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Progress Report of the Irrigated Eighty-Acre Demonstration Farm Unit of the Harney Branch Experiment Station

1927-1930

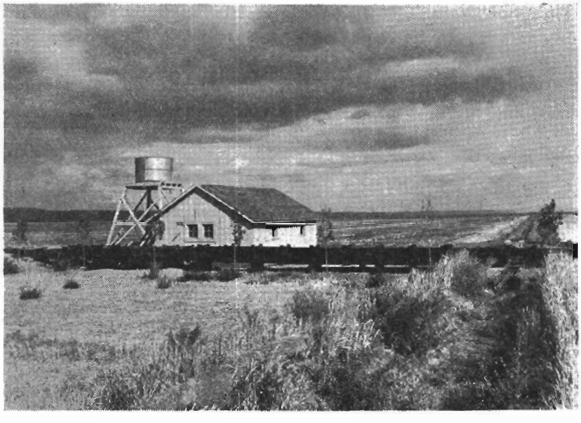

Figure 1. Pump-house, weir box, and flume, on the Demonstration Farm Unit.

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Deep Well Irrigation a Proved Success in Harney Valley

An average return on the capital investment of 18.2 percent for the first four years operation of the Eighty-Acre Demonstration Farm Unit establishes beyond reasonable doubt the economic feasibility of irrigation by pumping in the Harney Valley.

Estimating that the operator of a farm such as this would perform half of the labor himself, hiring the other half, his labor income would have averaged $1,615 a year for the four years, in addition to 6 percent interest on his capital investment.

Experience with this project indicates that the following suggestions are important to prospective pump irrigators:

1. When starting a farm project to be irrigated by pumping do not attempt to irrigate too much. Ten to twenty acres the first season is usually enough except for experienced irrigators.

2. Make a contour map of the proposed project to assist in locating the well so as to irrigate the tract with the least amount of flume, ditches, and loss of time, and to indicate the system of distribution best suited to the topography of the land and the soil type.

3. Wells drilled for irrigation purposes should be of sufficient size to insure ample water.

4. Wells should be cased entirely to the bottom.

5. The perforations in the casing should be small to prevent excessive pumping of sand and consequent caving of well.

6. FIT THE LAND FOR IRRIGATION. This is the MOST IMPORTANT operation. Land properly fitted will produce large returns with moderate applications of water. It will enable the irrigator to handle the maximum amount of land in a given period of time. Land not properly leveled is not likely to produce returns that will justify irrigation by pumping.

7. Sowing a permanent crop, such as alfalfa, on land just fitted for irrigation should be avoided. If much soil has been moved the land will settle, making it impossible to apply water uniformly or economically. An annual crop such as grain, peas, or potatoes should be planted the first year.

8. If necessary to sow alfalfa the first year it is advisable to give the land a trial irrigation and then relevel before putting in the crop. While this is expensive, it is cheaper than the production of a poor, uneven crop over a period of years.

9. If possible do not irrigate a growing crop until after it shades the ground. It is far better to irrigate before sowing than to have to "irrigate the crop up."

10. Good irrigating increases returns in much greater proportion than the additional labor required over careless irrigating. A few dry spots in the field may easily be the determining factor between a loss or a satisfactory return on the investment. Frequent light irrigations give more uniform growth and much better returns than heavy irrigations at long intervals.

TABLE OF CONTENTS

SUMMARY

1. The irrigated eighty-acre demonstration farm unit was established in 1927 on the Harney Branch Experiment Station to obtain information on the following points:

(1) Cost of drilling and casing a well to irrigate an eighty-acre tract.

(2) Cost of installing and operating a suitable pumping plant.

(3) Cost of leveling an eighty-acre tract for irrigation and constructing a distribution system.

(4) Cost of producing standard crops under irrigation by pumping.

2. The tract is irrigated from an 18-inch drilled well, 85 feet deep, cased to a depth of 60 feet with 12-gauge galvanized steel casing. A Kimball turbine pump is used, operated by a 25 horse-power semi-Diesel oil engine.

3. The total first cost of the well and pumping plant was $4,134.22. This includes the weir-box, turnouts, and flume, and also the compressed-air starting equipment installed in 1930.

4. Leveling and constructing permanent ditches cost $16.03 per acre up to 1930. Some additional leveling will be necessary before the land is in ideal condition for irrigating. Proper leveling of the land is very important because

(1) It reduces the labor of irrigating and the amount of water used, which together make up about a third of the total cost of production.

(2) It increases yields through more effective application of the water.

5. The total capital investment in land, leveling, well, and pumping plant is $77.48 per acre in 1930. This includes a value of $10 an acre for the unimproved sage-brush land, and $5 an acre for clearing the sage-brush.

6. For the first four years the cost of pumping has averaged 92¢ per hour and $6.78 per acre-foot of water. This cost includes depreciation of the pumping plant and 6 percent interest on the investment. The average amount of water delivered has been 1.7 second-feet.

7. For the 4 years the average annual application of water has been 1.27 acre-feet per acre of crop. The rainfall during the growing season for the last three years averaged 1.55 inches, 39 percent below the 16-year average.

8. After allowing all costs of production, including depreciation of equipment and pumping plant, the crops grown on the demonstration farm unit gave a return on the capital investment of 11.6 percent in 1927, 5.6 percent in 1928, 47.9 percent in 1929, and 8.0 percent in 1930, averaging 18.2 percent for the 4 years (see Table VIII).

9. The most promising crops for the conditions of this demonstration seem to be alfalfa hay, wheat intercropped in row alfalfa producing seed, and potatoes.

10. A survey is now being conducted by the U. S. Geological Survey to determine the amount of water available for irrigation by pumping in the Harney Valley.

Progress Report of the Irrigated Eighty-Acre Demonstration Farm Unit of the Harney Branch Experiment Station 1927-1930

By

OBIL SHATTUCK, Superintendent

and

ROY E. HUTCHISON, Assistant

INTRODUCTION

Irrigation of experimental plots by pumping from wells has been carried on at the Harney Branch Experiment Station since 1919. The results have been uniformly favorable and have created much interest among farmers, business men, and other residents of the Harney Valley and of the state.

The question was raised, however, by farmers and other visitors at the Experiment Station, as to whether the results obtained on the small plots used in the experimental work could also be obtained under actual farm conditions. The general opinion among the farmers was that the experimental crops should be grown in fields, rather than plots, so that the cost of production, amount of irrigation, and yields would be more comparable to general farming practices.

Purpose of demonstration. Owing to the remote prospects of gravity irrigation and the excellent prospects of obtaining underground water from wells within economic depth in sufficient quantities for irrigation, and owing to the further fact that in normal years a small additional amount of water applied to the growing crops at the proper time means the difference between failure and profitable returns, it was the general consensus of opinion among the farmers that the time had arrived for obtaining definite data on the following points:

1. Cost of drilling and casing a well to supply water for an eighty-acre farm unit.
2. Cost of suitable engine and pump, installation, and operation.
3. Cost of distribution system and preparing and leveling eighty-acre tract for irrigation.
4. Cost of producing standard crops under irrigation by pumping.

Acknowledgment: The authors thank H. E. Selby, Associate in Farm Management, Oregon Agricultural Experiment Station, for helpful assistance in summarizing the data.

History. With these objects in view, Mr. S. N. Bolton, a farmer residing one mile south of the station, in 1926 took up the matter of obtaining additional funds from the State Legislature to drill a large well, obtain the proper equipment, seed, etc., to start a standard eighty-acre irrigated farm unit.

After conferring with several of the leading farmers and obtaining their hearty cooperation, Mr. Bolton brought the matter before the public and the representatives of the Board of Regents of Oregon State Agricultural College. The plans met with the approval of the public generally and arrangements were made to meet with a committee of the Board of Regents, including one member of the State Land Board, at a later date to formulate definite plans. The committee representing the Board of Regents and the State Land Board arrived in Burns on October 24, 1926, and met the interested farmers and members of the Burns and Harney County Commercial Club. Several places were visited with a view to securing a suitable location for the eighty-acre Demonstration Farm Unit. The final decision was to locate the new Demonstration Farm Unit on the north eighty of the Harney Branch Experiment Station so that it might be under the direct supervision of the Board of Regents and the Director of Experiment Stations.

A memorial was prepared by the interested farmers, assisted by the members of the Burns and Harney County Commercial Club and a copy mailed to each member of the Board of Regents, State Land Board, and interested members of the State Legislature.

Through the united efforts of all persons interested, a State appropriation of $8,000.00 was granted by the 1927 Legislature for the purpose outlined.

Soil type. The only objection to the location of the demonstration farm unit on the north eighty of the experiment station was the poor soil. Eighty percent of this eighty classifies as poor and the remainder as average. The soil ranges from a sandy silt loam to black adobe, badly spotted with both black and white alkali.

THE WELL

The well is located a little to the northeast of the center of the field. This central location makes it possible to apply the water to all parts of the fields with the least amount of ditches and loss of time.

The well is an 18-inch hole, drilled to a depth of 85 feet and cased to a depth of 60 feet with 18-inch 12-gauge galvanized steel casing made up in sections 4 feet in length with 3-inch collars of the same material with which to rivet them together. The lower section, 4 feet in length, carries a "starting shoe," or band of steel ⅜ inch thick and 5 inches wide, with the lower edge beveled out on the inside. The four sections immediately above the section carrying the starting shoe are perforated with numerous small holes to let the water enter the casing.

Log of the well. The well was drilled with an "auger type" bucket machine, operated by one horse. The operator of the drilling outfit assisted by one of the station employees performed all of the work. The well was drilled in 13½ eight-hour days, the exact time being 213 man-hours.

The log of the well follows:

0 – 1½ feet Sandy silt loam.
1½– 5 feet Black angular adobe.
5 – 9½ feet Yellow clay.
9½–10½ feet Fine blue sand.
10½–12 feet Fine gravel.
12 –14 feet Fine gravel changing to coarse sand and carrying the first flow of water.
14 –20½ feet Blue clay and fine sand.
20½–37½ feet Blue clay.
37½–41 feet Blue clay and gravel hard-pan. The hardness of this stratum caused some trouble with the auger bucket.
41 –53½ feet Wash gravel and coarse sand changing to fine sand at the bottom, mixed with gray clay. This stratum carries the second flow of water and at present is supplying all of the water pumped.
53½–54½ feet Fine red sand.
54½–59½ feet Yellow clay streaked with gray sand.
59½–61½ feet Sand, gravel, and clay mixed.
61½–62½ feet Fine blue sand.
62½–73½ feet Blue clay streaked with blue sand.
73½–84½ feet Fine bluish gray sand changing to coarser formation with some gravel as the depth increased. This formation carries the third flow of water.
84½–85 feet Blue clay. On taking out the last bucketful of material, about six feet of the sand caved into the hole from this sand formation and drilling was discontinued.

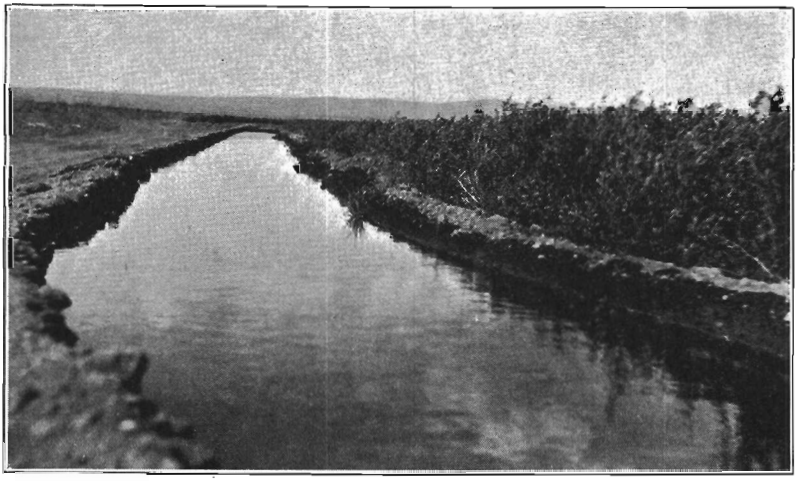

Figure 2. One of the main ditches from the pumping plant. Use of a large head of water minimizes the labor cost of irrigating.

Some difficulty was experienced at a depth of 42½ to 45 feet as the casing did not follow the drilling close enough and this allowed the gravel to cave, after which it was almost impossible to pick up the loose gravel even with the 12-inch bucket. Except for this instance, and the hard-pan layer, no other difficulty was experienced. The casing followed readily and caused no trouble whatever.

COST OF WELL AND PUMPING PLANT

A summary of the cost of the well and pumping plant is given in Table I. The details of the cost are given in Table X (pages 22-23). The cost has been grouped under several headings to enable the reader to note the cost of the various pieces of equipment, installation charges of each, freight, and the various other items that enter into the installation of a pumping plant.

TABLE I. SUMMARY OF COST OF WELL AND PUMPING PLANT

1. Drilling and casing 18-inch well	$ 205.00
2. 60-foot well casing	225.20
3. Installing test pump and testing well	57.87
4. Installing concrete floor and engine base	172.52
5. Kimball turbine pump	865.86
6. Installing pump	31.80
7. 25 H.P. semi-Diesel "Y" oil engine	1,721.65
8. Installing engine	104.16
9. Installing cooling system for engine	159.27
10. Constructing pump house	289.35
11. Weir box, turnouts, and flume	125.73
Total cost, 1927	$3,958.41
12. Compressed-air starter, installed 1930	175.81
Total cost of well and pumping plant	$4,134.22

For details of cost of well and pumping plant see Table X, pages 22-23.

COST OF LEVELING AND CONSTRUCTION OF PERMANENT DITCHES

A contour map of the north eighty was prepared with readings at 50-foot intervals. This showed the tract to be reasonably level, with a general slope from west to east. There were three areas, however, that were high and so located as to require long hauls to dispose of the earth. These areas were located in the northwest corner of Field I, the southwest corner of Field II, and the east side of Field V (Figure 5, page 17). Field II was in the worst condition, having an area of about four acres from which it was necessary to remove approximately twelve inches of the surface soil and haul more than half of it about an eighth of a mile. The construction of the high-line ditches also required long hauls.

As it was the desire of all concerned to crop the entire unit from the start of the 1927 season it was impossible to do any leveling before the sowing of the crops. During the fall of 1927 it was necessary to fall-plow most of the demonstration area. By the time this was completed freezing temperatures put an end to field work and prevented further leveling or ditch work.

During the fall of 1928 fields I, II, and V were given a good working with fresnos and a float, but the long haul necessary prevented the completion of the job before low temperatures again put an end to field work. During the spring and fall of 1929 three four-horse fresnos and the float were used for a period of almost two months on these fields.

Figure 3. Alfalfa hay in Field V, 1929. The pump-house and stacks of first-cutting alfalfa appear in the background.

The average cost of the leveling and permanent ditch construction on the demonstration unit to date has been $16.03 per acre (tables II and XI). The experience on this tract indicates that the cost of fitting reasonably level land for irrigation will be from $15 to $20 per acre.

TABLE II. SUMMARY OF COST OF LEVELING AND CONSTRUCTION OF PERMANENT DITCHES FOR EACH FIELD, 1927-1930

	Cost of leveling and ditches					
	Field I	Field II	Field III	Field IV	Field V	Total
1927	$ 29.92	$ 35.99	$ 0.99	$ 4.86	$ 7.65	$ 79.41
1928	29.58	35.52	.....	.....	52.08	117.18
1929	162.36	132.92	16.11	.....	130.37	441.76
1930	102.91	374.77	11.09	11.92	111.90	612.59
Total	$324.77	$579.20	$ 28.19	$ 16.78	$302.00	$1,250.94
Crop area (acres)	19.0	15.3	5.5	5.5	24.0	69.3
Cost per acre producing crop	$ 17.10	$ 37.83	$ 5.13	$ 3.05	$ 12.58	$ 18.07

For details of leveling and ditch cost see Table XI, page 24.

There is still considerable leveling work to do before these three fields will be in ideal shape for irrigation. Where it is necessary to move eight to twelve inches of soil from an area of several acres a great deal of time is required. As the season is very short from harvest until the regular freeze-up, time is the limiting factor.

Leveling or proper fitting of the land is of major importance as the crop returns are almost in direct proportion to the area of land properly fitted for irrigation.

The cost of fencing will vary greatly with the size of fields and the number of sides upon which a fence is necessary. No additional expense for fencing has been required for the Demonstration Farm Unit as the original fence built in 1911 on three sides has been satisfactory. As adequate data on average costs of fencing are not available no attempt has been made to include this comparatively minor item in the cost summaries in this report. It is thought that on most farms the investment cost will vary from $2.50 to $5.00 per acre and the annual charge for interest and depreciation from 25¢ to 50¢ per acre. Usually part, if not all, of this cost is properly chargeable to livestock enterprises rather than to the production of crops.

TOTAL CAPITAL INVESTMENT IN THE DEMONSTRATION UNIT

A summary of the cost of the land, leveling, and permanent ditches is given in Table III. The land is valued at $10.00 per acre, which was the original cost of the land in 1911 and is still an approximate value of similar unimproved sage-brush land. The cost of clearing the sage-brush has been charged at $5.00 per acre. Adding the cost of the leveling and ditch work for each year gives an investment value for land and leveling of $31.03 per acre in 1930.

TABLE III. SUMMARY OF COST OF LAND, CLEARING, LEVELING, AND PERMANENT DITCHES, 1927-1930

	Total value	Value per acre
Value of unimproved land, 78 A. @ $10.00	$ 780.00	$ 10.00
Clearing sage-brush, 78 A. @ $5.00	390.00	5.00
Construction of permanent ditches, 1927	79.41	1.02
Total value, 1927	$1,249.41	$ 16.02
Leveling and permanent ditches, 1927-1928	117.18	1.50
Total value, 1928	$1,366.59	$ 17.52
Leveling and permanent ditches, 1928-1929	441.76	5.66
Total value, 1929	$1,808.35	$ 23.18
Leveling and permanent ditches, 1929-1930	612.59	7.85
Total value, 1930	$2,420.94	$ 31.03

For details of leveling and ditch cost see Table XI, page 24.

Summarizing the investment value of the land, well, and pumping plant gives a total investment of $77.48 per acre in 1930 (Table IV).

TABLE IV. SUMMARY OF TOTAL INVESTMENT IN LAND, WELL, AND PUMPING PLANT, 1927-1930

Year	Value of land, leveling, and permanent ditches	Value of pumping plant	Total capital investment	Investment per acre
1927	$1,249.41	$3,958.41	$5,207.82	$66.77
1928	1,366.59	3,885.34*	5,251.93	67.33
1929	1,808.35	3,666.12*	5,474.47	70.19
1930	2,420.94	3,622.71*	6,043.65	77.48

*Annual depreciation has been deducted from the value for the previous year (see Table XII).

COST OF PUMPING

The cost of pumping, including depreciation of the plant and 6 percent interest on the investment, has averaged for the four years 92¢ per hour of pumping and $6.78 per acre-foot of water (tables V and XII).

TABLE V. SUMMARY OF PUMPING COST, 1927-1930*

Items	1927	1928	1929	1930	Total 4 years
Fuel oil	$ 39.34	$128.59	$126.81	$128.16	$ 422.90
Lubricating oil	10.55	23.69	31.62	32.13	97.99
Repairs	.....	31.07	.....	218.59	249.66
Interest (6%)	79.17†	233.12	219.97	217.36	749.62
Depreciation	73.07†	219.22	219.22	230.94	742.45
Total	$202.13	$635.69	$597.62	$827.18	$2,262.62
Hours pumping	238.3	619.7	829.2	768.8	2,456.0
Cost per hour	$ .848	$ 1.026	$ .721	$ 1.076	$ .922
Acre-feet of water	36.5	90.4	117.5	90.5	334.9
Cost per acre-foot	$ 5.54	$ 7.03	$ 5.09	$ 9.14	$ 6.78

*For detailed pumping costs see Table XII, page 25. The small amount of labor required for operating the pumping plant was part of the irrigating work and is included in the labor for irrigating each crop.

†Interest and depreciation for 1927 computed on basis of ½ year.

During the operation of the pumping plant from 1927 until 1930 the well was open to a depth of 73 feet. The economic capacity of the well was 1.7 second-feet, or 765 gallons per minute, although it has furnished as high as 2.58 second-feet for short periods.

Cave-in decreases efficiency in 1930. On July 10, 1930, the well caved at the 65-foot level just below the casing in a stratum of sand, gravel and clay, filling the well to the 56-foot level. This necessitated the removal of 4 six-foot sections of pump column and 13 feet of suction pipe. It also cut off 0.7 second-foot of water, leaving a flow of but 1 second-foot. This caused the plant to be operated at a great disadvantage during the remainder of the season as it was necessary to operate with a six-foot suction and with only 6 inches of the intake pipe submerged.

Since the close of the 1930 irrigation season the cave-in has been successfully repaired and cased. It is not anticipated that further trouble will be experienced from this source.

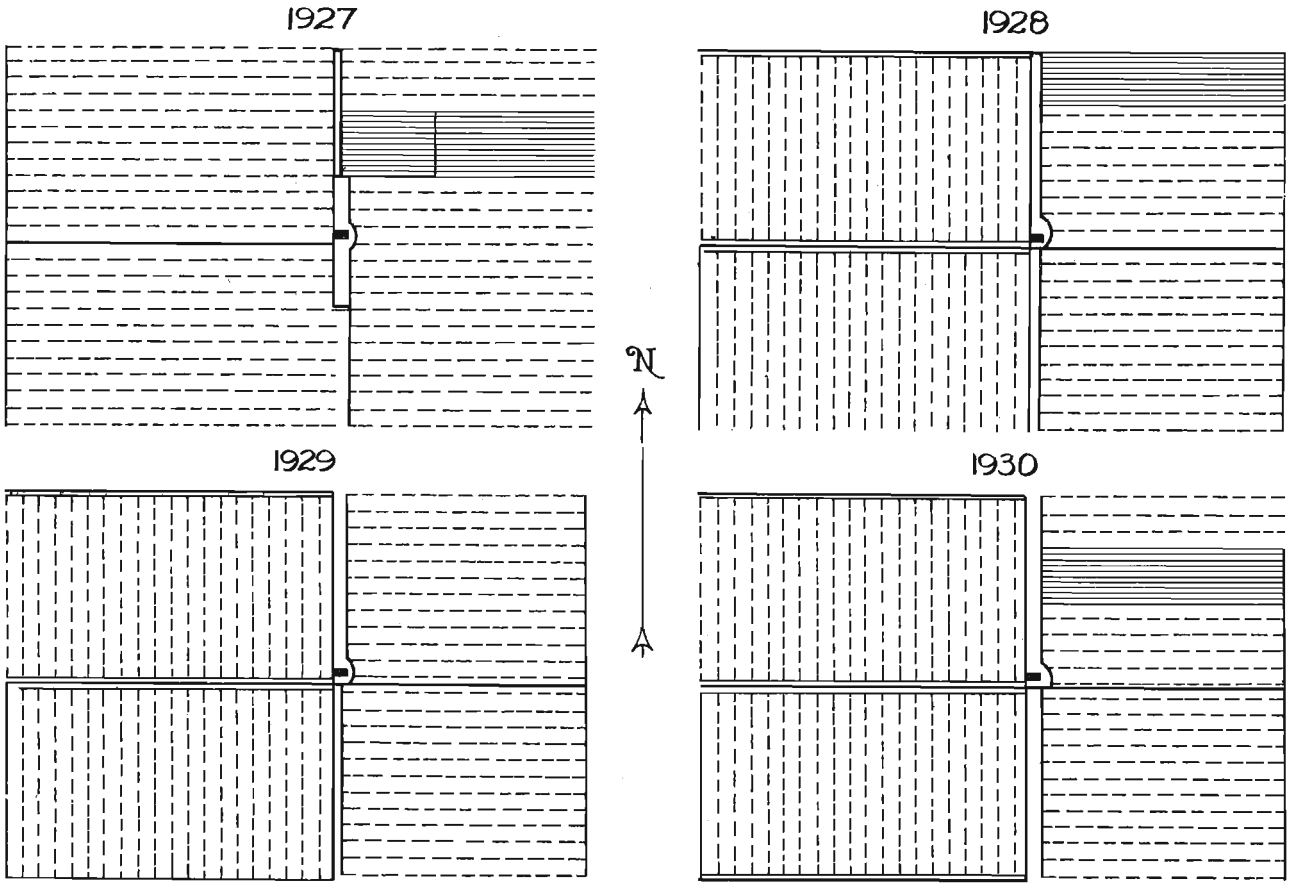

Figure 4. Diagram of distribution system for each year. Heavy solid lines indicate ditches; light lines close together, furrows in potatoes; broken lines, direction of borders; black rectangle, pump-house.

METHOD AND AMOUNT OF IRRIGATION

As the major portion of the area comprising the demonstration farm classifies as a heavy soil type, deficient in organic matter and badly spotted with black and white alkali, it was necessary to select some system of distribution by which the water could be applied to the surface of the land.

The border system was selected as the most satisfactory method and the entire area was fitted with borders running west to east, 25 feet apart. The borders were made by thoroughly disking the land and then using an inverted "V" diker, one round trip making a fairly satisfactory border. This method of making borders, however, sometimes causes a depression along each side of the border which may be avoided by using a scraper and dragging earth across the full width of the strips.

The water is carried to the ends of the borders in main ditches and released into each border in turn through a sub-ditch, which prevents any washing out of the main ditches.

In the spring of 1928 the direction of the borders on fields I and II was changed from east and west to north and south, and the borders were made 50 instead of 25 feet apart.

The value of the "border" method in the irrigation of heavy soil types has been well demonstrated on this area. By dividing the head of water and applying one-half of it to each end of a border at the same time the land can be covered with practically no loss by percolation, and the water is delivered immediately to the root zone of the growing crop, insuring vigorous thrifty growth.

The furrow method of distribution with lath tubes leading the supply from the head ditch to the furrows has proved to be the most satisfactory method to use with row crops such as potatoes.

Rainfall below normal. There has been a steady decrease in the annual precipitation at this station during the four years that this project has been in operation. The precipitation during the months of May and June in 1927 was very beneficial to crops generally. The growing seasons in 1928 and 1930, however, were unusually dry and it was necessary to "irrigate up" more than 60 percent of the crops during both seasons. This is a serious handicap with a heavy type of soil because of the excessive evaporation and retarding of crop growth by the puddling or running together of the soil, followed by baking and deep cracking.

The total precipitation for the year 1928 was 0.26 inch below the sixteen-year average, that of 1929 2.75 inches below, and that of 1930 3.35 inches below, establishing a new low record.

TABLE VI. PRECIPITATION AT HARNEY BRANCH EXPERIMENT STATION, 1927-1930, AND 16-YEAR AVERAGE

Year	Annual precipitation (Sept. 1-Aug. 31)	Pecipitation during growing season (Apr. 1-July 31)
	inches	*inches*
1927	10.96	3.66
1928	7.96	1.07
1929	5.47	2.62
1930	4.87	.97
16-year average (1914-1929)	8.22	2.53

Average application of water. The average acre-foot application of water per acre of crop is shown in Table VII for each field for each year. The average application per acre of crop for the four years was 1.19 acre-feet. This includes 7.2 acre-feet of water that was supplied in 1927 from a smaller well used for irrigating experimental plots, and 10.2 acre-feet from the same source in 1930.

TABLE VII. ACRE-FEET OF WATER APPLIED PER ACRE OF CROP FOR EACH FIELD, 1927-1930

Field	1927	1928	1929	1930
	acre-feet	*acre-feet*	*acre-feet*	*acre-feet*
Field I	0.27	1.11	1.69	1.24
Field II	.12	1.59	1.70	1.70
Field III	1.00	1.59	1.67	1.11
Field IV	1.79	1.38	1.71	2.00
Field V	.91	1.19	1.70	1.44
Average	0.64	1.30	1.70	1.46

THE FARM UNITS

Owing to the fact that the station is located on a "correction section" the total acreage of this demonstration farm unit is only 78 acres. The farm is divided into four main units, the divisions running from west to east, and south to north. The northeast unit is subdivided into three sections to facilitate a three-year crop rotation, but to date the south block has been combined with the southeast unit for cropping. This makes five fields, as indicated in Figure 5.

The difference between the acreage in crop and the total of 78 acres is land that is occupied by the pumping plant, ditches, roadways, and high points of ground that cannot be irrigated. After the first year, 0.6 acre was added to fields III and IV by bringing additional land under irrigation and the subdivision between the fields was shifted to make them equal in size.

COST OF PRODUCTION AND RETURNS

The crop that was grown on each field in each year is shown in Table VIII, together with the costs of production and returns. Eleven acres in Field II was in row alfalfa when the demonstration unit was established, and although this was plowed and disked the alfalfa has persisted and produced seed in the crops of grain that have been sown on this field. Field V also contained twelve acres of row alfalfa that interfered with obtaining a good stand of the new seeding of alfalfa, and this field was not properly leveled and fitted for irrigation before seeding to a permanent crop, which has increased the costs and reduced the returns. The data on costs and returns show that the poorest returns are obtained on those fields that are irregular and have not been properly fitted for irrigation.

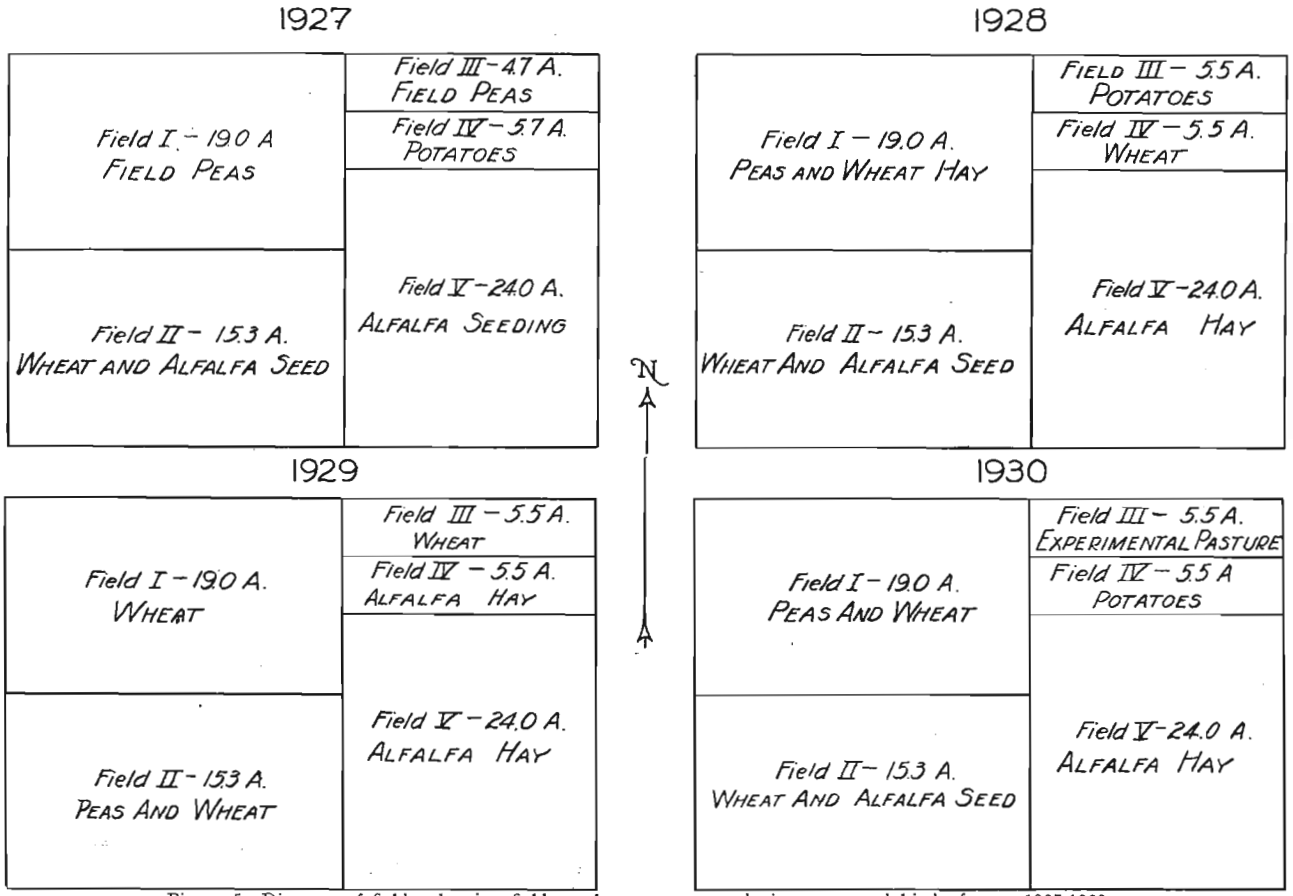

Figure 5. Diagram of fields, showing field number, acreage producing crop, and kind of crop, 1927-1930.

TABLE VIII. SUMMARY OF COSTS AND RETURNS FOR EACH FIELD, 1927-1930

Field No.	Kind of crop	Crop area	Total cost	Total returns	Loss*		Profit*		Total return on investment†
					Total	Per acre	Total	Per acre	
		acres							%
I	Field peas	19.0	$ 461.05	$ 324.31	$136.74	$ 6.67			
II	Wheat and alfalfa seed	15.3	353.27	1,091.08			$ 737.81	$ 48.22	
III	Field peas	4.7	171.80	203.00			31.20	6.63	
IV	Potatoes	5.7	523.94	561.40			37.46	6.57	
V	Alfafa seeding	24.0	906.37	527.60	378.77	15.78			
	Total 1927	68.7	$ 2,416.43	$ 2,707.39			$ 290.96	$ 4.24	11.6
I	Peas and wheat hay	19.0	$ 628.47	$ 252.90	$375.57	$ 19.77			
II	Wheat and alfalfa seed	15.3	719.93	658.71	61.22	4.00			
III	Potatoes	5.5	503.40	708.22			$ 204.82	$ 37.24	
IV	Wheat	5.5	202.20	405.56			203.36	36.97	
V	Alfalfa hay	24.0	601.61	607.88			6.27	.26	
	Total 1928	69.3	$ 2,655.61	$ 2,633.27	$ 22.34	$ .32			5.6
I	Wheat	19.0	$ 569.69	$ 1,180.24			$ 610.55	$ 32.13	
II	Peas and wheat	15.3	633.56	1,269.53			635.97	41.57	
III	Wheat	5.5	173.35	565.02			391.67	71.21	
IV	Peas and oats	5.5	262.16	408.53			146.37	26.61	
V	Alfalfa hay	24.0	756.10	1,267.00			510.90	21.28	
	Total 1929	69.3	$ 2,394.86	$ 4,690.32			$2,295.46	$ 33.12	47.9
I	Peas and wheat	19.0	$ 760.69	$ 550.14	$210.55	$ 11.06			
II	Wheat and alfalfa seed	15.3	775.89	950.42			$ 174.53	$ 11.41	
III	Experimental pasture	5.5	192.73	192.73					
IV	Potatoes	5.5	604.43	922.42			317.99	57.80	
V	Alfalfa hay	24.0	937.31	778.38	158.93	6.62			
	Total 1930	69.3	$ 3,271.05	$ 3,394.09			$ 123.04	$ 1.78	8.0
	Total 4 years	276.6	$10,737.95	$13,425.07			$2,687.12	$ 9.72	18.2

*The profit or loss as shown here is based on net income after allowing 6% interest on the investment.
†Including the 6% interest on the investment charged in cost of production.

In computing the cost of production man labor has been charged at 40¢ per hour and horse labor at 10¢ per horse-hour. The charges for the use of machinery cover depreciation of the machine and 6 percent interest on its average value (Table XXXIII). In the detailed cost tables the charges shown under "machinery cost" cover all machinery other than tractor or truck. The value of the stand of alfalfa has been estimated at $20 per acre, and this has been charged to each year of the hay crop at $2.00 per acre, on the basis of a ten-year life of the stand.

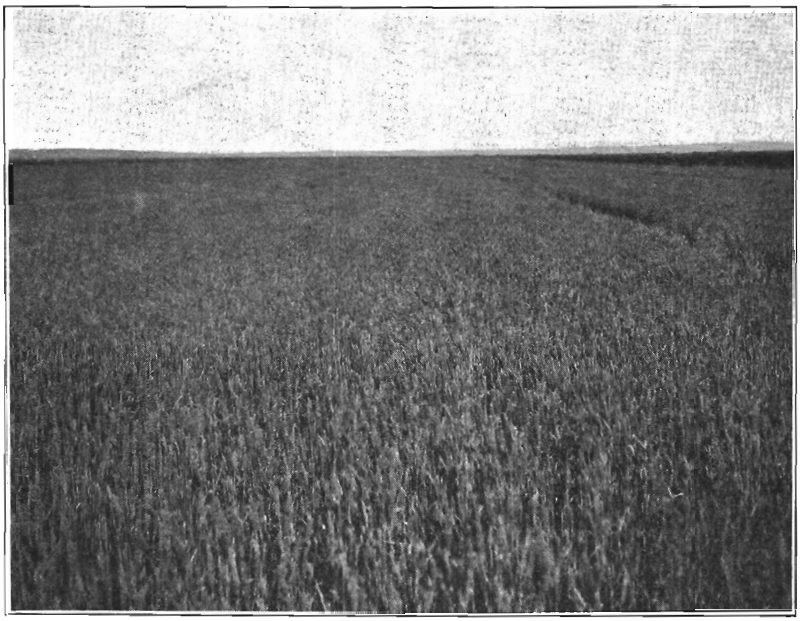

Figure 6. Federation wheat in Field IV, 1928.

The prices at which the crops have been credited under "returns" are the prices prevailing in the Harney Valley at the time. Practically all of them are the prices received in the actual sale of the products.

The crop prices that were received are perhaps somewhat above normal, even for the Harney Valley, and part of the products being sold as seed grown on the Experiment Station may have contributed some advantage in price. It may also be noticed that the charges for the use of the tractor and the International truck are low, as a result of fortunate purchase prices of these machines and of fuel for them. (These buying opportunities, however, were open to any private individual.) On the other hand, it should be remembered that the first year's production was under almost dry-land conditions, the irrigation water not being available until late in the season; that very little leveling had been done and the land was in poor condition for irrigating during the first two years; and that the last three years of the period have been unusually dry and unfavorable to

crop production. It is thought that on the whole the handicaps under which the demonstration has labored more than offset the advantages that may be pointed out.

In 1930, Field III was sown to a grass pasture mixture that was a total failure. As this has not as yet been demonstrated to be a practicable crop for the Harney Valley, and was purely an experiment, the expense for this field for 1930 has been charged to experimental work rather than as a loss to the demonstration unit.

TABLE IX. SUMMARY OF COST OF PRODUCTION PER ACRE AND PER UNIT OF CROP FOR EACH FIELD. 1927-1930

Field number	Kind of crop	Area	Gross cost per acre	Credit for straw, pasture, seed, etc.	Net cost per acre	Yield per acre	Cost per unit of crop
		acres					
I....	Field peas	19.0	$24.26	$ 2.67	$21.59	573 lb.	$3.76 per 100 lb.
II....	Wheat (and alfalfa seed)	15.3	23.09	59.10	0*	10.6 bu.	0*.
III....	Field peas	4.7	36.56	5.79	30.77	1.468 lb.	2.09 per 100 lb.
IV....	Potatoes	5.7	91.92	.....	91.92	6.472 lb.	1.42 per 100 lb.
V....	Alfalfa seeding	24.0	37.76	1.98	35.78	.....	.....
I....	Pea and wheat hay	19.0	33.08	3.71	29.37	1.60 T.	$18.35 per T.
II....	Wheat (and alfalfa seed)	15.3	47.06	17.84	29.22	22.3 bu.	1.31 per bu.
III....	Potatoes	5.5	91.53	2.04	89.49	8.199 lb.	1.09 per 100 lb.
IV....	Wheat	5.5	36.76	6.39	30.37	45.0 bu.	.67 per bu.
V....	Alfalfa hay	24.0	25.07	1.56	23.51	3.40 T.	6.91 per T.
I....	Wheat	19.0	29.98	7.07	22.91	40.8 bu.	$ .56 per bu.
II....	Peas and wheat (and alfalfa seed)	15.3	41.41	31.80	9.61	2.226 lb.	.43 per 100 lb.
III....	Wheat	5.5	31.52	17.75	13.77	51.4 bu.	.37 per bu.
IV....	Peas and oats.....	5.5	47.66	13.49	34.17	2.588 lb.	1.32 per 100 lb.
V....	Alfalfa hay	24.0	31.51	1.04	30.47	3.83 T.	7.96 per T.
I....	Peas and wheat....	19.0	40.03	4.12	35.91	1.242 lb.	$ 2.89 per 100 lb.
II....	Wheat (and alfalfa seed	15.3	50.71	29.66	21.05	27.1 bu.	.78 per bu.
III....	Experimental pasture	5.5	35.04	.....	.....	.....	.....
IV....	Potatoes	5.5	109.90	.....	109.90	7.234 lb.	1.52 per 100 lb.
V....	Alfalfa hay	24.0	39.06	7.01	32.05	2.54 T.	12.58 per T.

*The value of the alfalfa seed more than covered the cost of producing the wheat.

Average costs per acre and per unit of crop are given in Table IX. Detailed cost summaries for each field for each year are given in tables XIII-XXXII.

AMOUNT OF UNDERGROUND WATER AVAILABLE IN THE HARNEY VALLEY

The amount of irrigation from wells that will be possible in the Harney Valley will depend, of course, on the amount of underground water available at economic pumping depth. More definite information on this point will be available when the survey of the underground water resources of the region, now being conducted by the U. S. Geological

Survey, is completed. It is expected, however, that the water will be more than ample for any amount of development of irrigation by pumping likely to take place in the near future.

CONCLUSIONS

1. The cost of drilling and casing wells in the Harney Valley is not prohibitive.

2. The cost of a suitable engine and pump, installation, etc., will vary from $2,500 to $4,000. The pumping cost will vary from $5 to $10 per acre-foot of water.

3. The cost of the distribution system and leveling of land will vary from $10 to $30 per acre.

4. The data upon the cost of producing standard crops under irrigation indicate that these crops can be produced at a satisfactory profit with water pumped from wells within the probable pumping lift in the Harney Valley.

Appendix

TABLES X - XXXIII

TABLE X. DETAILED STATEMENT OF THE COST OF WELL AND PUMPING PLANT

1. Drilling and casing 18-inch well:		
Drilling and casing well 1 to 50 feet @ $2.50 per ft	$ 125.00	
Drilling and casing well from 51 to 60 ft. @ $3.00 per ft	30.00	
Drilling, but not casing well 61 to 85 ft. @ $2.00 per ft	50.00	$ 205.00
2. 60 feet of casing for 18-inch well:		
44 ft. 18-in. 12-gauge galvanized steel casing @ $3.45 per ft	$ 151.80	
12 ft. 18-in. 12-gauge galvanized steel casing, perforated, @ $4.45 per ft.	53.40	
Starting shoe with 4 ft. of 18-in. 12-gauge galvanized steel casing attached	20.00	$ 225.20
3. Installing test pump and testing well:		
125½ man-hours @ 40¢	$ 50.65	
33 horse-hours @ 10¢	3.30	
Use of tractor	3.92	$ 57.87
4. Installing concrete floor and engine base:		
5,400 sacks of cement @ $1.35	$ 72.90	
12 yds. gravel delivered at Station @ $2.25	27.00	
2 yd. sand delivered at Station @ $4.50	9.00	
154 man-hours @ 40¢	61.60	
16 horse-hours @ 10¢	1.60	
Use of tractor	.42	$ 172.52
5. Kimball turbine pump for 18 in. well:		
Kimball Direct Flow Turbine No. 1002-(7 sections) f.o.b. Los Angeles, Cal.	$ 616.37*	
2 Additional 6-foot sections @ $68.00, f.o.b. Los Angeles	163.20	
Freight on pump Los Angeles to Burns	71.95	
Freight on 2 sections Los Angeles to Burns	14.34	$ 865.86
6. Installing Kimball turbine pump:		
69¾ man-hours @ 40¢	$ 27.70	
1 horse-hour @ 10¢	.10	
Cutting and fitting discharge pipe	2.50	
2 8x12-inch blocks, 3 ft. long	1.50	$ 31.80
7. Engine to operate pump:		
25 h.-p. Semi-Diesel 'Y' oil engine f.o.b. Portland	$1,529.50*	
Freight on engine Portland to Burns @ $2.73	192.15	$1,721.65
8. Installing 25 h.-p. 'Y' oil engine:		
Storage of engine at Burns 60 days on account of bad roads	$ 7.00	
Hauling engine (7,000 lb.) Burns to Experiment Station	10.00	
68 man-hours @ 40¢	27.20	
5 horse-hours @ 10¢	.50	
2 wood blocks 8x12x24-inches for fuel tank	1.00	
Adjusting connecting rod, wrist pin, and main bearing bushing by Diesel expert and express and meals	10.97	
48 feet 8-inch belt @ 95¢ and express $1.89, total	47.49	$ 104.16

*Full price; discount allowed educational institutions not deducted.

TABLE X. DETAILED STATEMENT OF THE COST OF WELL AND PUMPING PLANT (Continued)

9. Installing cooling system for engine:		
1 1,340-gallon galvanized iron tank	$ 25.00	
Lumber and nails for tank tower	25.00	
Second-hand rotary pump, size 1½ inches	30.00	
Plumbing to connect cooling and fuel systems	40.70	
72⅝ man-hours @ 40¢	29.07	
Welding rotary pump	9.50	$ 159.27
10. Constructing pumphouse:		
Lumber and shingles	$ 145.65	
Hardware, nails and windows	42.00	
25 gallons Oronite shingle oil @ 26¢	6.50	
128 hours carpenter's labor @ 50¢	64.00	
Board for carpenter, 35¢ per meal	16.80	
31 man-hours @ 40¢	12.40	
20 horse-hours @ 10¢	2.00	$ 289.35
11. Weir box, turnouts, and flume. This includes a double 2-ft. weir and box, 2 'T' turnouts 2x2x16 feet with a 2x2x8 turnout in the center of each, with 2 sections of flume 2x2x16 feet all treated, painted and joints tinned.		
Lumber	$ 40.45	
120 man-hours @ 40¢	48.00	
Carpenter's labor and board	11.35	
2 2-ft. weirs @ $2.50	5.00	
Nails and metal strips	4.25	
20 gallons Oronite rubber roof paint	12.60	
8 gallons Oronite shingle oil @ 26¢	2.08	
Horse labor	2.00	$ 125.73
12. Compressed air starter, installed 1930:		
Cost of starter f.o.b. Burns	$ 162.11	
Fittings	1.70	
12 hours plumber's labor @ $1.00	12.00	$ 175.81
TOTAL COST OF WELL AND PUMPING PLANT		$4,134.22

TABLE XI. HOURS OF LABOR AND COST OF LEVELING AND CONSTRUCTION OF PERMANENT DITCHES FOR EACH FIELD, 1927-1930

	Field number	Man-hours	Horse-hours	Tractor-hours	Machinery charge	Total cost
1927	I	53.2	83.5	.....	$ 0.29	$ 29.92
	II	63.5	102.0	.....	.39	35.99
	III	1.8	2.6	.....	.01	.99
	IV	9.4	10.6	.....	.04	4.86
	V	15.4	14.3	.....	.06	7.65
Total 1927		143.3	213.0	.....	$ 0.79	$ 79.41
1928	I	54.2	67.2	2.3	$ 0.26	$ 29.58
	II	65.0	77.3	3.1	.55	35.52
	III	.....	.....	.....	.....	.....
	IV	.....	.....	.....	.....	.....
	V	101.3	84.8	6.0	.68	52.08
Total 1928		220.5	229.3	11.4	$ 1.49	$117.18
1929	I	251.2	483.0	26.8	$ 2.86	$162.36
	II	179.0	533.0	13.8	2.50	132.92
	III	26.5	53.0	.....	.21	16.11
	IV	.....	.....	.....	.....	.....
	V	171.2	471.0	29.5	2.99	130.37
Total 1929		627.9	1540.0	70.1	$ 8.56	$441.76
1930	I	126.0	451.0	13.2	$ 2.13	$102.91
	II	464.8	1709.0	27.0	7.15	374.77
	III	13.6	54.5	.....	.20	11.09
	IV	14.6	54.5	1.0	.23	11.92
	V	137.0	497.0	12.8	2.28	111.90
Total 1930		756.0	2766.0	54.0	$ 11.99	$612.59
Total 1927-1930		1747.7	4748.3	135.5	$ 22.83	$1,250.94
Average per acre (78 A.)		22.4	60.8	1.7	$ .29	$ 16.03

TABLE XII. COST OF PUMPING, 1927-1930

1927	
322 gallons fuel oil @ 12.2¢	$ 39.34
19 gallons lubricating oil @ 55.5¢	10.55
Depreciation engine and pump, $2,882.74 @ 6.67% (½ year)	64.06
Depreciation pump house, $289.35 @ 5% (½ year)	4.82
Depreciation weir box, etc., $125.73 @ 10% (½ year)	4.19
Interest on 1927 value of plant, $3,958.41 @ 6% (½ year)	79.17
Total pumping cost 1927	$ 202.13
1928	
1054 gallons fuel oil @ 12.2¢	$ 128.59
46 gallons lubricating oil @ 51.5¢	23.69
Repairing engine, 60.8 man-hours @ 40¢	24.32
Fitting engine wrist pin bushing	6.75
Depreciation engine and pump, @ 6.67%	192.18
Depreciation pump house @ 5%	14.47
Depreciation weir box, etc. @ 10%	12.57
Interest on 1928 value of plant, $3,885.34 @ 6%	233.12
Total pumping cost 1928	$ 635.69
1929	
1409 gallons fuel oil @ 9¢	$ 126.81
62 gallons lubricating oil @ 51¢	31.62
Depreciation engine and pump @ 6.67%	192.18
Depreciation pump house @ 5%	14.47
Depreciation weir box, etc., @ 10%	12.57
Interest on 1929 value of plant, $3,666.12 @ 6%	219.97
Total pumping cost 1929	$ 597.62
1930	
1,424 gallons fuel oil @ 9¢	$ 128.16
63 gallons lubricating oil @ 51¢	32.13
Repairing weir box and raising flume:	
144.5 man-hours @ 40¢	57.80
Threading pipe	6.00
2 45° elbows	22.20
Repairing engine:	
60 man-hours @ 40¢	24.00
Mechanic 23 hours @ $1.50	34.50
Piston pin and bushings	24.97
Emergency engine and operator, 16 hours	12.00
32 gallons distillate @ 13.5¢	4.32
Adjusting pump column for cave-in:	
77 man-hours @ 40¢	30.80
Cutting and welding suction pipe	2.00
Depreciation engine and pump @ 6.67%	192.18
Depreciation pump house @ 5%	14.47
Depreciation weir box, etc., @ 10%	12.57
Depreciation starting equipment @ 6.67 %	11.72
Interest on 1930 value of plant, $3,622.71 @ 6%	217.36
Total pumping cost 1930	$ 827.18

Note: The small amount of labor required for operating the pumping plant was done as part of the irrigating work and is included in the labor for irrigating each crop.

TABLE XIII. SUMMARY OF COSTS AND RETURNS FOR FIELD PEAS
Field I—19.0 Acres—1927

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Disking	22.0	.....	21.8	$ 0.85	$ 18.37
Harrowing	8.5	.....	8.5	.42	7.22
Rolling	12.0	24.0	.....	.40	7.60
Bordering	14.0	.....	6.0	.14	8.14
Fertilizing	7.0	14.0	.....	1.05	5.25
Inoculating seed	8.5	.....	.....	.....	3.40
Seeding	13.2	26.5	.....	2.41	10.34
Ditching	4.2	6.6	.....	.03	2.37
Irrigating	75.8	.....	.....	.....	30.32
Harvesting	110.5	61.0	.....	1.59	51.89
Threshing	93.0	59.0	14.5	9.33	58.23
Cleaning	22.5	.....	2.5	.05	10.05
Total labor and machinery	391.2	191.1	53.3	$ 16.27	$213.18
Seed: 2300 lb. @ 5¢					115.00
Culture: 8 bottles @ 50¢					4.00
Land-plaster: 2700 lb. @ 2.26¢					61.02
Pumping: 35.2 hours					29.83
Interest on value land, $18.18 per A. @ 6%					20.72
Taxes @ 91.2¢ per A.					17.30
TOTAL COST					$461.05
Returns:					
Seed peas: 5585 lb. @ 3¢					167.55
Feed peas: 5298 lb. @ 2¢					105.96
Pea straw: 12.7 T. @ $4.00					50.80
TOTAL RETURNS					$324.31

TABLE XIV. SUMMARY OF COSTS AND RETURNS FOR WHEAT AND ALFALFA SEED
Field II—15.3 Acres—1927

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Disking	10.5	.....	10.5	$ 0.41	$ 8.81
Harrowing	9.8	3.5	8.5	.43	8.10
Rolling	12.0	24.0	.....	.40	7.60
Bordering	18.0	.5	8.5	.21	10.86
Fertilizing	4.5	9.0	.....	.68	3.38
Treating seed	6.0	.....	.....	.....	2.40
Seeding	15.5	31.0	.....	1.51	10.81
Ditching	6.4	10.3	.....	.04	3.63
Irrigating	20.8	.....	.....	.....	8.32
Harvesting	68.9	85.0	.....	2.35	38.41
Threshing	87.5	38.5	20.2	13.03	59.96
Cleaning	132.8	.....	.....	.52	53.64
Total labor and machinery	392.70	201.8	47.70	$ 19.58	$215.92
Seed: 2108 @ 3¢					63.24
Copper carbonate 6¾ lb. @ 34¢					1.95
Binder twine 15 lb. @ 20¢					3.00
Land-plaster 1300 lb. @ 2.26¢					29.38
Pumping 10.8 hours					9.16
Interest on value land, $18.18 per A. @ 6%					16.70
Taxes @ 91.2¢ per A.					13.92
TOTAL COST					$353.27
Returns:					
Seed wheat: 4000 lb. @ 2.5¢					$100.00
Feed wheat: 5785 lb. @ 1.5¢					86.78
Wheat straw: 5.8 T. @ $3.00					17.40
Alfalfa seed: 2800 lb. @ 30¢					840.00
Alfalfa straw: 13.4 T. @ $3.50					46.90
TOTAL RETURNS					$1,091.08

TABLE XV. SUMMARY OF COSTS AND RETURNS FOR FIELD PEAS
Field III—4.7 Acres—1927

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Plowing	8.0	24.0	.....	$ 0.22	$ 5.82
Disking	8.7	12.0	4.7	.26	6.82
Harrowing	4.2	7.0	1.8	.10	3.20
Rolling	3.0	6.0	.....	.10	2.70
Bordering	5.5	.....	2.0	.04	2.24
Fertilizing	1.4	3.5	.....	1.56	2.47
Seeding	3.0	6.0	.....	.30	2.10
Ditching	1.4	2.1	.....	.....	.77
Irrigating	52.2	.....	.....	.....	20.88
Harvesting	34.0	21.0	.....	.59	16.29
Threshing	54.0	37.0	9.0	5.80	34.70
Cleaning	12.2	.....	1.3	.04	5.44
Total labor and machinery	187.6	118.6	18.8	$ 9.01	$103.43
Seed: 520 lb. @ 5¢					$ 26.00
Culture: 2 bottles @ 50¢					1.00
Sulfur: 200 lb. @ 3.68¢					7.37
Pumping: 25 hours					21.20
.5 acre feet from small well @ $6.78					3.39
Interest on value land, $18.18 per A. @ 6%					5.13
Taxes @ 91.2¢ per A.					4.28
TOTAL COST					$171.80
Returns:					
Seed peas: 3780 lb. @ 3¢					$113.40
Feed peas: 3120 lb. @ 2¢					62.40
Pea straw: 6.8 T. @ $4.00					27.20
TOTAL RETURNS					$203.00

TABLE XVI. SUMMARY OF COSTS AND RETURNS FOR POTATOES
Field IV—5.7 Acres—1927

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Disking	18.4	41.0	3.4	$ 0.42	$ 13.24
Harrowing	9.0	16.0	3.5	.22	6.82
Rolling	4.2	8.5	.....	.14	2.67
Plowing	14.0	42.0	.....	.38	10.18
Fertilizing	3.2	7.2	.....	.44	2.44
Planting	63.2	20.5	.....	1.76	29.09
Cultivating and furrowing	31.0	41.0	.....	.30	16.80
Ditching	2.3	2.6	.....	.....	1.18
Irrigating	158.5	.....	.....	.....	63.40
Harvesting	264.3	71.0	8.7	4.71	121.01
Grading and marketing	61.1	.....	16.4	.....	31.00
Miscellaneous	11.8	4.5	.....	.03	5.20
Total labor and machinery	641.0	254.3	32.0	$ 8.40	$303.03
Seed potatoes: 5355 lb. @ 2.17¢ per cwt.					$116.37
Sulfur: 700 lb. @ 3.685¢					25.80
Lath for tubes					1.44
Formaldehyde					5.60
Pumping: 65.5 hours					55.55
.7 acre-feet from small well @ $6.78					4.75
Interest on value land, $18.18 per acre @ 6%					6.22
Taxes @ 91.2¢ per acre					5.18
TOTAL COST					$523.94
Returns:					
Extra fancy seed potatoes: 2000 lb. @ 3.5¢					$ 70.00
Commercial potatoes: 19000 lb. @ 1.75¢					332.50
Rough culls: 2077 lb. @ 1¢					20.77
Small seed potatoes: 13813 lb. @ 1¢					138.13
TOTAL RETURNS					$561.40

TABLE XVII. SUMMARY OF COSTS AND RETURNS FOR ALFALFA SEEDING
Field V—24.0 Acres—1927

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Disking	61.7	123.0	20.7	$ 1.61	$ 46.87
Harrowing	27.5	28.5	13.8	.79	20.16
Rolling	45.5	91.0	.....	1.53	28.83
Floating	50.0	127.8	4.2	.33	34.79
Bordering	59.8	96.2	.....	.65	34.19
Ditching	20.5	17.9	.....	.07	10.06
Fertilizing	13.2	28.8	.....	1.78	9.94
Seed	19.2	34.5	.....	1.68	12.81
Irrigation	387.5	.....	.....	.....	155.00
Harvesting	30.0	42.0	.....	.70	16.90
Miscellaneous	23.7	.....	.....	.....	9.48
Total labor and machinery....	738.6	589.7	38.7	$ 9.14	$379.03
2700 lb. sulfur @ 03.685¢					$ 99.50
652 lb. seed @ 38¢					247.76
Culture: 10 bottles @ 50¢					5.00
Pumping cost: 101.8 hours @ 84.8¢					86.39
6 acre-feet water from small well @ $6.78					40.68
Interest on value land, $18.18 per A. @ 6%					26.19
Taxes @ 91.2¢ per A.					21.82
TOTAL COST					$906.37
Returns:					
6.8 T. hay @ $7.00					$ 47.60
24 A. new stand of alfalfa @ $20.00					480.00
TOTAL RETURNS					$527.60

TABLE XVIII. SUMMARY OF COSTS AND RETURNS FOR PEA AND WHEAT HAY
Field I—19.0 Acres—1928

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Plowing	85.0	254.2	.....	$ 1.35	$ 60.77
Disking	42.1	108.4	6.0	1.64	31.72
Harrowing	17.8	52.8	.....	.20	12.60
Floating	53.8	.....	27.2	1.11	33.51
Bordering	12.2	.....	7.8	.30	8.30
Inoculating seed	8.0	.....	.....	.....	3.20
Seeding	21.0	75.5	.....	1.98	17.93
Ditching	20.8	25.7	.9	.10	11.35
Irrigating	271.9	.....	.....	.....	108.76
Harvesting	93.8	78.5	.....	1.43	46.80
Total labor and machinery....	626.4	595.1	41.9	$ 8.11	$334.94
Seed: Peas, 2544 lb. @ 3¢					$ 76.32
Wheat, 1309 lb. @ 2¢					26.18
Culture for peas: 3 bottles @ 50¢					1.50
Treating wheat: 21.8 bu. @ 5¢					1.09
Pumping cost: 144.9 hours					148.64
Interest on value land, $19.72 per A. @ 6%					22.48
Taxes, 19 A. @ 91.2¢					17.32
TOTAL COST					$628.47
Crop returns:					
Hay: 30.4 T. @ $6.00					$182.40
Pasture for sheep: 10 plots					70.50
TOTAL RETURNS					$252.90

TABLE XIX. SUMMARY OF COSTS AND RETURNS FOR WHEAT AND ALFALFA SEED
Field II—15.3 Acres—1928

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Plowing	43.0	21.8	35.8	$ 1.66	$ 35.36
Disking	47.0	105.8	11.8	1.83	35.93
Harrowing	17.0	51.0	.....	.13	12.03
Floating	28.0	.....	14.0	.56	17.36
Bordering	28.1	27.8	10.7	.82	19.12
Seeding	10.5	40.0	.....	.98	9.18
Ditching	4.0	4.8	.1	.04	2.16
Irrigating	397.8	.....	.....	.....	159.12
Harvesting	124.5	160.5	.....	4.10	69.95
Threshing	42.8	.....	13.0	7.41	29.73
Cleaning	111.5	.....	.....	.70	45.40
Marketing	12.0	.....	11.5	.....	14.00
Total labor and machinery	866.2	411.7	96.9	$ 18.23	$449.34
Seed wheat: 2184 lb. @ 2¢					$ 43.68
Treating wheat: 36.4 bu. @ 5¢					1.82
Binding twine: 42 lb. @ 18¢					7.56
Grain sacks: 115 @ 12.5¢					14.38
Pumping cost: 166.8 hours					171.09
Interest on value land: $19.72 per A. @ 6%					18.11
Taxes, 15.3 A. @ 91.2¢					13.95
TOTAL COST					$719.93
Crop returns:					
Milling wheat: 14959 lb. @ 1.75¢					$261.78
Cracked wheat: 5508 lb. @ 2.25¢					123.93
Alfalfa seed: 650 lb. @ 30¢					195.00
Straw: 28143 lb. @ .175¢					49.25
Pasture for sheep					28.75
TOTAL RETURNS					$658.71

TABLE XX. SUMMARY OF COSTS AND RETURNS FOR POTATOES
Field III—5.5 Acres—1928

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Plowing	9.0	.....	9.0	$ 0.35	$ 7.55
Rolling	.8	1.5	.....	.03	.50
Double disking	12.5	19.2	6.0	.57	9.89
Harrowing	4.4	8.6	1.5	.07	3.29
Leveling	20.0	15.0	6.2	.30	12.28
Floating	8.2	.....	6.2	.26	6.02
Cutting and treating seed	104.5	.....	.....	.....	41.80
Planting	9.5	19.0	.....	1.63	7.33
Ditching	13.3	26.4	5.0	.22	10.18
Irrigating	152.9	.....	.....	.....	61.16
Cultivating	35.0	36.8	.....	.51	18.19
Harvesting	197.5	57.0	8.0	1.90	93.00
Sorting and storing	130.8	.....	2.0	.....	53.92
Marketing	4.8	.....	4.0	.....	5.12
Total labor and machinery	703.2	183.5	47.9	$ 5.84	$330.23
Seed potatoes					$ 82.40
Corrosive sublimate: 14 oz. @ 25¢ per oz.					3.50
Sacks: 130 @ 11¢					14.30
Pumping cost: 59.9 hours					61.44
Interest on value land: $19.72 per A. @ 6%					6.51
Taxes, 5.5 A. @ 91.2¢					5.02
TOTAL COST					$503.40
Crop returns:					
Commercial potatoes: 12875 lb. @ 1.25¢					$160.94
Seed potatoes: 17846 lb. @ 2½¢					446.19
Rough and injured potatoes: 3593 lb. @ 1¢					35.93
Feed culls: 10781 lb. potatoes @ .5¢					53.91
Pasture for sheep (volunteer peas)					11.25
TOTAL RETURNS					$708.22

TABLE XXI. SUMMARY OF COSTS AND RETURNS FOR WHEAT
Field IV—5.5 Acres—1928

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Disking	15.8	32.2	5.0	$ 0.64	$ 12.18
Rolling	3.8	7.5	.....	.13	2.40
Harrowing	6.6	19.9	.....	.05	4.68
Floating	7.5	.....	3.8	.16	4.68
Bordering	4.5	.....	1.8	.07	2.59
Seeding	4.8	18.0	.....	.44	4.16
Ditching	13.3	26.4	.5	.17	8.33
Irrigating	82.7	.....	.....	.....	33.08
Harvesting	43.2	52.0	.....	1.33	23.81
Threshing	28.8	.....	4.8	2.47	15.91
Cleaning	19.2	.....	.....	.13	7.81
Total labor and machinery	230.2	156.0	15.9	$ 5.59	$119.63
Seed: wheat 624 lb. @ 2¢					$ 12.48
Treating: 10.4 bu. @ 5¢					.52
Sacks: 10 @ 12.5¢					1.25
Binder twine: 18 lb. @ 18¢					3.24
Pumping cost: 52.2 hours					53.55
Interest on value land, $19.72 per A. @ 6%					6.51
Taxes: 5.5 A. @ 91.2¢					5.02
TOTAL COST					$202.20
Returns:					
Certified seed wheat: 6217 @ 3¢					$186.51
Commercial seed wheat (sold early): 3308 @ 2¢					66.16
Feed wheat: 4551 @ 2.25¢					102.40
Fine cracked wheat: 768 @ 2¢					15.36
Sheep pasture and straw					35.13
TOTAL RETURNS					$405.56

TABLE XXII. SUMMARY OF COSTS AND RETURNS FOR ALFALFA HAY
Field V—24.0 Acres—1928

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Ditching	17.9	14.9	1.0	$ 0.12	$ 9.17
Irrigating	320.4	.....	.....	.....	128.16
Harvesting	276.5	442.5	.....	10.18	165.03
Total labor and machinery	614.8	457.4	1.0	$ 10.30	$302.36
Depreciation of stand, $20 per A. @ 10%					$ 48.00
Pumping cost: 195.9 hours					200.97
Interest on value land, $19.72 per A. @ 6%					28.39
Taxes, 24 A. @ 91.2¢					21.89
TOTAL COST					$601.61
Crop returns:					
Alfalfa hay: 81.5 T. @ $7.00					$570.50
Pasture for sheep					37.38
TOTAL RETURNS					$607.88

TABLE XXIII. SUMMARY OF COSTS AND RETURNS FOR WHEAT
Field I—19.0 Acres—1929

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Disking	25.8	79.8	.....	$ 0.66	$ 18.96
Harrowing	13.5	12.0	7.5	.42	10.02
Floating	22.5	.....	11.2	.46	13.94
Bordering	13.0	16.0	2.5	.20	8.00
Seeding	10.8	39.0	.....	.95	9.17
Ditching	16.2	21.0	.....	.07	8.65
Irrigating	242.0	.....	.....	.....	96.80
Harvesting	50.8	63.0	.....	2.83	29.45
Threshing	125.2	76.5	17.0	10.34	74.87
Total labor and machinery	519.80	307.30	38.2	$ 15.93	$269.86
Seed: 2545 lb. wheat @ 3¢					$ 76.35
Treating seed					2.12
62 lb. twine					10.84
Pumping: 226.8 hours					163.47
Interest on value land: $26.10 per A. @ 6%					29.73
Taxes: 19 A. @ 91.2¢					17.32
TOTAL COST					$569.69
Crop returns:					
Wheat: 46485 lb. @ 2.25¢					$1,045.91
Straw: 51,730 lb. @ .25¢					129.33
Pasture					5.00
TOTAL RETURNS					$1,180.24

TABLE XXIV. SUMMARY OF COSTS AND RETURNS FOR PEAS AND WHEAT
Field II—15.3 Acres—1929

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Disking	22.8	81.2	.....	$ 0.66	$ 17.90
Bordering	8.0	12.5	2.0	.16	5.41
Floating	18.0	.....	9.0	.36	11.16
Harrowing	4.5	.....	4.5	.22	3.82
Seeding	14.8	55.2	.....	1.34	12.78
Ditching	12.8	21.5	.....	.07	7.34
Irrigating	270.5	.....	.....	.....	108.20
Harvesting	145.2	42.0	.....	1.09	63.37
Threshing	174.0	121.0	26.0	16.64	108.74
Cleaning	53.0	.....	.....	.65	21.85
Total labor and machinery	723.60	333.40	41.50	$ 21.19	$360.57
Seed: 1813 lb. wheat					$ 50.13
1704 lb. peas @ 3¢					51.12
Treating wheat: 302 bu. at 5¢					1.51
Pumping: 183.6 hours					132.32
Interest on value land: $26.10 per A. @ 6%					23.96
Taxes: 15.3 A. @ 91.2¢					13.95
TOTAL COST					$633.56
Crop returns:					
Feed grain: 31844 lb. @ 2.25¢					$716.49
Seed peas: 2216 lb. @ 3¢					66.48
Alfalfa seed: 1040 lb. @ 30¢					312.00
Alfalfa seed: 115 lb. @ 20¢					23.00
Straw: 56625 lb. @ .25¢					141.56
Pasture					10.00
TOTAL RETURNS					$1,269.53

TABLE XXV. SUMMARY OF COSTS AND RETURNS FOR WHEAT
Field III—5.5 Acres—1929

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
D. disking	5.0	20.0	.....	$ 0.07	$ 4.07
Harrowing	2.2	.....	2.2	.12	1.88
Floating	7.0	.....	3.5	.14	4.34
Bordering	5.5	4.0	2.2	.13	3.61
Seeding	3.5	13.0	.....	.34	3.04
Ditching	2.1	.....	.....	.01	.85
Irrigating	68.2	2.5	.....	.....	27.53
Harvesting	14.5	18.0	.....	.81	8.41
Threshing	38.5	28.5	5.0	3.38	23.63
Cleaning	22.8	.....	.....	.26	9.38
Total labor and machinery....	169.3	86.0	12.90	$ 5.26	$ 86.74
Seed: 725 lb. wheat					$ 21.75
Treating seed					.60
22.5 lb. twine					3.92
Pumping: 64.8 hours					46.70
Interest on value land: $26.10 per A. @ 6%					8.62
Taxes: 5.5 A. @ 91.2¢					5.02
TOTAL COST					$173.35
Crop returns:					
Seed wheat: 11394 lb. @ 3¢					$341.82
Feed wheat: 5580 lb. @ .25¢					125.55
Straw: 19500 lb. @ .25¢					48.75
Alfalfa seed: 153 lb. @ 30¢					45.90
Pasture					3.00
TOTAL RETURNS					$565.02

TABLE XXVI. SUMMARY OF COSTS AND RETURNS FOR PEAS AND OATS
Field IV—5.5 Acres—1929

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Plowing	11.5	.....	11.5	$ 0.31	$ 9.51
D. disking	6.8	20.0	1.8	.13	5.57
Border	5.5	4.0	1.8	.14	3.46
Spring-toothing	5.5	.....	3.5	.14	3.74
Floating	12.0	.....	6.0	.25	7.45
Seeding	6.5	12.0	.....	.59	4.39
Ditching	10.9	33.5	.....	.34	8.05
Irrigating	89.2	.....	.....	.....	35.68
Harvesting	67.8	24.0	.....	.62	30.14
Threshing	72.8	49.5	10.8	6.88	45.27
Cleaning	39.5	.....	.....	.38	16.18
Total labor and machinery....	328.0	143.0	35.4	$ 9.78	$169.44
Seed: 616 lb. peas @ 3¢					$ 18.48
652 lb. oats @ 2¢					13.04
Pumping: 66.0 hours					47.56
Interest on value land, $26.10 per A. @ 6%					8.62
Taxes: 5.5 A. @ 91.2¢					5.02
TOTAL COST					$262.16
Crop returns:					
Feed grain: 12374 lb. @ 2.25¢					$278.42
Peas: 1863 lb. @ 3¢					55.89
Straw: 22289 lb. @ .25¢					55.72
Alfalfa seed: 45 lb. @ 30¢					13.50
Pasture					5.00
TOTAL RETURNS					$408.53

TABLE XXVII. SUMMARY OF COSTS AND RETURNS FOR ALFALFA HAY
Field V—24.0 Acres—1929

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Spring toothing	16.0	.....	16.0	$ 0.79	$ 13.59
Bordering	14.5	13.5	3.5	.35	8.90
Floating	15.5	.....	7.8	.31	9.63
*Seeding	9.8	35.0	.....	.86	8.28
Ditching	18.5	16.5	.....	.18	9.23
Irrigating	312.5	.....	.....	.....	125.00
Mowing	60.5	121.0	.....	3.14	39.44
Raking	20.5	41.0	.....	.69	12.99
Shocking	97.7	.....	.....	.....	39.08
Stacking	227.0	241.8	.....	6.83	121.81
Total labor and machinery	792.5	468.8	27.3	$ 13.15	$387.95
*Seed: 910 lb. wheat @ 2¢					$ 18.20
1164 lb. peas @ 3¢					34.92
Pumping cost @ 288.0 hours					207.57
Interest on value land: $26.10 per A. @ 6%					37.57
Taxes: 24 A. @ 91.2¢					21.89
Depreciation of stand: 24 acres @ $2.00					48.00
TOTAL COST					$756.10
Crop returns:					
92 T. hay @ $13.50					$1,242.00
Pasture					25.00
TOTAL RETURNS					$1,267.00

*Wheat and peas sown to thicken stand.

TABLE XXVIII. SUMMARY OF COSTS AND RETURNS FOR WHEAT AND PEAS
Field I—19.0 Acres—1930

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Fertilizing	57.3	145.0	.....	$ 3.85	$ 41.27
Disking	35.7	101.0	10.5	.74	29.32
Harrowing	28.0	62.0	12.5	.74	23.14
Bordering	1.8	7.0	.....	.04	1.46
Floating	11.0	.....	11.0	.44	9.24
Seeding	22.0	80.0	1.0	1.95	19.25
Treating	7.5	.....	.....	.....	3.00
Ditching	6.5	8.0	.....	.01	3.41
Irrigating	226.8	.....	.....	.....	90.72
Harvesting	147.5	99.5	.....	2.57	71.52
Threshing	104.7	87.5	21.8	11.28	70.63
Total labor and machinery	648.8	590.0	56.8	$ 21.62	$362.96
56 loads manure @ 50¢					$ 28.00
Seed: peas 2760 lb. @ 2.25¢					62.10
wheat 2410 lb. @ 3¢					72.30
Culture: 6 bottles @ 50¢					3.00
Treating wheat: 40.2 bu. wheat @ 5¢					2.10
Grain sacks: 180 @ 5¢ and 2½ lb. twine @ 18¢					9.45
Pumping: 168.8 hours					163.63
Interest on value land: $34.95 per A. @ 6%					39.83
Taxes: 19 A. @ 91.2¢					17.32
TOTAL COST					$760.69
Returns:					
Mixed feed: 23592 lb. @ 2¢					$471.84
Mixed straw: 31318 lb. @ .25¢					78.30
TOTAL RETURNS					$550.14

TABLE XXIX. SUMMARY OF COSTS AND RETURNS FOR WHEAT AND ALFALFA SEED

Field II—15.3 Acres—1930

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Fertilizing	137.0	182.0	.....	$ 7.74	$ 80.74
Disking	20.5	32.0	12.5	.60	17.00
Harrowing	22.5	38.0	13.0	.72	18.72
Bordering	1.8	7.0	.....	.04	1.46
Seeding	10.7	41.0	.2	1.03	9.53
Building ditches	8.5	10.0	.....	.02	4.42
Irrigating	304.5	.....	.....	.....	121.80
Harvesting	61.5	62.0	.....	2.70	33.50
Threshing	75.8	68.5	19.5	12.37	57.34
Cleaning	33.5	.....	.....	.30	13.70
Total labor and machinery	676.3	440.5	45.2	$ 25.52	$358.21
151 loads manure @ 50¢					$ 75.50
Seed wheat: 2517 lb. @ 3¢					75.51
Treating seed wheat: 42 bu. @ 5¢					2.10
Binding twine: 52 lb. @ 18¢					9.36
Grain sacks: 190 @ 5¢					9.50
Pumping: 206.0 hours					199.69
Interest on value land, $34.95 per A. @ 6%					32.07
Taxes: 15.3 A. @ 91.2¢					13.95
TOTAL COST					$775.89
Returns:					
Alfalfa seed: 1200 lb. @ 30¢					$360.00
Feed wheat: 24830 lb. @ 2¢					496.60
Straw: 37530 lb. @ .25¢					93.82
TOTAL RETURNS					$950.42

TABLE XXX. SUMMARY OF COSTS AND RETURNS FOR EXPERIMENTAL PASTURE

Field III—5.5 Acres—1930

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Plowing	2.0	.....	2.0	$ 0.10	$ 1.70
D. disking	12.0	30.0	4.5	.27	9.87
Floating	21.0	10.0	13.5	.62	15.42
Blading	2.8	.....	3.5	.07	2.59
Harrowing	9.5	21.0	2.5	.18	7.08
Seeding	9.0	.....	.....	.....	3.60
Ditching	3.5	2.5	.....	.03	1.68
Irrigating	65.0	.....	.....	.....	26.00
Total labor and machinery	124.8	63.5	26.0	$ 1.27	$ 67.94
Seed					$ 36.97
Culture: 1 bottle					.50
Pumping: 66 hours					70.77
Interest on the value of land: $34.95 per A. @ 6%					11.53
Taxes: 5.5 acres @ 91.2¢					5.02
TOTAL COST					$192.73
Charged to experimental work					$192.73

TABLE XXXI. SUMMARY OF COSTS AND RETURNS FOR POTATOES
Field IV—5.5 Acres—1930

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Plowing	31.3	61.5	10.8	$ 1.12	$ 24.11
Disking	10.7	12.0	7.7	.34	8.90
Harrowing	14.3	35.5	5.3	.33	11.72
Floating	14.5	.....	14.5	.59	12.19
Treating and cutting seed	98.0	.....	.....	.....	39.20
Planting	8.2	16.5	.....	1.40	6.33
Ditching	3.0	2.0	.....	.01	1.41
Furrowing	22.5	22.5	.....	.35	11.60
Cultivating	17.8	17.8	.....	.47	9.37
Irrigating	133.2	.....	.....	.....	53.28
Harvesting	164.5	40.0	5.5	.....	73.88
Sorting and storing	136.7	.....	.....	.....	54.68
Total labor and machinery	654.7	207.8	43.8	4.61	$306.67
Seed: 5800 lb. @ 2.5¢					$145.00
Corrosive sublimate: 22 oz. @ 25¢					5.50
Sulfur: 170 lb. @ 3.9¢					6.63
Pumping: 128.0 hours					124.08
Interest on value land: $34.95 per A. @ 6%					11.53
Taxes: 5.5 A. @ 91.2¢					5.02
TOTAL COST					$604.43
Returns:					
Commercial potatoes: 19813 lb. @ 2.25¢					$445.79
Seed potatoes: 14130 lb. @ 3¢					423.90
Cull potatoes: 4658 lb. @ .75¢					34.94
Rough and cut potatoes: 1186 lb. @ 1.5¢					17.79
TOTAL RETURNS					$922.42

TABLE XXXII. SUMMARY OF COSTS AND RETURNS FOR ALFALFA HAY
Field V—24.0 Acres—1930

	Man-hours	Horse-hours	Tractor- or truck-hours	Machinery cost	Total cost
Fertilizing	17.5	50.0	.....	$ 1.31	$ 13.31
Disking	8.5	34.0	.....	.12	6.92
Floating	14.8	.....	14.8	.60	12.44
Spring-toothing	16.2	.....	16.2	.81	13.77
Bordering	5.5	11.0	.....	.10	3.40
*Treating seed	2.5	.....	.....	.....	1.00
*Seeding barley	7.5	15.0	.....	.73	5.23
*Seeding clover	6.8	13.5	.....	.53	4.60
Ditching	8.5	5.0	.....	.01	3.91
Irrigating	323.5	.....	.....	.....	129.40
Harvesting	308.7	346.5	.....	6.24	164.37
Threshing	33.5	33.5	7.8	5.04	24.91
Cleaning	6.0	.....	.....	.05	2.45
Total labor and machinery	759.5	508.5	38.8	$ 15.54	$385.71
20 loads manure @ 50¢					$ 10.00
*Seed barley: 1290 lb. @ 3¢					38.70
*Yellow blossom sweet clover: 370 lb. @ 11¢					40.70
*Culture: 2 bottles @ 50¢					1.00
*Formaldehyde: ¼ pt. @ 60¢					.15
Pumping: 277.5 hours					268.99
10.6 acre-feet water from small well @ $6.78					71.87
Interest on value land: $34.95 per A. @ 6%					50.30
Taxes: 24 A. @ 91.2¢					21.89
Depreciation of stand: 24 acres @ $2.00					48.00
TOTAL COST					$937.31
Returns:					
Alfalfa hay: 122005 @ .5¢					$610.03
Alfalfa seed: 237 lb. @ 30¢					71.10
Barley: 3714 lb. @ 2¢					74.28
Straw: 9189 lb. @ .25¢					22.97
TOTAL RETURNS					$778.38

*Barley and sweet clover sown to thicken stand.

TABLE XXXIII. BASIS FOR MACHINERY AND EQUIPMENT CHARGES

Machine and size	Make	Initial cost	Year purchased	Hours service in 10 years	Rental per hour*
Binder, 6 ft.	Deering Ideal	$250.00	1924	2,400	$0.135
Cultivator, 2-horse	John Deere	40.00	1913	1,200	.042
Cultivator	Montgomery Ward	7.45	1930	400	.024
Double disk, 6 ft. 18 in.	John Deere	136.97	1926	4,800	.039
Disk. 4 ft. double	John Deere	32.00	1928	3,200	.013
Disk, single—7 ft. 18 in.	John Deere	80.00	1923	2,400	.042
Disk, single—5 ft. 20 in.	John Deere	65.00	1913	2,400	.035
Diker, inverted 'V' 7 ft.		7.00	1927	1,600	.005
Ditcher, 6 ft. 'V'	Martz Special	10.00	1918	2,400	.005
Ditcher, 5 ft. steel	Martin	50.00	1923	2,400	.028
Drill. 7-14 double disk.	J. D. Van Brunt	178.23	1923	2,400	.098
Fanning mill, Size B	Chatham	60.00	1913	4,800	.017
Fanning mill, Size B	Clipper	60.00	1927	4,800	.017
Float. 8x24 ft.		15.00	1920	1,200	.017
Float. 6x32 ft.		25.00	1928	800	.040
Fresno, small	Aschbacher	15.00	1923	2,400	.008
Fresno, large	Montgomery Ward	26.50	1925	2,400	.015
Fertilizer sower, 8 ft.	John Deere	92.33	1927	800	.148
Harrow, spike-tooth		30.00	1913	600	.007
Hay slips, 7x15		8.50	1928	1,000	.012
Hay derrick	Mormon	100.00	1928	800	.162
Manure spreader, Size C	John Deere	195.50	1925	2,400	.107
Mower, high lift	John Deere	91.78	1926	2,400	.053
Plow, sulky two-way	Syracuse, J. D.	99.91	1923	4,800	.028
Plow. walking, 14 in.	Syracuse, J. D.	18.94	1923	4,800	.005
Plow, shovel	Oliver	5.00	1913	1,200	.005
Plow, shovel	Montgomery Ward	4.75	1930	400	.016
Plow tractor 2-12 gang	John Deere	96.38	1928	2,400	.052
Potato planter, Hoover	John Deere	105.67	1927	800	.172
Potato digger, Hoover	John Deere	122.69	1927	1,200	.133
Potato digger, shaker	John Deere	25.50	1925	1,600	.021
Rake, hay 10 ft. Mt.Wh.	John Deere	61.22	1927	2,400	.034
Rack, hay, 8x16 ft.		15.00	1924	2,400	.008
Reaper, self-rake	McCormick	100.00	1913	1,200	.108
Roller, 8 ft.	Western Land	63.35	1924	2,400	.034
Separator, 22x32	Adv. Rumely.	1,075.75	1923	2,400	.582
Tractor, 9–18 gas.	Case	360.00	1924	3,600	.130
Truck, 1 ton	International	250.00	1928	3,600	.091
Truck	Ford. Model A	785.77	1930	3,600	.284
Wagon, Moline, 3¼ old	Moline	60.00	1919	3,200	.025
Weeder, blade, 8 ft.	Snider	31.36	1923	2,400	.017
Tractor: fuel, lubrication, interest and depreciation, per hour					$0.40
International truck: fuel, lubrication, interest, and depreciation, per hour					.40
Ford truck: fuel, lubrication, interest, and depreciation, per hour					.50
Motor for fanning mill, per hour					.007
Man labor, per hour					.40
Horse and harness, per horse-hour					.10

*6 percent interest on average value, and depreciation based on estimated number of hours service in ten years.