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FARM MANAGEMENT ANALYSIS
OF SUGAR BEET SEED FARMS IN WASHINGTON COUNTY, UTAH

by

Dwain W. Norris

A thesis submitted in partial fulfillment of the requirements

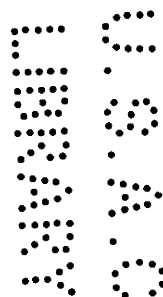
for the degree of
Master of Science

in

The School of Commerce

Utah State Agricultural College

1942



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Approved:

Major Professor

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FARM MANAGEMENT ANALYSIS
OF SUGAR BEET SEED FARMS IN WASHINGTON COUNTY, UTAH

INTRODUCTION

In 1928 the Utah Agricultural Experiment Station conducted an Agricultural Survey of the "Dixie" section of Washington County, Utah, which includes the irrigated section of the Virgin and Santa Clara Rivers. Special reference was given to production and marketing of truck crops and fruit. In 1934-35 another study was conducted by the Utah Agricultural Experiment Station and the United States Department of Agriculture in cooperation with the Utah State Planning Board. In this study special reference was given to the present use of the agricultural resources of Washington County together with suggestions for better utilization of the resources and the development of new agricultural resources.

The cultivated acres per farm in Washington County (approximately 16 acres) necessitates a high acre return if the income from the farm is to be sufficient to maintain a family with a reasonable standard of living ^{1/}.

It has been recommended, as a result of the above studies, that there be a reorganization and intensification of the farm business in Washington County. The 1928 study showed that on these small farms the crop yields per acre were relatively low for an area with such favorable growing conditions. Even though the price of agricultural products were high in 1928, the returns per farm were not high enough to maintain a favorable standard of living.

^{1/} Thomas, W. P., Preliminary Report on the Agricultural Resources of Washington County, August 1935. Manuscript at the Department of Agricultural Economics, U.S.A.C. p. 15

The problem was to reorganize the farm business in such a way that the small acreage being cultivated would yield higher returns.

During the last few years it has been the general opinion that crop yields per acre have increased on the farms which have been producing sugar beet seed. This increase in crop yields is thought to have resulted from a better system of crop rotation and a more extensive application of fertilizer to the soil, which in turn came as a result of growing sugar beet seed on the farms.

Some of the data obtained in the 1928 and 1934 studies will be used in this study to show the supposed changes in crop yields and farm income on farms producing sugar beet seed.

The index prices of all commodities sold by farmers was 149 in 1928 and 98 in 1940. This would mean that farm prices were approximately 51 percent higher in 1928 than in 1940, but even so it will still be possible to make some good comparisons between the results of this study and the 1928 study.

OBJECTIVES

The objectives of this study are (1) to determine the effect that a cash crop, the production of sugar beet seed, has had on farm organization and practices, (2) to determine why the production of sugar beet seed in the "Dixie" district has had such a beneficial effect upon crop yields, and (3) to show the economic changes.

THE DEVELOPMENT OF THE SEED INDUSTRY IN UTAH

In 1810 Napoleon began to encourage the manufacture of sugar from beets in France and by 1890 many experiments were carried

on in the United States in extracting sugar from the beets 2/. Since that time the production of sugar from the sugar beet has become quite a thriving industry. For period 1935-39, there was produced annually in the United States an average of 1,380,000 tons of beet sugar 3/. A total farm income from sugar for the same period in the United States was \$50,974,000.00 per year.

This fifty million dollars farm income is in a large measure dependent upon favorable legislation as well as a reliable source of good sugar beet seed. There is no objective in this study that would warrant the discussion of congressional legislation relating to the importation of sugar into the United States. However, in order to understand why sugar beet seed is grown in Washington County, Utah, some discussion is desirable.

Previous to the World War I, practically all of the sugar beet seed used in America was imported from Europe. This led to a critical situation because of the blockade and ship shortage, and resulted in a hasty attempt to create in the United States a seed growing industry. This development was far from satisfactory to meet the needs of the industry. Following the war, American growers again became dependent upon foreign seed. For a five year period, 1924-29, the United States imported annually 12,500,000 pounds of sugar beet seed to plant 700,000 acres devoted to sugar beet production 4/. Losses due to the white fly made it desirable that resistant sugar beet seed be produced in the United States. Even as late as 1932 only 550,000 pounds

2/ The Progressive Reference Library, The Holst Publishing Company, Chicago, Illinois, 1936. p. 262

3/ Agricultural Statistics 1940, U. S. Dept. of Agriculture. p.139

4/ Bracken, A. F., Classnotes for Course at Utah Agricultural College, in Root Crops, Ms., 1942. p. 97

of sugar beet seed was produced in the United States 5/. However, since that time, sugar beet seed production has increased rapidly. In 1939 there was a total of 13,853,400 pounds of seed produced, which was plenty to supply the demand in the United States 5/. Of this amount 6,412,300 pounds were resistant to the disease known as curly top.

The curly top disease was recognized and described as early as 1897. From that date until 1934, when the United States Department of Agriculture introduced a variety resistant to curly top, practical control measures were not available and disease outbreaks took heavy toll from the sugar beet growing districts west of the Rocky Mountains 6/.

Overpeck, a representative of the Department of Agriculture working at the New Mexico Experiment Station, found that plantings of beets made from August 1 to September 15 and over-wintered in the soil would produce seed the following season 7/. This discovery decreased the time required to produce a crop of sugar beet seed by one year. Formerly two full seasons were required with an intermediate expensive over-winter siloing of the plants. This new discovery reduced the cost of production, thus enabling American producers to compete with European producers.

It was this new discovery together with the discovery of the resistant variety that was really responsible for the production of sugar beet seed in the United States on a large commercial scale. The growing of the resistant variety is the major reason sugar beet seed

5/ Agricultural Statistics 1941, U. S. Dept. of Agriculture. p. 150

6/ Sugar Beet Culture, Farmer's Bulletin No. 1903. p. 42

7/ Overpeck, John C., Sugar Beet Seed Production Studies in Southern New Mexico, 1931-36. New Mexico Agricultural Experiment Station. p.9

production is being carried on in the "Dixie" section of Washington County, Utah.

In locating a place for the production of a resistant variety of the seed it was necessary for the United States Department of Agriculture, working in cooperation with various sugar companies, to find an agricultural area that was fairly isolated. An isolated area in which sugar beets were not being produced would be most desirable in order to obtain a pure strain of resistant seed. From this point of view the "Dixie" section fits perfectly into the picture and, in addition to this, the climatic conditions together with a very favorable growing season were just what was needed for the production of the seed. And, lastly, the farmers in that district were very much in need of a new crop that would intensify production on their various farms.

DESCRIPTION OF THE CHARACTERISTICS AND CONDITIONS IN WASHINGTON COUNTY

Washington County is located in the southwestern corner of Utah, and is bounded on the west by Nevada, and on the south by Arizona. There is a wide range in elevation within the county. It ranges from 3,000 feet along the Virgin River to more than 7,500 feet in the Pine Valley and other mountain valleys. As a result of this wide range in elevation there is an extreme range in climatic conditions. At the higher elevations the growing season is much shorter than at the lower elevations. The growing season at St. George, Utah, which is in the "Dixie" section, is about 196 days or 6½ months (table 1).

The "Dixie" district includes the irrigated section of the Virgin and Santa Clara Rivers in Washington County. The towns where farm surveys were taken for this study were St. George, Hurricane, Leeds, Washington, and Middleton.

Table 1. Temperature, growing season, precipitation, and elevation at 4 stations in Washington County, Utah 1/.

Station	TEMPERATURE			:Growing Season		:Precipitation		
	Length	: Jan.	: July	Length	:Length	:Length	:Annual	:
	of	: aver-	: aver-	of	: of	: of	:Precip-	:Elevation
	Record2/	: age	: age	Record2/	:Season	:Record2/	:itation:	:
	YR.	F. ^o	F. ^o	YR.	days	yr.	in.	feet
Leeds	24	36	80	24	209	27	12.7	3200
Pinto	24	27	66	22	83	25	15.6	6000
St. George	39	38	83	38	196	40	8.7	2880
Springdale	32	39	81	29	196	32	14.5	4048

1/ Yearbook of Agriculture, 1941 U. S. Department of Agriculture. p.1150

2/ Length of record means the number of years, data for the particular information was kept.

The rainfall in Washington County is relatively slight, averaging about 9 inches at St. George, but increasing somewhat in the higher and mountainous sections of the county. Table 1 shows the average rainfall at Pinto, which has an elevation of over 6,000 feet, to be 15.6 inches. During the summer, Washington County is characterized by torrential rains which contribute a considerable proportion of the total annual rainfall. These rains, however, are not very beneficial to agricultural and range lands because of the extremely rapid run-off. Due to the rainfall conditions, a considerable part of the county is only sparsely covered with vegetation, and the carrying capacity of these lands for livestock is low. In other areas of the county, however, the forage conditions are much more favorable and will maintain relatively large numbers of livestock.

In general, Washington County is predominantly agricultural. Of the population in the county in 1930 exactly one-half of those engaged in gainful occupations were employed directly in agriculture 3/.

3/ Thomas, W. P., op. cit. p. 4

A large share of the agricultural production in Washington County is consumed by the people in the county. They try to produce as large a share of their food supply as they reasonably can. The products which are shipped in are mostly those which have been processed or manufactured. In general the farms in Washington County are quite small in size, averaging only 15.9 acres of irrigated crop land per farm ^{9/}.

GENERAL INFORMATION

All of the sugar beet seed grown in the "Dixie" district of Washington County is contracted to the Utah-Idaho Sugar Company, which has a policy to limit the amount of seed produced and the number of growers. This company has established its seed growing headquarters in St. George, Utah, and at this point they have a fully equipped cleaning and grading plant, and a complete seed laboratory has been established. From a million to one and a half million pounds of seed is tested for germination and purity in this laboratory each year.

Table 2 shows many of the facts concerning sugar beet seed production in the area. The number of growers has increased from 3 in 1932 to as many as 159 in 1937. The acreage harvested reached a maximum production of 1,596,613 pounds of sugar beet seed, which was produced in 1936.

^{9/} Ibid: p. 15

Table 2. Sugar beet seed production
in the "Dixie" district and the Moapa Valley, 1932-41 1/.

Year	No. of Growers number	No. of Acres acres	Seed Produced pounds	Seed Per Acre pounds
1932	3	5	8,324	1,632
1933	84	241	341,308	1,418
1934	105	398	938,040	2,358
1935	94	459	921,794	2,006
1936	157	726	1,596,613	2,197
1937	159	751	1,361,546	1,813
1938	155	756	1,531,923	2,026
1939	141	694	1,241,616	1,789
1940	110	509	1,209,825	2,377
1941	125	612	1,288,334	2,107

1/ Information released by the Utah-Idaho Sugar Company, Salt Lake City, Utah. 1942 Publication rights reserved.

This crop, as can be seen from table 2, is relatively new in the area, and even though it is relatively new it has resulted in an industry that gives a return of over \$100,000.00 to the growers per year. The crop has become of tremendous importance to Washington County and is even more important to the commercial beet growers of Utah and Idaho because it supplies seed which is resistant to the attack of the white fly or beet leaf hopper. As mentioned before, all of the seed grown in the area has a high resistance to the disease, curly top, which is caused by the white fly.

The production of sugar beet seed in the "Dixie" district has been very largely responsible for an increased use of commercial fertilizer. Prior to 1932 very little commercial fertilizer was used in the "Dixie" district, that being the first year that sugar beet seed

was grown on a commercial scale in the area. Since 1932 the farmers have gradually increased the amount of fertilizer used per acre and, at the present time, are applying about 350 pounds (table 3). In order to obtain high quality sugar beet seed and at the same time give the farmers the highest returns per acre, the Utah-Idaho Sugar Company has recommended the use of commercial fertilizer. Word received from the Company is that this practice of applying 350 pounds of commercial fertilizer per acre has definitely been followed by the sugar beet seed growers during the past few years. The time of application, the amount applied, and the kind of fertilizer is shown in table 3.

Table 3. Contents of fertilizers applied
to sugar beet seed fields 1/.

Kind	Amount pounds	Time of Application time
Mixture of Am. Sulphate and P_2O_5	150	Before planting
Mixture of Am. Sulphate and P_2O_5	50	Planted with seed
Am. Sulphate	150	October
Treble super phosphate	200	February
Am. Sulphate	150	April
Total	350	

1/ Information released by the Utah-Idaho Sugar Company, Salt Lake City, Utah. 1942

In addition to the application of 350 pounds of commercial fertilizer per acre on the land which is growing sugar beet seed, many of the farmers are applying from 150 pounds to 200 pounds of phosphate fertilizer per acre on the land planted into alfalfa. This is, of course, in addition to all manure that might have applied to the soil.

In order to insure the perpetuation of pure strains of the resistant types, the seed is grown in a four to six year rotation plan. The sugar beet seed is followed by a grain crop which is followed by three or four years of alfalfa. This plan gives the growers three to five years to eliminate any volunteer beets that might have appeared in the field and thus helps to insure a pure strain of resistant seed.

According to the County Agricultural Agent, Anson B. Call, Jr., of Washington County, Utah, sugar beet seed is planted about once every five years. Mr. Call's statement follows:

It is the general practice to plant the sugar beet seed in September or the fore part of October. The beet partially matures and is harvested the next year, about the first of July. The ground is then plowed and put into alfalfa with a grain crop--generally barley--as a nurse crop. This remains in the ground over the winter and is harvested early the next summer as a grain crop. The alfalfa usually matures enough that same summer to produce at least one crop. During the next three or four years, while the land is in alfalfa, the farmers get four and sometimes five crops of alfalfa per year. About the fifth year of the rotation the farmer usually harvests the first crop of alfalfa before plowing the land for another crop of sugar beet seed. Sometimes the farmer will let the second crop of alfalfa partially mature before plowing the land, thus adding fertility to the soil in the form of green manure 10/.

According to observations and reports, the introduction of sugar beet seed production into the "Dixie" district, under such a plan as the above with emphasis on fertility and crop rotation, has had a very beneficial effect upon the crop yields and farm income. The object of this study is to measure as accurately as possible the changes in farm organization, yields and farm income on farms growing sugar beet seed.

10/ Personal letter received from Anson B. Call, County Agricultural Agent of Washington County, Utah. Dated July 6, 1942.

THE FARM BUSINESS ANALYSIS

In the spring and early summer of 1941, survey records, based on the 1940 year's business, were taken from 24 farmers of the "Dixie" section of Washington County, Utah. This survey covered some of the irrigated farms where a general diversified system of farming is followed. Since about 1931, sugar beet seed has been produced on some of these farms. The definition of terms is followed by the analysis of these records which will show the capital invested in the farm business, returns from various enterprises, farm expenses, the net returns of the grower, and the influence which the introduction of sugar beet seed production has had upon crop yields, farm income, and farm organization and practices.

DEFINITION OF TERMS.

"Dixie" district - The "Dixie" district includes the irrigated section of the Virgin and Santa Clara Rivers in Washington County, Utah.

Sugar beet seed farms - Sugar beet seed farms refers to those farms in the "Dixie" district that are producing sugar beet seed.

The 1928 study - In 1929 the Utah Agricultural Experiment Station conducted an Agricultural Survey of the "Dixie" section of Washington County, Utah. The data gathered covered the crop year for 1928 and in this thesis is referred to as the 1928 study.

The 1934 study - In 1934-35 a study was conducted by the Utah Agricultural Experiment Station and the United States Department of Agriculture in cooperation with the United States Planning Board. The data was gathered from farms in the "Dixie" district of Washington

County, Utah, and covered a five year period from 1929 to 1933 inclusive, and in this thesis is referred to as the 1934 study.

Crop index - Is the yield of all crops in percentage of some base. In this study the base was the average yields for the State of Utah for the period 1926-31. In the calculation of the crop index each crop was given a weight according to the acreage of that crop.

A farm - Is the total land and livestock operated as a unit, or by one man, partnership or family. It includes all of the machinery and improvements used in the farming operations. Rented land or livestock is included in the farm of the man who operates it but not in the farm of the man who is the legal owner.

Capital - Is the value of all farm property, including land, houses, other farm buildings, livestock, machinery, farm feeds, and farm supplies. House furnishings and personal effects of members of the family are not included. It includes the portion of the value of the family automobile which is used for farm purposes. The value of capital is the average of the beginning and ending inventory values. In cases where part of the farm is rented it includes the combined investment of the landlord and the tenant, unless otherwise stated.

Total farm expense - Unless otherwise specified includes (a) all current cash expenses for farm purposes; (b) livestock purchases; (c) value of all unpaid labor except that of the operator; (d) the amount, if any, that the beginning inventory values of livestock, farm feeds, and supplies, real estate, and machinery exceeds the closing inventory values. It does not include any interest charges, or any rental paid for use of land.

Total farm returns - Unless otherwise stated include (a) the amount received from the sale of crops plus the value of crops on hand at the end of the year that are to be sold; (b) the amount received from the sale of livestock and livestock products; (c) the amount received from miscellaneous sources such as work away from farm, the pasturing of livestock; (d) the amount, if any, that the closing inventory values of livestock and feeds and supplies exceed the beginning inventory values. They do not include the value of farm privileges.

Farm income - Income from Capital and operator's labor. Farm receipts minus farm expense.

Labor income - Is what a farmer receives for his year's work and management, in addition to the use of a house and farm products for home use. It is farm receipts minus farm expenses minus interest at 5 percent on the average farm capital.

Farm privileges - Are the estimated rental value of the farm house for a year plus the value at the farm of the farm produce used in the operator's household.

Labor earnings - Are the sum of the labor income and farm privileges. Unless otherwise stated, they are the labor earnings for the entire farm or what the operator's labor earnings would be if he owned the entire farm.

Return on capital - Is farm income minus the value of the operator's time. The percent return may be compared with the percent return on other investments.

Farmer's equity - Is the difference between farm assets and farm liabilities.

Animal Unit - Is a common unit of measure of all kinds of livestock. One mature range cow is considered as the standard or as one animal unit and all other livestock equal to this. For example, 5 sheep are considered as equal to 1 cow and, hence, are equal to 1 animal unit.

Man-work-units - Are the total amounts of productive work undertaken on a farm during the year. They are calculated on the basis of the average hours of man labor required to grow and harvest an acre of the various kinds of crops and care for one head of the different kinds of livestock. Ten hours of productive labor are equivalent of 1 man-work-unit.

Man equivalent - Is a measure of the total amount of man labor used on the farm during the year. It is calculated by reducing all labor to months and dividing by 12. Labor of boys is adjusted to its equivalent in man time.

Capital Invested. The average capital invested in the farm business as reported by these 24 farmers was \$12,664.00 with an average indebtedness of \$4,541.00, leaving a net worth of \$8,123.00, which is the farmer's equity in his business (table 4). The major investment was in land, comprising 59 percent of the total, while buildings constituted 22 percent, livestock 11 percent, and farm equipment and supplies 8 percent.

Table 4. Average capital invested in the farm business, as reported by 24 farmers in Washington County, Utah, 1940.

Item	Total Investment dollars	Percentage of Total percent
Investment in land	7470	59
Investment in buildings	2753	22
Investment in farm equipment, supplies	1057	8
Investment in livestock	1384	11
Total Capital	12664	100
Indebtedness <u>1/</u>	4541	
Farmer's Equity	8123	

1/ Includes rented land which amounted to \$1825.00

The average size of farms surveyed was 261.3 acres, with 211 acres of waste and pasture, leaving about 50.3 acres of cultivated land (table 5). In general, the farms in Washington County are quite small in size, averaging only 16 acres of irrigated crop land per farm 11/. This data would indicate that the 24 farms included in this survey were some of the larger farms.

11/ Thomas, W. P., op. cit. p. 15

Table 5. Acres per farm and value per acre as reported
by 24 farmers in Washington County, Utah, 1940.

Type of land	Acres in Farm		Value		
	Acreage	Percentage	Total	Per	Percentage
	: :	: cultivated :	: :	: Acre :	: of total
	Acres	Percent	Dollars	Dollars	Percent
Field crops					
irrigated	40.3	80.1	4997	124	68.8
Dry	4.6	9.1	423	92	5.8
Plowable pasture	.9	1.8	94	105	1.3
Fruit land	4.5	9.0	828	184	11.4
Total cultivated	50.3	100.00	6342	126	87.3
Pasture & Waste	211		925	4.38	12.7
Total	261.3		7267		100.0

Of the 50.3 acres of cultivated land the major portion, 40.3 acres, or 80.1 percent, was in irrigated crops; 4.6 acres, or 9.1 percent, was idle or in fallow; 4.5 acres, or 9 percent, was fruit land; and .9 acres, or 1.8 percent, was in plowable pasture that was irrigated.

The average acre value of all cultivated land, as reported by the growers, whose farms were surveyed, was \$126.00, with the irrigated land valued at \$124.00, dry land at \$92.00, plowable pasture at \$105.00, and fruit land at \$184.00.

Acres Planted to Various Crops. Alfalfa, constituting 46.9 percent of the total acres planted in crops, is the principal field crop grown (table 6). Barley ranks next with an acreage of 16.3 percent, then sugar beet seed with an acreage of 10.9 percent, with the remaining crops occupying 25.9 percent of the acres planted.

Table 6. Acres per farm planted to various crops, as reported by 24 farmers in Washington County, Utah, 1940.

Crops	Acres per farm	
	Number	Percentage of total
	Acres	Percent
Alfalfa	25.3	46.9
Barley	8.8	16.3
Sugar beet seed	5.9	10.9
Alfalfa seed	3.3	6.1
Wheat	2.9	5.4
Peaches	1.3	2.4
Sugar cane	1.0	1.9
Corn silage	.2	.3
Miscellaneous crops	5.3	9.8
Total cropped area	54.0	100.0

Figure 1 clearly indicates that about three times as much land was planted in alfalfa as was planted in barley and approximately four times as much was in alfalfa as was in sugar beet seed.

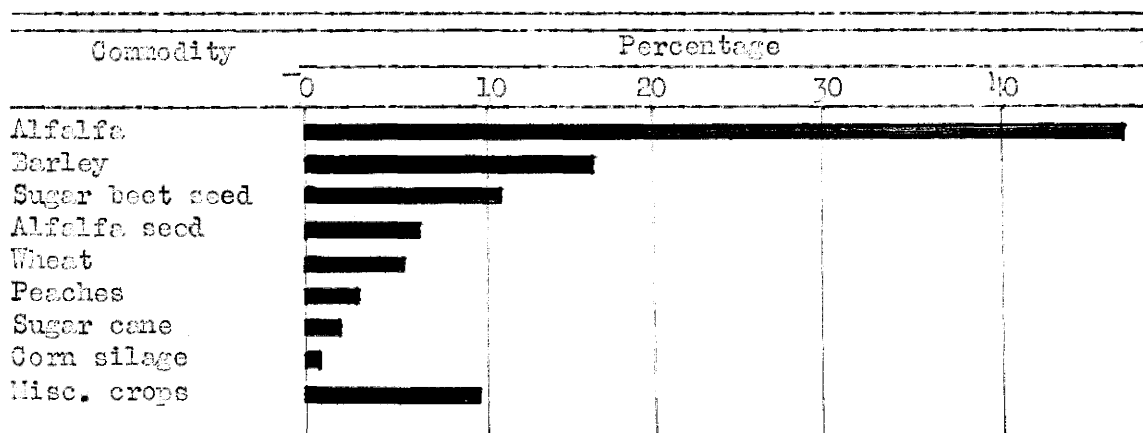


Figure 1. 68.6 percent of the farm land was planted in alfalfa and grain in 1940 and 10.9 percent to sugar beet seed production.

The survey of the 24 farms in Washington County shows an average acre-yield of alfalfa of 3.9 tons, which gives an acre return of \$39.00 (table 7). The returns per acre for sugar cane, barley, wheat, and alfalfa seed range from \$21.00 to \$34.00. Peaches and sugar beet seed give the highest returns per acre. Peaches with an average acre yield of 142.8 bushels resulted in a return per acre of \$57.00, and sugar beet seed with an average acre yield of 2458.7 pounds gave a return of \$209.00 per acre.

Table 7. Acre-yields and returns from crops as reported by 24 farmers in Washington County, Utah, 1940.

Crops	Acre Yield	Average Price Received	Average Acre Returns
	yield	dollars	dollars
Alfalfa	3.9 tons	10.00	39.00
Barley	50.1 bu.	.63	32.00
Sugar beet seed	2458.7 lb.	.085	209.00
Alfalfa seed	3.4 bu.	6.31	21.00
Wheat	36.6 bu.	.85	31.00
Peaches	142.8 bu.	.61	87.00
Sugar cane	11.4 tons	3.00	34.00

The high returns from sugar beet seed production in the "Dixie" section shows the importance of this crop to the farmers growing it and to the area as a whole.

Number of Various Kinds of Livestock. Of the farms surveyed, 100 percent reported having dairy cattle, including heifers over one year, averaging 6 head per farm (table 8). Only one farm, or 4 percent of the total farms, reported sheep, with an average of 17.5 sheep for

that farm, while 46 percent reported beef cattle, with an average of 38.4 head for the farms reported. Hogs were kept on 92 percent of the farms, averaging 11.8 hogs to the farm; horses on 96 percent of the farms, averaging 4 head per farm; chickens on 88 percent of the farms, averaging 21.2 hens per farm; while turkeys were kept on only 8 percent of the farms, averaging 2563 turkeys per farm.

Table 8. Number of various kinds of livestock per farm as reported by 24 farmers in Washington County, Utah, 1940.

	No. farms keeping various kinds of livestock	Percentage of total farms	No. of livestock per farm	
			Average of all farms	Average of those keeping livestock
	number	percent	number	number
Dairy cattle	24	100	6.0	6.0
Beef cattle	11	46	17.6	38.4
Sheep ^{1/}	1	4	.7	17.5
Hogs	22	92	10.8	11.8
Horses	23	96	3.8	4.0
Chickens	21	88	21.2	24.2
Turkeys ^{2/}	2	8	213.6	2563.0

^{1/} The sheep were all on one farm.

^{2/} The turkeys were practically all on one farm.

In most cases the dairy cattle kept on the farms are for the purpose of supplying the family with dairy products. Also in some cases the hogs and poultry were kept principally for home use. The beef cattle and sheep were kept more for commercial purposes. On about 4 out of the 24 farms beef cattle were being fed out for the market. This practice is not at all common in the area, but would seem to indicate that a feeding enterprise would fit into a farm organization program where feed is available. Such a practice would be very satisfactory, especially where manure is badly needed to keep up fertility of the soil.

Farm Income. This survey shows that the average cash income per farm was \$3379.00 (table 9). Of this, \$1739.00, or 51.4 percent, was from crops, and \$1381.00, or 40.9 percent, from the sale of livestock and livestock products. In addition to this, there were miscellaneous receipts of \$259.00, or 7.7 percent (figure 2).

Table 9. Cash income per farm, as reported by 24 farmers in Washington County, Utah, 1940.

Item	Cash income per farm	
	Amount	Percentage
	dollars	of total percent
Hay	221.00	6.5
Alfalfa seed	50.00	1.5
Grain	65.00	1.9
Sugar beet seed	1231.00	36.4
Fruits	145.00	4.3
Other crops	27.00	.8
Total crop income	1739.00	51.4
Dairy cattle	338.00	10.0
Chickens	302.00	8.9
Beef cattle	497.00	14.7
Hogs	120.00	3.6
Sheep	5.00	.2
Turkeys	111.00	3.3
Horses	8.00	.2
Total livestock income 1/	1381.00	40.9
Miscellaneous receipts	259.00	7.7
Total from farm	3379.00	100.0

1/ Income from livestock has been corrected for changes in inventories and livestock purchases.

Table 9 and figure 2 show that the major source of cash income from the farms in the 1940 survey was from the sale of sugar beet seed and beef cattle. The income from sugar beet seed constituted 36.4 percent of the total, while beef cattle returned 14.7 percent, or approximately 51 percent of the total farm income came from these enterprises. The return from the sale of hay was \$221.00 or only 6.5 percent of the average total farm income. While the income from the sale of hay was considerably lower than the income from the sale of sugar beet seed, the acreage planted into hay was 46.9 percent, while only 10.9 percent was planted into sugar beets. This would indicate that practically all of the hay was fed to livestock and the returns from hay would come indirectly through the livestock. The cattle had an average of 211 acres (table 5) of pasture and waste land on which to graze, together with a grazing permit on public domain. Some of the cattle graze the year around. Since this is the case, probably not a great deal of the feed was fed to the beef cattle. The amount of feed produced on the farms in the area would not permit the feeding of beef cattle on a very large scale.

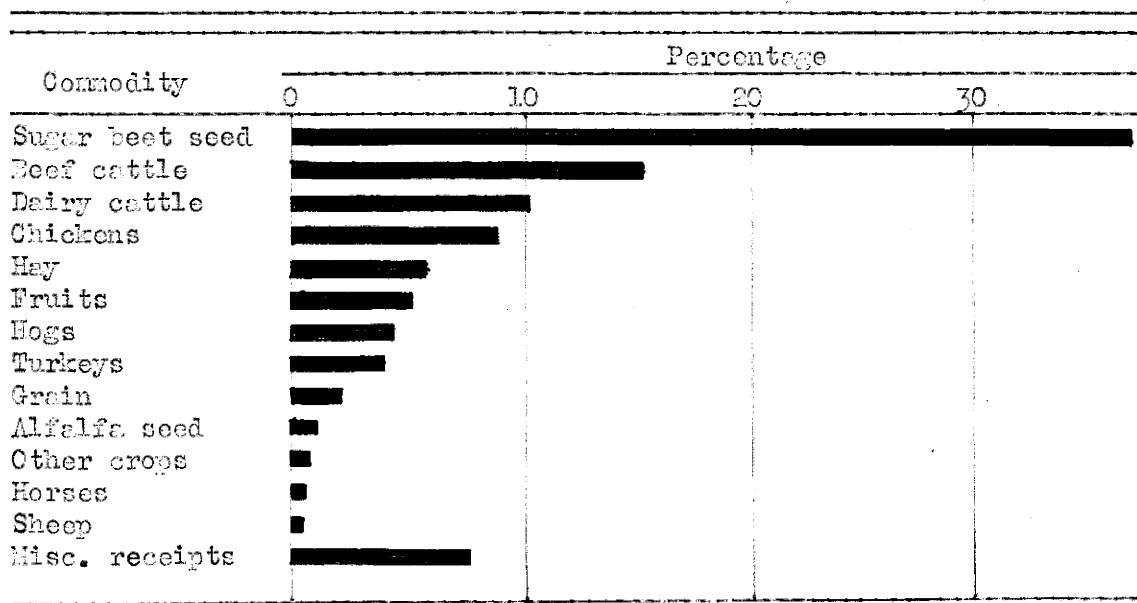


Figure 2. The sale of sugar beet seed and beef cattle was the principal cash income as reported by 24 farmers in Washington County, Utah, 1940.

The income from grain returned 1.9 percent of the total, while fruits were 4.3 percent, dairy cattle and products 10 percent, chickens and products 8.9 percent, hogs 3.6 percent, turkeys 3.3 percent, and sheep and wool 0.2 percent. Much of the pork, dairy, and poultry products was used in the home.

Farm Expense. In terms of averages the general farm expense constituted 29.1 percent of the total current expense, or \$569.00, while hired labor was 27.4 percent, or \$535.00, and auto, truck, and tractor expense was 12.4 percent, or \$243.00, per farm. These three items made up 68.9 percent of the total current expense.

The average feed purchased amounted to \$188.00 and land taxes \$171.00. The repairs to buildings and equipment amounted to an average of \$119.00, while water taxes were \$98.00, seed and plants were \$19.00, and insurance was \$13.00 (table 10).

Table 10. Expense per farm as reported by 24 farmers in Washington County, Utah, 1940.

Item	Amount	Percentage of total
	DOLLARS	PERCENT
General farm expense <u>1/</u>	569.00	29.1
Hired labor	535.00	27.4
Auto, truck and tractor <u>2/</u>	243.00	12.4
Feed <u>3/</u>	188.00	9.6
Land taxes	171.00	8.7
Repairs to building & equipment	119.00	6.1
Water taxes	98.00	5.0
Seeds & plants	19.00	1.0
Insurance	13.00	.7
		100.0
Total current cash expense	1955.00	85.0
Inventory decreases <u>4/</u>		
Machinery & Real Estate	142.00	6.0
Unpaid family labor	206.00	9.0
		100.0
Total farm expense	2303.00	

- 1/ Includes farm supplies, threshing, shearing, telephone, hauling, beet seed cleaning, fertilizer, etc.
- 2/ This item is the proportion of auto expense chargeable to the farm.
- 3/ Includes range fees and stock pasture.
- 4/ Adjustment was made for livestock purchases and decreases.

The average total farm expense was \$2303.00 (table 10). The current expense constituted \$1955.00, or 85 percent, while inventory decreases amounted to \$142.00, or 6 percent, and unpaid family labor \$206.00, or 9 percent.

Financial Summary of Farm Business. The total farm income, including, in addition to returns from crops and livestock, a miscellaneous income of \$61.00 and an income of \$198.00 for labor off of farm, was \$3379.00. By deducting the total expense of \$2303.00, there was a farm income of \$1076.00 (table 11).

Table 11. Financial summary and returns per farm as reported by 24 farmers in Washington County, Utah, 1940.

FINANCIAL SUMMARY:	
Total cash returns from crops	\$1739.00
Total cash returns from livestock 1/	1381.00
Miscellaneous farm receipts	61.00
Labor off of farm	198.00
Total farm returns	\$3379.00
Total farm expense 2/	2303.00
Total farm income	\$1076.00
Interest on investment	633.00
Labor income	\$ 943.00
Farm privileges	500.00
Labor earnings	\$ 943.00
RETURN ON CAPITAL:	
Total farm income	\$1076.00
Value of operator's time	720.00
Return on investment	\$ 356.00
Percent return on investment $(356 \div \$12,664)$	2.8
RETURNS PER CULTIVATED ACRE:	
Average cultivated acres per farm	50.3 acres
Total farm returns per cultivated acre	\$ 67.00
Total farm expense per cultivated acre 2/	46.00
Net farm income per cultivated acre	\$ 21.00

1/ Cash returns from livestock and total farm expenses have been corrected for purchases and increase in inventories.

2/ Includes unpaid family labor and was adjusted for livestock purchases and decreases.

If an interest rate of 5 percent is allowed on the capital investment(\$12,664) it would amount to \$633.00. This deducted from the total net income leaves a labor income of \$443.00, which, when added to the average farm privileges, makes labor earnings of \$943.00 (table 11).

If the operator could have been making an average of \$60.00 per month, whether he was working on his own farm or for some one else, his yearly wage would have amounted to \$720.00. This deducted from the average net return per farm of \$1,076.00 would be a return to capital of \$356.00. This would amount to 2.8 percent return on the average total capital invested per farm (table 11).

The above figure would indicate that the average farmer on the farms represented in this survey would have as a result of having their own farms a yearly wage of \$720.00 plus a return of 2.8 percent, or \$365.00, on capital. In addition to this there were farm privileges which amounted to an average of \$500.00 plus unpaid family labor of \$206.00, making a total family income of \$1791.00, which comes as a result of home and farm ownership.

The average total return per cultivated acre for the 24 farms surveyed amounted to \$67.00. The average farm expense per acre was \$46.00, leaving a net return of \$21.00 per cultivated acre.

Size of Business and Labor Efficiency. The productive man work units per farm was 450. An average of 1.88 men per farm amounted to 239 productive man-work-units per man (table 12). The animal units per farm averaged 26.

Table 12. Business and labor as reported by 24 farmers in Washington County, Utah, 1940.

<u>SIZE OF BUSINESS:</u>	
Productive man-work-units per farm	450
Man equivalent per farm	1.88
Animal units per farm	26
<u>LABOR EFFICIENCY:</u>	
Productive man-work-units per man	239

COMPARISON AND CONCLUSION

The Utah Agricultural Experiment Station conducted an Agricultural Survey of the "Dixie" section of Washington County, Utah, in 1929 12/. This study included a survey of 69 farms, which were located in various parts of Washington County, and included data for the crop year of 1928. Also in 1934 a study was conducted by the Utah Agricultural Experiment Station in cooperation with the Utah State Planning Board. In the 1934 study all farms in Washington County were included in the survey and the data gathered covered a five year period from 1929 to 1933 inclusive. These various studies hereinafter will be referred to as the 1928 and the 1934 studies.

In order to show just what influence the production of sugar beet seed has had upon farm organization and practices in the "Dixie"

12/ Thomas, W. F., An Economic Survey of the "Dixie" Section, Washington County, Utah, 1929. Agricultural Experiment Station, Utah State Agricultural College, Logan, Utah.

section it will be necessary to compare some of the figures secured from the 24 sugar beet seed farms surveyed in 1940 with the figures from farms in the same area where sugar beet seed growing is not and has not been of commercial importance. The studies made in 1928 and in 1934 provide the best source of information available for this comparison.

The 24 farms included in this study were located in the various towns of St. George, Leeds, Hurricane, and Washington. In order to make an adequate comparison it was necessary to take only that information from the various studies that pertained to the various towns as above set forth.

In the 1928 study a fairly accurate check was made upon the proportion of land planted into various crops and upon the crop yields. The figures obtained in the 1934 study represent an estimate over a five year period so it is quite likely that the figures secured in the 1928 study would be the most reliable.

Table 13 shows the number of farms surveyed in the various studies that were located in the communities as listed in the table. There were a total of 36 farms in the 1928 study, 367 farms in the 1934 study, and 24 farms in the 1940 survey. It must be kept in mind that there were other farms included in the 1928 and 1934 studies besides the ones listed above. In order to make more favorable comparisons the farms located in other communities than the ones listed in the table were eliminated.

Table 13. Number and place of location of the farms surveyed for the various studies in Washington County, Utah.

Location	Number of farms surveyed		
	1928 study number	1934 study number	1940 study number
Washington	11	62	—
St. George	8	143	14 ^{1/}
Loeds	6	29	4
Hurricane	11	133	6
Totals	36	367	24

^{1/} Some of these farms were located in Washington

The total cultivated acres per farm as represented by the surveys made in 1928, 1934, and 1940 were 22.3, 15.6, and 50 acres, respectively (table 14). These figures definitely indicate that the Utah-Idaho Sugar Company chose the larger farms upon which to grow sugar beet seed. The important thing about table 14, however, is the fact that it shows the change that has been brought about in the proportion of land planted into various crops as a result of growing sugar beet seed. A close examination of the table will show three important changes in the percentage of land planted into various crops; (1) 12 percent of the cultivated acres on the farms surveyed in 1940 was planted into sugar beet seed; (2) a larger percentage was planted into barley; and (3) a much smaller proportion was planted into wheat.

Table 14. Average number of cultivated acres planted in the different crops for the various years.

Crop	1928 study		1934 study		1940 study	
	Acreage	Percent	Acreage	Percent	Acreage	Percent
	acres	percent	acres	percent	acres	percent
Alfalfa	11.2	50	6.3	40	25	50
Barley	.9	4	1.2	8	9	18
Sugar beet seed	-- 1/	--	-- 2/	--	6	12
Wheat	5.9	26	3.9	25	3	6
Corn and Cane	.4	2	1.7	11	1	2
Other crops	3.9	18	2.5	16	6	12
Total	22.3	100	15.6	100	50	100

1/ No sugar beet seed was grown in 1928.

2/ A small amount of sugar beet seed was included with the other crops.

The changes as presented would show that a proportion of the land formerly planted into wheat is now being planted into barley and sugar beet seed. The change from wheat production to that of barley would show that the farmers favor barley as a nurse crop with alfalfa, and that barley is preferred for feeding purposes, especially since they can produce more barley per acre than they can wheat. The change from wheat to the production of sugar beet seed would represent a change toward a more intensive type of farming.

Another step toward intensification on the 24 farms surveyed in 1940 is shown in an increase in crop yields per acre. As set forth in table 15, the crop yields, for the farms represented in this study, for alfalfa, wheat, and barley were 3.9 tons, 36.6 bushels, and 50.1 bushels respectively. When compared to crop yields from farms in the same area as represented in the 1928 study a considerable increase is shown. For alfalfa the increase in yield per acre amounted to 37 percent, for wheat 52 percent, and for barley 26 percent. Likewise, when

the yields on the farms represented in this study were compared to those in the same area as represented in the 1934 study, there were considerable increases shown. In this comparison there was an increase of 22 percent for alfalfa yields, 101 percent for wheat yields, and 58 percent for barley yields.

Table 15. Comparison of crop yields in the various studies in the sugar beet seed area in Washington County, Utah.

:Comparison of 1928 & 1940 studies:				Comparison of 1934 & 1940 studies			
:1928 study :		:1940 study :		:Increase :		:1934 study:	
Yield :		Yield :		Percent :		Yield :	
Crop :							
Alfalfa :	2.35 tons :	3.9 tons :	37	:	3.19 tons	3.9 tons:	22.2
Wheat :	24 bu. :	36.6 bu. :	52	:	18.2 bu.:	36.6 bu. :	101.1
Barley :	40 bu. :	50.1 bu. :	26	:	31.6 bu.:	50.1 bu. :	58.5
:	:	:	:	:	:	:	:

Under the new system, the 4 to 6 year crop rotation plan that is being practiced on the sugar beet seed farms, the land that is to be planted into sugar beet seed is plowed up after the first crop of alfalfa is harvested. If the usual 4 or 5 crops of alfalfa had been harvested from all of the land growing alfalfa, no doubt the increase in alfalfa yields would have been larger.

A crop index worked out and weighted on the basis of acreage also shows an increase in crop yields on the sugar beet seed farms. The crop index represents yield and acreage of three of the major crops, alfalfa, wheat, and barley, grown in the "Dixie" district on 36 farms in 1928, 367 farms over a five year period ending 1933, and on 24 farms surveyed in 1940. State averages for the period 1926-31 were used as base yields. The crop index thus arrived at was 102 for 1928, 99 for the five year average, and 145 for 1940 (table 16).

This crop index of 145 for the sugar beet farms surveyed in 1940 shows an increase in crop yields of approximately 45 percent over and

and above the crop yields as represented in the 1928 and 1934 studies. The above increase in crop yields would intensify production as well as provide higher returns per acre. One answer to the problem of low yields and low returns per acre, which is fairly typical of the area, is the increase in crop yields, 45 percent, as was reported by the 24 farmers growing sugar beet seed.

Table 16. Crop indices as worked out for the 1928, 1934 and 1940 studies.

Crop indices for the various periods 1/	
Study	Crop index
1928	102
1934	99
1940	145

1/ Weighted on the basis of acreage using state averages for the period 1926-31 as base yields.

This is probably the most appropriate place in the thesis to discuss and answer the questions as set forth as the objectives of this study. The objectives were to determine the effect that sugar beet seed production has had upon farm organization and practices, crop yields and farm income.

The first objective can not be determined unless we understand what the farming practice was and is on similar farms in the same area which do not grow sugar beet seed. Mr. Anson B. Call gives us a general picture of the farm practice in the "Dixie" district before sugar beet seed was grown 13/. The period of time that alfalfa was left in the

13/ County Agricultural Agent, Washington County, Utah. Letter dated July 6, 1942.

ground varied all the way from 5 to 25 years. Then the alfalfa was finally plowed under, grain was planted from year to year without adding any fertilizer to the soil. It is easy to see that under such a practice the soil would become run down. Since the application of fertilizer to the soil on those farms growing sugar beet seed has resulted in material increases in yield per acre, we could conclude that the run down condition of the soil was responsible for the low yields formerly received.

The change then, as brought about by the production of sugar beet seed, has been a systematic crop rotation plan lasting from 4 to 6 years. This systematic crop rotation plan is a big improvement over the old haphazard crop rotation plan lasting anywhere from 5 to 25 years. This improved crop rotation plan would be partially responsible for the increased crop yields on the sugar beet seed farms.

No doubt, the major reason for increased crop yields was the addition of commercial fertilizer to the soil. In addition to the application of 850 pounds of commercial fertilizer per acre to the soil producing sugar beet seed, many of the farmers have been applying about 200 pounds of commercial fertilizer per acre to the land planted into alfalfa, together with any manure that might have been applied to the soil.

In brief, a good crop rotation plan and the application of commercial fertilizer and manure has resulted in an increase in crop yields. The additional yields have enabled the farmers to carry on more extensive feeding enterprises and the sale of the livestock from the sugar beet farm has not only increased the farm income but has supplied

larger quantities of manure which has been returned to the soil as fertilizer. This has been made possible chiefly due to the production of sugar beet seed and has resulted in a more intensive type of farming.

In addition to an improved system of crop rotation and the application of fertilizer to the soil, there are other things that might have had some influence upon crop yields on the farms surveyed in 1940. For instance, the farms growing sugar beet seed were on the average considerably larger than the average of all farms in the area. This is unlikely, however, to have much of an effect on crop yields.

An examination of the weather reports shows the precipitation at St. George, Utah, to have been 9.6 inches in 1939 and 10.86 inches in 1940, making an average of 10.23 inches 14/. The average precipitation from 1929-33 at St. George was 8.95 inches or 1.28 inches below the 1939-40 average, and in 1927-28 the average was 9 inches. This slight advantage of about an inch more precipitation in 1940 over the amount of precipitation in the other two periods undoubtedly had some influence upon the crop yields on the farms growing sugar beet seed. This, however, was probably not of any major importance.

The question might now be asked as to why the farmers were able to make the changes and adapt themselves to the new practices in farming. By referring to table 6, it is found that only 10.9 percent of the cultivated land on the average farm was planted into sugar beet seed. Table 9 shows that 36.4 percent of the total farm income was received from sugar beet seed. Since such a large percentage of the

14/ Climatological Data, published by the U. S. Department of Commerce, Weather Bureau, 1929-41.

cash returns come from such a small proportion of the land, the farmers have, no doubt, been willing to adopt the new practices in order to get the high returns for the sugar beet seed. Due to such good results as have come from the production of sugar beet seed, there are, no doubt, many farmers in the area that would like to produce the seed, who have not yet had the chance to do so. Due to the influence exercised by the Utah-Idaho Sugar Company, the decision as to the individual growers, the number of growers, and the number of acres to be planted usually rests with the company. There is only so much seed in demand; therefore, only so much should be produced.

Although the number of sugar beet seed growers have to be limited, we have to realize as a result of the conclusions reached in the preceeding discussion that farming practices and crop yields have been improved on the farms which have been fortunate enough to grow the seed. However, the thing that is of most importance to the grower is the increased returns which are a result of better agricultural practices and the production of sugar beet seed.

In order to get a general yet complete picture of beneficial effects which sugar beet seed production has had in the "Dixie" district of Washington County, we must fully realize the situation that existed before sugar beet seed was produced in the county. Three of the major conclusions reached by Dr. W. P. Thomas and others as a result of data gathered for the 1928 and 1934 studies were: (1) that crop yields were low and needed to be increased; (2) that returns to labor, capital, and management were low; and (3) that the problem confronting the farmers was the reorganization of the farm business in such a way that the

small number of acres now being cultivated could be made to yield high acre returns.

The analysis of the 24 farms producing sugar beet seed, as has been presented in this thesis, would indicate that the sugar beet seed growers have gone a long way in solving these three major problems. Even though farm prices were considerably higher in 1928 than in 1940, the net farm income per cultivated acre was \$21.00 in 1940 as compared to \$17.00 on farms in the same area as shown by the 1928 study. The income per cultivated acre as represented by the above figures would be 29 percent greater in 1940 than in 1928.

The results of improved farm practices, increased crop yields, and the production of sugar beet seed on the farms growing the seed, are all shown in the increased farm income per cultivated acre. The end result has been more intensive agricultural practices, higher net returns, and a higher standard of living.

SUMMARY

Prior to 1932, or before sugar beet seed was grown in the "Dixie" district, it was a recognized fact that there was a need for the reorganization of the farming practices in the area in such a way that the small acreage being cultivated would yield higher returns.

An isolated district with a favorable climate was needed for the production of a pure strain of resistant sugar beet seed. The "Dixie" district was fairly isolated and sugar beet plants could be over-wintered in the soil, thus enabling the growers to produce a crop of sugar beet seed in less than one year. It was for these reasons

that the sugar beet seed industry was established in the "Dixie" section of Washington County, Utah.

The Utah-Idaho Sugar Company has established its seed growing headquarters in St. George, Utah, and has in a large measure been responsible for the development of a sugar beet seed industry which pays the farmers in the area over \$100,000.00 each year.

The farmers producing the sugar beet seed are now following a systematic crop rotation plan and have developed a practice of applying 650 pounds of commercial fertilizer per acre on the land planted into sugar beet seed. In addition, some commercial fertilizer and increased quantities of manure are being applied to land other than that producing sugar beet seed. This is a new practice in the area, but one that has been needed for a long time.

The total number of cultivated acres per farm was 50.3, of which 47 percent was planted into alfalfa, 16 percent into barley, 11 percent into sugar beet seed, and the remaining 26 percent into other crops.

The average returns from an acre of sugar beet seed was \$209.00. This was from 3 to 8 times higher than the returns per acre from any other crop.

On some of the farms cattle are being fattened for the market. This practice is fairly new in the "Dixie" district and has, in most cases, developed as a result of the production of more feed on the sugar beet seed farms in the area.

The income per farm was \$3379.00, while the average total farm expense was \$2303.00, leaving a farm income of \$1076.00. After

allowing for interest on the investment, the operator had a labor and management wage of \$1443.00. By adding the farm privileges, which amounted to \$500.00, to the labor and management wage of \$1443.00, the labor earnings would amount to \$1943.00.

A large proportion of the land formerly planted into wheat on the sugar beet farms is now being planted into barley and sugar beet seed. The barley is used as a nurse crop for alfalfa. The sugar beet seed is produced in order to intensify farming operations and to secure larger returns.

Crop yields on the sugar beet farms would range all the way from 30 percent to 75 percent higher than the yields on farms in the same area before sugar beet seed was produced. The crop index for the 24 sugar beet seed farms was 145 as compared to a crop index of 102 in 1926 and 99 in 1934 for farms located in the same area.

Before sugar beet seed was grown in the "Dixie" district there was only a haphazard crop rotation plan. Alfalfa was left in the ground all the way from 5 to 25 years, and then, when finally plowed up, grain was planted from year to year without much thought of soil fertility. The sugar beet seed farmers, after adopting a better crop rotation system and applying fertilizer to the soil, have obtained excellent results as is shown in the crop index of 145.

Approximately 11 percent of the cultivated land on the sugar beet seed farms was planted into sugar beet seed. In comparison to this, approximately 37 percent of the total farm income was received from sugar beet seed. Such large returns from a relatively small acreage indicates why the farmers in the "Dixie" district are quite willing to grow sugar beet seed.

As a result of growing sugar beet seed on the farms in the "Dixie" section of Washington County, Utah, farm practices have been improved, which in turn have resulted in increased crop yields. The returns from increased crop yields, together with the returns from the sugar beet seed, have greatly increased the returns per farm and have thus enabled the sugar beet seed farmers to maintain a higher standard of living.

It is quite evident that all of the farmers in the "Dixie" district will not be able to produce sugar beet seed. On the other hand it would be possible for those farmers not growing the seed to obtain a crop index that would compare to the crop index on the farms producing the seed. It can be quite definitely recommended that all farmers in the area who haven't already done so should improve their farm organization and practices. They should follow a systematic crop rotation plan, make proper application of commercial fertilizer, and use barnyard manure as much as possible. By so doing the farmers could increase the crop yields, which would enable them to keep more livestock. More manure would be supplied for fertilizer and a larger farm income would be realized from the sale of livestock.