pounds of alfalfa hay (2). With corn at $1.80 per cwt and alfalfa hay at $20 per ton, the value would be about $35 per acre or nearly $50 per acre for feed plus the fertilizer. If half of the tops were wasted by weather and trampling, which is probably quite common, the farmer would still realize over $25 per acre for his beet tops. Fencing and other costs incidental to pasturing should be subtracted from the above figures.

A third and less common way to utilize the tops is to make ensilage. This method has the greatest potential for financial gain to the farmer, but also presents the most serious obstacles. Only 1 farmer in the southwestern Idaho sample ensiled beet tops, while 38 farmers plowed them down and 4 pastured them. Feeding tops in the field was much more common in eastern Idaho.

The yield of silage from an acre has been estimated to equal about one-half of the yield of beets, or about 10 tons of silage from a 20-ton beet crop. Costs of harvesting and storing beet-top silage is about $20 per acre, according to Utah-Idaho Sugar Company estimates.

If the silage were worth $7 per ton, a yield of 10 tons at a cost of $20 would net the farmer about $50 per acre above his return from the beets. This is probably an optimistic estimate but it could be realized under ideal conditions.

Why did so few farmers make use of beet tops for feed? Plowing tops down was popular because it was the simplest method of getting rid of them. Farmers could go into the field right after harvesting and get their fall plowing done. No fences were required to confine livestock. Harvesting was

facilitated because there were no windrows of tops to slow down trucks and harvesters. Thus, even though a lower financial return was likely, farmers usually plowed down their tops because it facilitated getting the fall work done.

Another reason for not feeding tops was possible contamination by insecticides and other applied chemicals. Where residues of these materials are present even in very small amounts, the tops are not acceptable as a livestock feed. Therefore, despite the possibility of getting greater economic gain from feeding tops directly or as silage, many growers were unwilling to take the risk of contaminated feed. In this way they were free to apply whatever chemicals were available that would increase beet yields without concern for feed contamination.

Other reasons given by growers for not ensiling tops include inadequate time during harvest, weather unfavorable to curing tops, lack of proper machinery for handling tops and unsuccessful attempts at making silage in previous years.

If pesticide residues were not a problem a farmer not wishing to bother with tops might possibly sell them to a cattle feeder to harvest for silage. The feeder would have the feed, the farmer would not be seriously delayed in his harvest operations and both might obtain a good return from the tops.

It is quite likely that machinery will be improved in the future so that the feed value of the tops will be saved without costly delays to the harvesting operations.

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Appendix Table 1. Idaho annual crop summary for sugarbeets

Year	Acres harvested (000)	Yield per acre (tons)	Production (1000 tons)	Seasonal price	Total value (000 dollars)
1924	40	6.8	270	$ 7.20	$ 1945
1925	36	12.7	456	6.24	2846
1926	18	6.0	108	6.89	744
1927	29	13.1	381	7.49	2854
1928	27	11.0	297	7.44	2210
1929	48	10.2	492	7.17	3530
1930	44	10.1	446	7.40	3302
1931	33	9.1	301	6.03	1816
1932	53	13.4	709	5.10	3618
1933	75	11.2	837	5.16	4319
1934	34	8.6	294	4.69	1379
1935	51	11.0	562	5.26	2956
1936	52	11.9	619	6.06	3751
1937	51	12.1	615	5.19	3192
1938	71	15.8	1122	4.43	4970
1939	73	13.5	985	4.21	4147
1940	71	16.1	1141	5.07	5785
1941	60	13.7	823	6.57	5407
1942	78	13.8	1076	7.04	7575
1943	42	15.5	651	8.14	5299
1944	43	14.4	618	10.30	6365
1945	53	15.3	809	9.90	8009
1946	76	16.8	1274	11.50	14651
1947	102	17.3	1761	11.90	20956
1948	80	15.4	1233	10.30	12700
1949	60	17.8	1067	10.20	10833
1950	87	17.3	1508	10.80	16286
1951	66	18.6	1227	11.40	14284
1952	56.5	18.6	1052	11.40	11993
1953	75.2	19.4	1459	11.80	16487
1954	89.1	17.6	1569	11.40	17877
1955	76.6	18.7	1433	11.30	16193
1956	74.7	20.7	1549	11.40	17659
1957	88.0	20.2	1777	11.40	20258
1958	87.0	21.9	1902	11.60	22063
1959	87.6	21.5	1886	11.70	22066
1960	94.9	18.3	1740	11.40	19836
1961	117.9	19.3	2272	11.30	25674
1962	127.1	19.1	2423	13.20	31984
1963	145.6	22.1	3212	11.80	37902
1964	174.7	16.1	2817	12.50	35212
1965	156.7	18.0	2818	13.00	36634
1966	119.5	18.9	2259	13.20	29819
1967	146.9	19.8	2912	13.30	38730
1968	184.6	18.0	3323	14.40	47347
1969*	186.9	18.1	3383		

Source: USDA, SRS, Agricultural Statistics and Idaho Crop Report Summary.