UNIVERSITY OF IDAHO
AGRICULTURAL EXPERIMENT STATION
Department of Agricultural Economics

AND

BUREAU OF AGRICULTURAL ECONOMICS
UNITED STATES DEPARTMENT
OF AGRICULTURE
in cooperation

A Method of Determining What to Produce

Budgeting the Farm Program on the Twin Falls Irrigation Project

By

BYRON HUNTER and PAUL A. EKE

BULLETIN NO. 195 DECEMBER, 1932

Published by the University of Idaho, Moscow, Idaho

Table of Contents

Acknowledgments

The authors are indebted to J. E. Nordby, Assistant Animal Husbandman; F. W. Atkeson, Dairy Husbandman; C. E. Lampman, Poultry Husbandman; and E. F. Rinehart, Associate Animal Husbandman, of the Idaho Experiment Station, for assistance given, respectively, in setting up the budgets which include hogs, dairy cattle, poultry, and sheep. Credit is also due H. W. Hulbert, Agronomist, and G. R. McDole, Soil Technologist, of the Idaho Experiment Station, for valuable suggestions and information furnished. Special thanks are extended to the many farmers and business men who supplied much of the data assembled in the study.

A Method of Determining What to Produce

By

BYRON HUNTER and PAUL A. EKE*

Purpose

THE major purpose of this Bulletin is to present a method of studying the agriculture of an area and the business of individual farms. The information and method presented, it is believed, should be very helpful to extension workers and farmers in planning production programs, organizing individual farms, and keeping farming better adjusted to changing prices and economic conditions.

Farmers learn what to produce fairly well by trial and error during periods when prices remain reasonably stable. However, the trial and error process requires time and usually is expensive. When the relative profitableness of farm enterprises is shifted abruptly by sudden and unequal changing of prices, such as occurred in 1920 and 1921 and again in 1930 and 1931, the problem of deciding what to produce and making production plans becomes very difficult. Under such trying circumstances, farmers are much confused and frequently shifts are made from one enterprise to another or radical changes made in the magnitude of enterprises without sound reasons for doing so. Such changes, of course, are likely to result in serious loss. This study was undertaken to develop a better basis for planning ahead, both for local areas and the individual farms.

Budgeting is the method chosen for making the comparisons in planning ahead. As here used it includes the plan for the proposed system of farming to be followed. It shows the use to be made of land, the crops to be grown, the livestock to be kept, and the estimated production, receipts, expenses, and net returns. A budget, or a series of budgets, when carefully prepared is a valuable aid in selecting enterprises, deciding how much of each to produce, and in estimating probable future returns. The farmer who carefully prepares budgets year after year and keeps records of yields obtained, prices received and paid, expenses incurred and mistakes made, becomes more efficient year after year in deciding what changes, if any, should be made in his production program and in comparing the probable future returns from his present farming system with estimated returns from modifications which may seem desirable.

The Area Studied

This Bulletin applies especially to the "deep soil phase" of the Twin Falls southside irrigation project. *Fig. 1* shows the specific area to which the crop yield data presented in *Table XVI* are applicable. This project is located on the Snake river in south central Idaho, and embraces in round numbers 203,000 acres of irrigated land. The elevation varies from about 3,700 to 4,000 feet. The

*Agricultural Economist, Bureau of Agricultural Economics, United States Department of Agriculture, and Head, Department of Agricultural Economics, Idaho Agricultural Experiment Station, University of Idaho, respectively.

surface of approximately 90 per cent of the project varies from nearly level to gently rolling, and the natural slope usually is sufficient for furrow irrigation. Only a limited area is so rough as to make irrigation difficult. A few comparatively small seepy areas have developed but drainage operations are proving effective in handling this problem.

The soil of the project is very uniform in texture and remarkably fertile under good cultural practices. Eighty per cent or more of the entire area is silt loam. The soils of the whole project are underlain with basalt rock. The soil is designated as "deep phase" where the

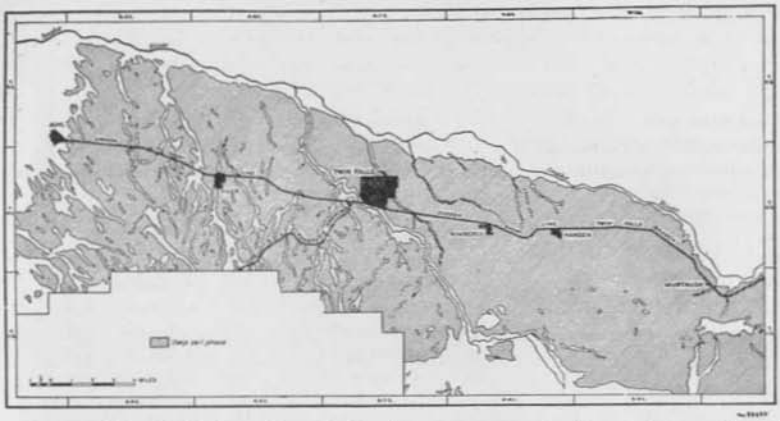

Fig. 1—The shaded portion of the figure represents the major portion of the deep soil phase of the Twin Falls southside irrigation project to which this Bulletin applies.

rock is more than three feet below the surface and as "shallow phase" where the rock is three feet or less below the surface. About 70 per cent of the project has the deep soil phase and 30 per cent the shallow. On the shallow phase the bedrock frequently comes to the surface and considerable of the land is so shallow that it must be used for pasture. Crop yields are somewhat lower, and irrigation water must be applied more frequently on the shallow than on the deep phase soil.

The average length of the frost-free period is about 130 days. There is considerable variation from year to year in the dates of the last killing frost in the spring and the first in the autumn. Occasionally hail storms do more or less damage in the limited areas over which they pass.

The average annual precipitation, which is about 11 inches, is too scant for crop production without irrigation. The summers are very dry, making it possible to cure crops with little damage. Occasionally, however, there is sufficient autumn rain to interfere with harvesting operations. November, January, and May, on the average, are the months of highest precipitation.

Water was first available for irrigation in 1905. Hence 1931 was the twenty-sixth year the project had been farmed. Results obtained

during these 26 years have shown the project is well adapted to the production of a wide range of crop and livestock enterprises.

Changes in Livestock Production

The Twin Falls Canal Company began taking a crop and livestock census in 1912. Little definite information is available concerning the relative importance of the crop and livestock enterprises prior to that date. The annual reports of these census enumerations furnish the data presented in *Fig. 2* and *Fig. 3*.

The number of each kind of livestock kept on the project from 1914 to 1929 is shown in *Fig. 2*. The number of mares, colts, stallions and jacks considered as one group declined gradually during the whole period. The number of work animals increased from 1914

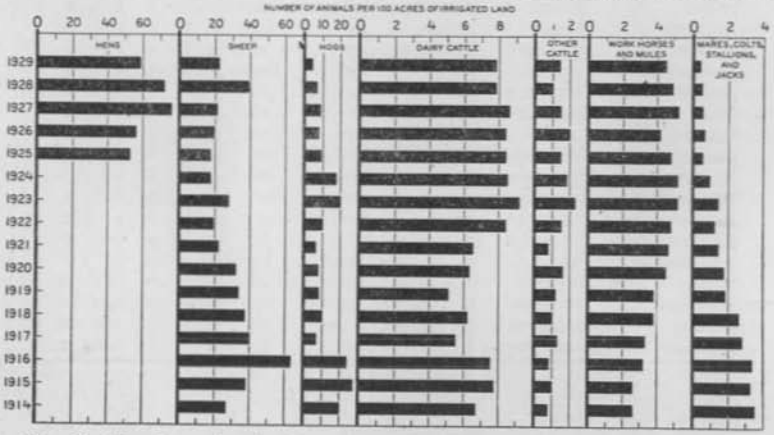

Fig. 2—Number of animals of each kind kept per 100 acres of irrigated land from 1914 to 1929 inclusive is indicated by horizontal bars and the figures above the respective classes of livestock. The data for poultry prior to 1925 are not available. (Compiled from the annual reports of the Twin Falls Canal Company).

to 1923 and then decreased slightly from 1924 to 1929. Dairy cattle, the figure shows, both increased and decreased twice during the 15-year period. Hogs were of considerable importance during the years 1914, 1915, and 1916, and again in 1924 and 1925, but were at the lowest level of production in 1929. The number of sheep increased very rapidly from 1914 to 1916, declined from 1916 to 1925, increased gradually during 1926 and 1927, increased sharply in 1928 and then decreased abruptly in 1929. On the whole it may be said that a relatively small amount of each kind of livestock was kept on the project from 1914 to 1929 when compared with the amounts kept in other more intensive livestock producing areas and that during this 16-year period crop farming predominated on the project quite strongly.

Changes in the Use of Land

The shifts made in the acreage devoted to the respective crops grown on the project from 1913 to 1929 are shown in *Fig. 3*. Some

crops were almost eliminated during this period while others alternately increased and decreased in importance.

Alfalfa has been the chief hay and soil improving crop from the beginning of the agriculture of the project. An average of about 27 per cent of the total irrigated area of the project was in alfalfa from 1913 to 1925, whereas an average of only 18 per cent was in alfalfa from 1926 to 1929. This decrease is probably due to the comparatively low returns from alfalfa and to a lack of appreciation of the beneficial influence which this crop has on the yields of other crops grown in the cropping system.

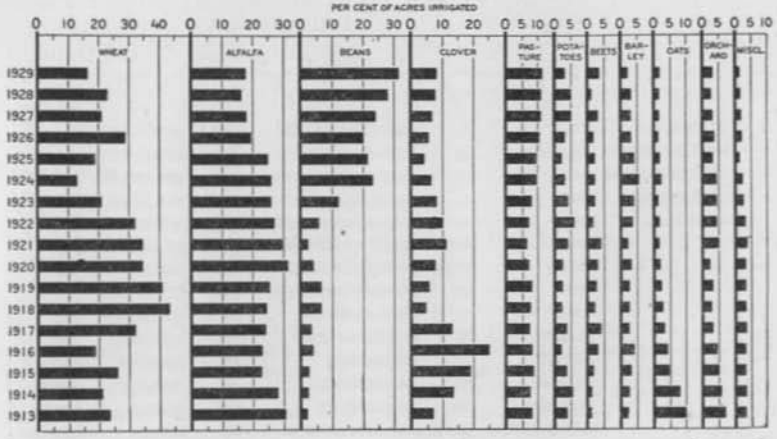

Fig. 3—The percentages of the total irrigated area that were devoted to the several crops and to pasture from 1913-1929 are indicated by the horizontal bars and the figures above the respective crops. (Compiled from the annual reports of the Twin Falls Canal Company).

As presented in *Fig. 2*, clover includes red, alsike, white clover and ladino. A seed crop and one cutting of hay are obtained from red clover whereas the alsike is grown only for seed. White and ladino are both grown for pasture and for the seed crop. The clovers, especially red clover, may be considered as competing more or less with alfalfa. The percentage of the irrigated area occupied by the clovers varied from about 25 per cent in 1916 to 4 percent in 1925.

Wheat was the popular crop during the period of World War high prices, 43 per cent of the irrigated area of the project being in wheat in 1918. The area in wheat dropped to about 13 per cent in 1924, then increased to 28 per cent in 1926 and declined again to around 17 per cent in 1929. Both oats and barley are of minor importance and are grown only for local use.

Potatoes, sugar beets, beans, and corn are the row-tilled crops of the project. These four crops are competitive in as much as any one of the four may be substituted for the others in the crop rotations and cropping systems of the project. For this reason it is of interest to note how the acreages devoted to these crops have varied during the 1913-1929 period. These changes may be regarded as an ex-

pression of the combined efforts of the farmers of the project to find the most profitable crop to produce.

As used in *Fig. 3*, beans include Great Northern, small red, butternut, and a number of garden varieties which are grown for seed under contract. The bean crop was of minor importance until comparatively recent years. The percentage of the irrigated area devoted to beans averaged 3.3 per cent from 1913 to 1921 but increased from 1.8 per cent in 1921 to 31.7 per cent in 1929. Bean prices remained fairly stable during this latter period. Growers who marketed through the local bean growers' association received for Great Norterns an average of $5.18 per 100 pounds from 1922 to 1929, the lowest average annual price being $4.27 per 100 pounds. At these prices beans were recognized as a reasonably safe and profitable crop and were grown on many fields continuously for six and eight years and on a few fields for as much as 10 and 12 years. Being a legume, the yield of beans under continuous production holds up remarkably well for several years and growers did not realize the damage being done until attempts were made to produce other crops such as alfalfa and clover.

Soil Fertility Problem

Examinations of fields which have produced beans continuously for several years show the soil to be deficient in organic matter and to have a compact "pan-like" condition just beneath the depth of plowing. The bean has a comparatively small root system, and in harvesting, the plants are cut off below the surface of the soil and removed from the field to the thresher. Under the continuous production of this crop, the organic matter of the soil appears to decay and disappear much faster than it is added. The soil condition which results from the continuous production of beans on the same land year after year may be designated as "bean soil sickness."

That soil depletion is likely to take place much more rapidly under irrigated farming than under non-irrigated should receive consideration when planning for the permanency of irrigated agriculture. The application of irrigation water maintains a favorable condition for the decay of the organic matter of the soil throughout most of the growing season. Furthermore, leaching is likely to be much greater under irrigated than non-irrigated farming except where the water is applied very skillfully or where the annual precipitation is excessive. Soil deterioration on the project has progressed sufficiently to create considerable sentiment among farmers in favor of adopting methods which will maintain or increase the organic content and productiveness of the soil. This problem was carefully considered when deciding what systems of farming should be compared in this study.

Basis for Setting Up the Budgets

The application of this Bulletin is restricted to the deep soil phase of the Twin Falls southside irrigation project (*Fig 1*). An 80-acre farm is used in presenting the method of comparing the estimated returns from competing crop and livestock enterprises and from dif-

ferent systems of farming. One size of farm is used in order to hold the maximum number of expense and cost items constant in all of the budgets. The soil of the 80-acre farm should be considered as in good physical condition and capable of producing at least average yields of deep soil phase land. The chief problem at the outset of the study was to (1) determine what crop rotations and farming systems are practical and feasible and (2) to assemble the information necessary for setting up the budgets for making the comparisons.

An intimate knowledge of the agriculture of the project was obtained during 1930 by interviewing more than 200 farmers and by studying farm methods and practices. Special attention was given to crop sequence, cropping systems, crop yields, the use of green manures, the field operations performed and seed and other materials used in crop production, the acres covered per day with teams and implements of different sizes, the feeding and management of livestock and the prices which farmers pay and receive in operating their farms.

The data gathered in 1930 were supplemented (1) by the annual crop and livestock census reports of the Twin Falls Canal Company covering the years 1913-1929 and (2) the results of a former study of the agriculture of the project made by the senior author during the four-year period 1919-1922.* The more essential data used in setting up budgets for the 11 systems of farming are presented in *Tables IX* to *XVI* under the caption: "Production Standards, Prices and Costs," page 38.

The machinery and implements needed for operating the 80-acre farm when organized for crop farming and the 1930 cash price thereof when purchased new are listed in *Table IX*. The value of the equipment varies slightly in the different budgets as the crop enterprises change. For example the potato digger is not included in the equipment where potatoes are not in the cropping system.

When organized for crop production, the farm is operated with four horses by one man (the farm operator) who hires additional labor when he cannot do it all himself. Since the amount of labor that should be charged in the different budgets is one of the most difficult items of expense to determine, the method used in figuring this item is given in considerable detail.

The field operations adopted for producing each crop and the usual time of performing the operations are shown in *Fig. 4*. The operations adopted are intended to represent reasonably thorough soil preparation and cultivation. Under some soil and weather conditions more, and under other conditions less, work would be necessary.

The hours of labor used per acre to perform each of the various field operations not done at custom rates under contract are shown in *Table X*. The approximate amounts of field labor applied directly to the respective crops in producing an acre of each is shown in *Table XI* by half-month periods. The data presented in *Table XI* were computed from the information given in *Fig. 4* and *Table X*. The

*U. S. Dept. of Agriculture Bulletin No. 1421, An Economic Study of Irrigated Farming in Twin Falls County, Idaho.

acres of each crop produced in a given system of farming multiplied by the amounts of labor used by the half-month periods as shown in *Table XI* give the amounts of direct labor applied to each crop. The amounts of labor needed for all of the crop, when added together, give the total amounts of direct crop labor needed by half month periods. These amounts are then increased by one-third to arrive at approximately the total amount of labor necessary to operate the farm. The addition of one-third of the direct crop labor is based on unpublished data of a study made in 1921 of 152 Twin Falls county farms having very little livestock. That study showed the value of the direct crop labor, as obtained by the survey method, at current rates amounted to but 75 per cent of the total average value of the man labor needed to operate the 152 farms. In other words a study of enterprises by the survey method picks up only on the average, about 75 per cent of the total labor needed to operate farms in this area.

Table XI shows also the estimated average number of hours available in half-month periods when soil and weather conditions are suitable for field work. In setting up the budgets it was assumed that the operator puts in full time when there is work to do. The hours of labor that the operator can do in each half-month are subtracted from the total amounts needed. The sum of the remainders (using only the positive quantities) gives the hours of labor to be hired.

The seed used per acre in crop production, the amounts purchased and the amounts grown, and values per 100 pounds are shown in *Table XII*.

The estimated feed needed annually for the different units of livestock kept in farming systems 1-11 is shown in *Table XIV*. The feeds used are listed as (1) farm grown and (2) purchased.

Receipts and expenses for the 80-acre farm operated under 11 different farming systems were computed on the basis of average prices for the 1922-1929 period and for the year 1931. It was possible to work out average prices which the farmers of the project received for most of the products sold during the two periods. For example, a local milling and grain company furnished a statement of the total amounts of wheat, oats and barley purchased each year from 1922 to 1931 and the total amounts paid therefor. From this information average prices were computed for these three commodities for the two periods. The prices used in computing receipts from other products sold were, in most cases, developed in a similar manner. The prices used in figuring receipts are shown in *Table XV*. The sources of the price data are given in footnotes to the table. The prices at which hired labor, feed bought, work done under contract and numerous other items of expense were charged are given in *Table XIII*.

The crops in each of the 11 systems of farming compared in *Tables I to VIII* are produced in definite crop rotations, each of which contains either alfalfa or clover. For example a 6-year rotation is used in System 1, *Table I*, which consists of wheat-alfalfa-alfalfa-potatoes-beans-beans. Of the 72 acres available for crop production, 12 acres are in wheat, 24 acres in alfalfa, 12 acres in potatoes

and 24 acres in beans. The question arose as to what yields should be used in figuring production from the crop rotations used. What is needed in computing production from this particular 6-year rotation are average yields of (1) wheat; (2) alfalfa for the first two years after it is seeded with wheat; (3) potatoes for the first year after plowing up alfalfa; and (4) beans for the second and third years after plowing up alfalfa. A special study was made to determine the average yields which may be expected from the respective crops when grown in rotations used in setting up the 11 budgets. The

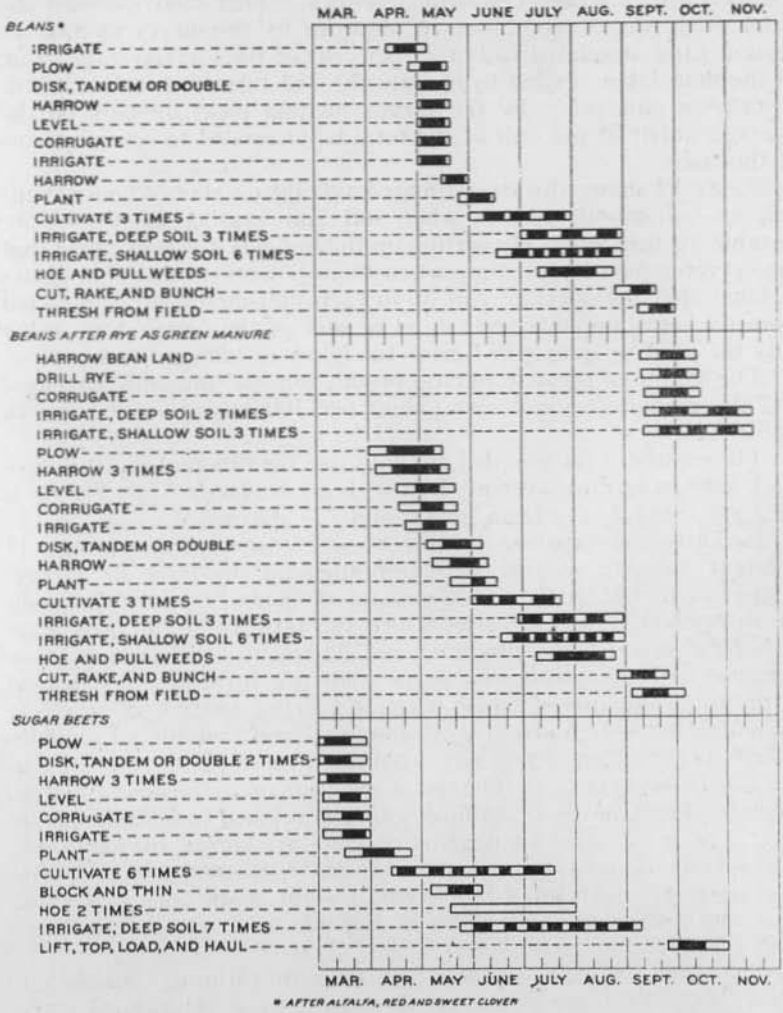

Fig. 4—Schedule of field operations. Black indicates normal periods for performing operations; white indicates range in the period due to variations in the seasonal conditions or cultural practices.

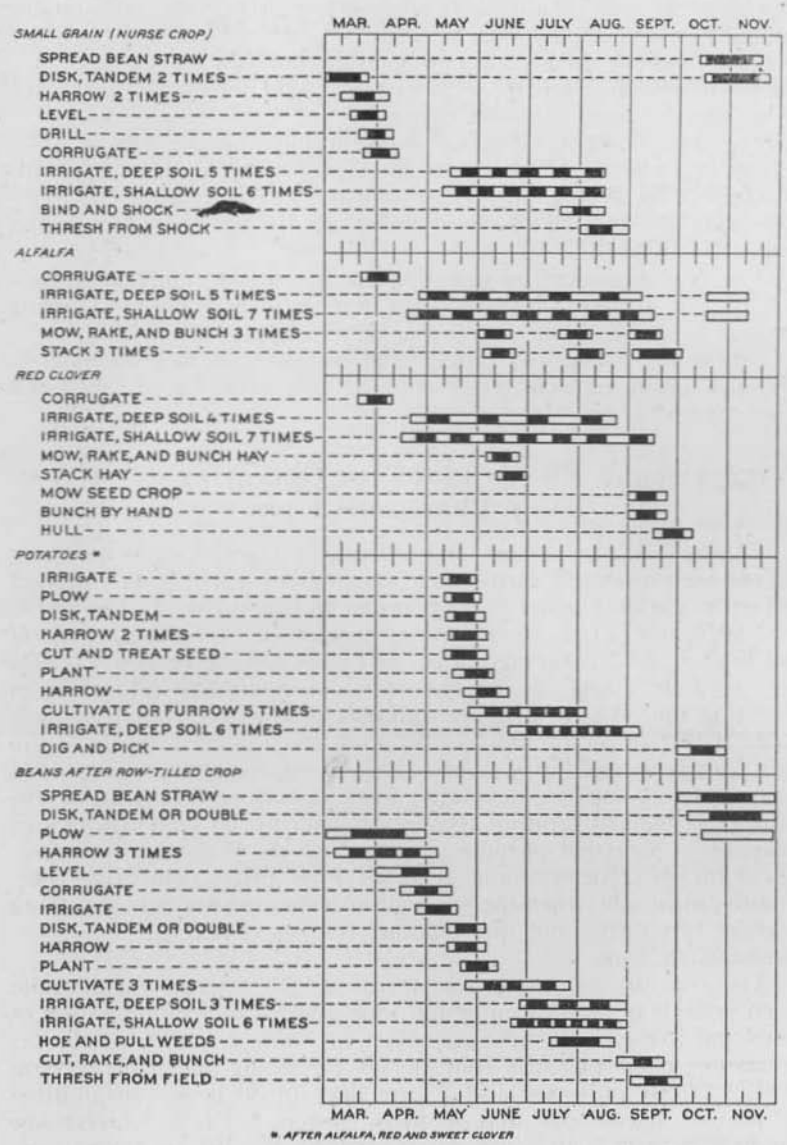

Fig. 4—Schedule of field operations. Black indicates normal periods for performing operations; white indicates range in the period due to variations in the seasonal conditions or cultural practices.

number of records obtained, the average yields worked out, and the standard error of the average are given in *Table XVI.*

The standards used for livestock production are as follows:

Seven sows are bred to obtain six litters of pigs and an average of six pigs is raised per litter farrowed.

The cows in the commercial dairy produce an average of 8,780 pounds of 4.1 per cent milk or 360 pounds of butterfat per cow. This standard is the average of 449 cows in the Pioneer Dairy Herd Improvement Association of Twin Falls county, for the year ending June 30, 1930.

The average number of eggs laid per hen in the commercial flock is 163. This is based on the average number of hens on hand during the year.

A crop of 96 lambs is raised from the ewes on hand October 1. The wool produced from the flock of 83 ewes and 17 ewe lambs and two rams is 830 pounds.

Comparison of Eleven Plans for Operating an 80-Acre Deep Phase Soil Farm

The organization plans and estimated receipts, expenses and returns for an 80-acre farm when operated by each of 11 different systems of farming under average prices and costs for (1) the period 1922-1929 and (2) the year 1931 are presented in *Tables I* to *VIII* and *Figs. 5* and 7. Average prices and costs for the years 1922-1929 were used in setting up the budgets to compare the returns from operating the 80-acre farm by different production plans during a period when prices of most farm products produced in the Twin Falls area remained fairly stable. Prices and costs for the year 1931 were used to compare the returns from operating the farm by the same 11 systems of farming after prices had shifted violently though unequally. A further purpose in setting up the budgets was to provide a means of determining at about what prices competing commodities must sell (when the production costs used are held constant) in order to return about the same net returns (*Table I*).

Organization Plans

The organization plans for operating the 80-acre farm under seven systems of crop farming and four systems of a combination of crops and livestock farming are given in *Table I.* Each of the organization plans provides four horses for doing the general farm work, a family milk cow and a farm flock of 30 hens. In addition to the four horses, cow and 30 hens, System 8 has a 4-brood sow hog unit, System 9 an 8-cow dairy herd, System 10 an 8-cow dairy herd and a flock of 400 hens, and System 11 a flock of 83 ewes and 17 ewe lambs kept for ewes.

The four horses and family cow are provided with 1.5 acres of permanent pasture in each of the 11 budgets. In Systems 1 to 9 inclusive the farmstead, garden, ditches, canals, roads, fences, etc., occupy 6.5 acres. This leaves 72 acres for the production of crops. The land occupied by the farmstead is increased .5 of an acre and .3 of an acre in Systems 10 and 11, respectively, to provide space for the

poultry buildings and yards and for the sheep buildings and lots. This reduces the acreage available for crop production to 71.5 acres in System 10 and 71.7 acres in System 11. It was assumed in setting up the budgets that the small amount of space required for the permanent buildings for the hog and dairy units can be found in the 6.5 acres occupied by the farmstead, garden, and waste land.

All of the land available for crop production in each of the 11 systems is occupied by definite crop rotations. *Table I* shows the rotations used and the acreage devoted to each crop grown for each farming system. Six-year rotations are used and the acreage devoted to each crop grown for each farming system. Six year rotations are used in Systems 1-6 and System 8, the 72 acres available for crop production being divided into six fields or tracts of 12 acres each. For example the crops grown each year in System 1 are 12 acres of wheat (alfalfa being seeded with the wheat), 24 acres of alfalfa, 12 acres of russett potatoes, and 24 acres of Great Northern beans. The wheat and potatoes are changed to different fields each year and the alfalfa and beans every second year. Where beans follow beans, rye, seeded in September after harvesting the beans, is plowed under as a green manure the following spring. The cropping plan for System 7 is a 4-year rotation:* first year wheat, 18 acres; second year, red clover, 18 acres; third year, potatoes, 12 acres and beans 6 acres; and fourth year, beans, 18 acres.

Each of the livestock units in Systems 8-11 may be considered as an addition to System 1. That is, the cropping plan of System 1 was so modified in setting up budgets for Systems 8-11 as to provide the pasture and home grown feeds used by the unit of livestock added in each system without changing the acreages of potatoes and beans grown. The amounts of these two crops produced and sold are the same in Systems 8-11 as in System 1. In other words, the addition of the livestock to System 1 interferes only with the production and sales of wheat and alfalfa hay.

The addition of the 4-sow hog unit in System 8 caused no change in the 6-year crop rotation of System 1. The hogs require the equivalent of about 1.3 acres of alfalfa for pasture and about 1.7 tons of hay. In System 9 two rotations, a 6-year and a 4-year, furnish sweet clover pasture and the home grown hay and grain for the 8-cow dairy herd. The 10.3 acres of rye, sown chiefly as a green manure, supplement the sweet clover pasture.

In System 10 the growing poultry stock requires 1.5 acres of alfalfa for range. This is provided by rotation No. 3 which occupies 6 acres. A cutting of hay is taken from the 1.5 acres of alfalfa range just before the young stock is turned out. In this rotation the land is used for range one year in four. Rotation No. 2 furnishes the 5.1 acres of sweet clover pasture required for the dairy herd. This is supplemented in the early spring and late autumn by 10.9 acres of rye.

*Another four-year rotation may be followed in which sweet clover is used as the soil restoring crop. This rotation consists of wheat as a nurse crop for sweet clover the first year; sweet clover, plowed under in May and planted to potatoes the second year, beans the third and fourth year if the soil is in fairly good condition. Otherwise, the rotation may be completed the third year by planting beans.

TABLE I

Organization of an 80-Acre "Deep Soil" Farm, Twin Falls Southside Irrigation Project, when Operated by One Man with 4 Horses Under Different Farming Systems, 1922-1929

Item	Crop farming						
	System 1	System 2	System 3	System 4	System 5	System 6	System 7
Farm acreage:	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Farmstead, garden, roads, ditches, canals, fences, etc.	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Permanent pasture	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Crop rotation and crop acreage	Wheat[1] 12 Alfalfa 12 Alfalfa 12 Potatoes 12 Beans[4] 12 Beans 12	Wheat[1] 12 Alfalfa 12 Alfalfa 12 Beans 12 S. Beets 12 Beans 12	Wheat[1] 12 Alfalfa 12 Alfalfa 12 Beans 12 Beans[4] 12 Beans 12	Wheat[1] 12 Alfalfa 12 Alfalfa 12 Alfalfa 12 Beans[4] 12 Beans 12	Alfalfa[2] 12 Alfalfa 12 Alfalfa 12 Potatoes 12 Beans[4] 12 Beans 12	Wheat[3] 12 Red clover 12 Red clover 12 Potatoes 12 Beans[4] 12 Beans 12	Wheat[3] 18 Red clover 18 Potatoes 12 / Beans[4] 6 — 18 Beans 18
	Total 72	Total 72	Total 72	Total 72	Total 72	Total 72	Total 72
Livestock:	Number	Number	Number	Number	Number	Number	Number
Work horses	4	4	4	4	4	4	4
Family cows	1	1	1	1	1	1	1
Family hens	30	30	30	30	30	30	30
Brood sows	....	....	....	....	....	....	....
Dairy Cows	....	....	....	....	....	....	....
Ewes	....	....	....	....	....	....	....
Ewe lambs	....	....	....	....	....	....	....
Hens	....	....	....	....	....	....	....
Hired labor for crop production	Hours 945	Hours 804	Hours 781	Hours 882	Hours 1126	Hours 682	Hours 437

TABLE I (Cont.)

Item	Crop and livestock farming			
	System 8 (System 1 & 4 sows)	System 9 (System 1 and 8 cows)	System 10 (System 9 and 400 hens)	System 11 (System 1 and 83 ewes)
Farm acreage:	Acres	Acres	Acres	Acres
Farmstead, garden, roads, ditches, canals, fences, etc.	6.5	6.5	7.0	6.8
Permanent Pasture	1.5	1.5	1.5	1.5
Crop rotations and crop acreage	Wheat[1] 12 Alfalfa 12 Alfalfa 12 Potatoes 12 Beans[4] 12 Beans 12 Total 72	No. 1 Wheat[1] [5] 7.4 Oats[1] 1.2 Alfalfa 8.6 Alfalfa 8.6 Potatoes 8.6 Beans[4] 8.6 Beans 8.6 Total 51.6 No. 2 Barley[3] 4.1 Wheat[3] 1.0 S. clo. pasture 5.1 Potatoes 3.4 Beans[4] 1.7 Beans 5.1 Total 20.4	No. 1 Wheat[1] 4.9 Oats[1] 1.7 Alfalfa 6.6 Alfalfa 6.7 Potatoes 5.4 Beans 1.3 Beans[4] 5.8 Wheat .9 Beans 6.7 Total 40.0 No. 2 Barley[3] 5.1 S. clo. pasture 5.1 Potatoes 5.1 Beans[4] 5.1 Beans 5.1 Total 25.5 No. 3 Wheat[1] 1.5 Alfalfa 1.5 Alfalfa 1.5 Potatoes 1.5 Total 6.0	No. 1 Wheat[1] 3.7 Alfalfa 3.7 Alfalfa 3.7 Potatoes 3.7 Beans[4] 3.7 Beans 3.7 Total 22.2 No. 2 Barley[3] 2.4 Wheat[3] 7.5 S. clo. pasture 9.9 Potatoes 8.3 Beans 1.6 Beans[4] 5.1 Wheat 4.8 Beans 9.9 Total 49.5
Livestock:	Number	Number	Number	Number
Work horses	4	4	4	4
Family cows	1	1	1	1
Family hens	30	30	30	30
Brood sows	4	....	....	....
Dairy cows	....	8	8	....
Ewes	....	....	....	83
Ewe lambs	....	....	....	17
Hens	....	....	400	....
Hired labor for crop production	Hours 945	Hours 822	Hours 803	Hours 641

1 Alfalfa is seeded with the grain.
2 Alfalfa is seeded alone.
3 Clover is seeded with the grain.
4 Rye is planted in September as soon as the beans are harvested. The rye is used as a green manure.
5 The brace is used to show that one field has been planted to two crops in order to raise the necessary feed for livestock and to keep the acreages of potatoes and beans the same as grown in the crop farming systems.

The sheep in System 11 require 9.9 acres of sweet clover pasture which is furnished by rotation No. 2. This is supplemented by 8.8 acres of rye. This rotation also provides the barley needed for the sheep.

Table I also shows the estimated hours of man labor that must be hired in each system for crop production. The labor spent on the livestock units added in Systems 8-11 is not included in these figures.

Production and Disposal of Crops, Livestock and Livestock Products

The estimated annual production and disposal of crops for each of the 11 systems of farming is shown in *Table II*. The sum of the items under disposal equals the total production of each crop. In the case of potato seed, nine-tenths of that used is home grown and one-tenth is purchased certified seed. All of the seed used for beans, sugar beets, alfalfa, sweet clover and rye is purchased. Home grown seed is used for all the other crops. *Table XVI* shows the crop yields used in computing production (*Table II*).

The estimated annual production and disposal of livestock and livestock products for Systems 8-11 are given in *Table III*. The four brood sows in System 8 farrow around March 1. Two of the sows are one year old in March and two are two years old. An average of 24 pigs is raised from the four spring litters. After the pigs are weaned the two junior sows are bred to farrow again about September 1 and the two senior sows are prepared for market and sold in July when weighing an average of 500 pounds. The 12 pigs raised from the two September litters are weaned when about 8 weeks old, and the two sows and three gilts saved from the spring crop of pigs are bred to farrow the last of February or early in March. One of the three gilts bred is considered barren and sold in March as a 350-pound sow. It will thus be seen that seven sows are bred each year to get an average of six litters of pigs and that each sow raises three litter of pigs, farrowing when 12, 18, and 24 months old. The hogs are provided with alfalfa pasture during the grazing seasons and the pigs are kept on practically a full ration and sold when about six months old and weighing an average of 180 pounds.

The dairy herd in System 9 consists of 8 cows, 2 heifers, 2 heifer calves and 1 bull. The average death loss allowed for the herd is estimated as the equivalent of .8 of a cow each year. An average of 1.2 low producing cows or barren heifers is sold each year to maintain an average production of 360 pounds of butterfat per cow. This makes it necessary to raise two of the best heifer calves each year to replace the cows lost by deaths and cull cows sold. After serving his allotted time in the herd the bull is exchanged for another proven sire. The bull is depreciated $50 each year in figuring expenses.

The dairy herd in System 10 is a duplication of that in System 9 and is given no further discussion here. The poultry unit in System 10 on October 1 consists of 175 hens beginning their second laying year and 225 pullets just beginning their first year. Due to death loss and culling, the average number of laying hens on hand during the year is 317 and the average production per hen is 163

Estimated Average Annual Production and Disposal[1] of Crops on an 80-Acre "Deep Soil" Southside Twin Falls Irrigation Project Farm When Operated Under 11 Different Systems of Farming, 1922-1929

Item	Unit	Crop farming							Crop and livestock farming			
		System 1	System 2	System 3	System 4	System 5	System 6	System 7	System 8 (System 1 and 4 sows)	System 9 (System 1 and 8 cows)	System 10 (System 9 & 400 hens)	System 11 (System 1 and 83 ewes)
Potatoes: Production	Cwt.	2760				2760	2760	2760	2760	2760	2760	2760
Disposal: Seed, No. 1	"	119				119	119	119	119	119	119	119
Sold, No. 1	"	1717				1717	1717	1717	1717	1717	1717	1717
Sold, No. 2	"	372				372	372	372	372	372	372	372
Culls and shrinkage	"	552				552	552	552	552	552	552	552
Beans: Production	Bu.	703	703	1055	703	703	665	665	703	703	703	703
Disposal: Sold	"	703	703	1055	703	703	665	665	703	703	703	703
Sugar Beets: Prod., beets	Ton		144									
Tops	Acres		12									
Disposal: Beets sold	Ton		144									
Tops sold	Acres		12									
Alfalfa: Production, hay	Ton	108	108	108	162	156			102	77	67	33
Disposal: Hay sold	"	88	88	88	142	20			80.7	27	16	....
Hay fed	"	20	20	20	20	136			21.3	50	51	33
Pasture used	Acres	....	....	....	....	....			1.3	....	1.5	....
Red clover: Prod., hay	Ton						26	20				
Seed	Lbs.						5952	5148				
Disposal: Hay sold	Ton						6	....				
Hay fed	"						20	20				
Seed used	Lbs.						132	198				
Seed sold	"						5820	4950				
Wheat: Production	Bu.	631	631	631	631		631	947	631	442	384	842
Disposal: Sold	"	611	611	611	611		611	917	81	427	113	815
Seed planted	"	20	20	20	20		20	30	20	14	6	27
Feed	"	....	....	....	....		....	....	530	1	265	....
Barley: Production	Lbs.									12833	15963	7512
Disposal: Feed	"									12423	15453	7272
Seed planted	"									410	510	240
Oats: Production	"									3373	4777	
Disposal: Feed	"									3253	4607	
Seed planted	"									* 120	170	
S. Clover: Production	Acres											9.9
Disposal: Pasture	"											9.9

[1] The sum of the items under disposal is equal to production for each crop.

TABLE III

Estimated Annual Production and Disposal of Livestock and Livestock Production on an 80-Acre "Deep Soil" Farm, Twin Falls Southside Irrigation Project, When Operated Under Four Different Systems of Crop and Livestock Farming[1]

Item	Unit	System 8 (system 1 & 4 sows)	System 9 (system 1 & 8 cows)	System 10 (system 9 &400hens)	System 11 (system 1 &83 ewes)
Hog enterprise:					
Production: Pigs	No.	36			
Sows	"	3			
Disposal: Gilts kept for sows	"	3			
Pigs sold weighing 180 lbs. each	"	33			
Barren sows weighing 350 lbs.	"	1			
Cull sows weighing 500 lbs.	"	2			
Dairy enterprise:					
Production: Calves	"		6	6	
Heifers over 1 yr. old	"		2	2	
Cows	"		1.2	1.2	
Butterfat	Lbs.		2880	2880	
Disposal: Calves sold at birth	No.		4	4	
Calves kept for milk	"		2	2	
Heifers kept for milk	"		2	2	
Cull cows, average sold	"		1.2	1.2	
Butterfat fed in whole milk	Lbs.		12	12	
Butterfat sold	"		2868	2868	
Poultry enterprise:					
Production: Eggs	Doz.			4317	
Broilers	No.			275	
Pullets	"			248	
Hens	"			175	
Disposal: Eggs	Doz.			4317	
Broilers sold	No.			275	
Pullets sold, culls	"			23	
Hens sold, culls	"			156	
Sheep enterprise:					
Production: Wool	Lbs.				830
Lambs	No.				96
Ewes	"				17
Disposal: Wool	Lbs.				830
Lambs kept for ewes	No.				17
Lambs sold	"				79
Cull ewes sold	"				8

1 In addition to livestock and livestock products listed in the table there are 30 hens and one family cow in the organization of each system from 1 to 11, inclusive.

eggs. The flock is maintained by raising pullets from 650 baby chicks bought each year. The growing young stock is provided a range of 1.5 acres of second year alfalfa, the pullets are kept in a laying house during their first year of production and the hens are provided with permanent yards.

The flock of sheep in System 11 on November 1 consists of 83 ewes, 17 ewe lambs kept for ewes, and 2 rams. The annual death loss for the flock is estimated as the equivalent of 9 ewes, 3 ewes dying

prior to the beginning of the lambing season. From the 80 ewes 96 lambs are raised. Seventeen ewe lambs are retained to replace the 9 ewes that die and 8 ewes sold as culls. This leaves 79 lambs to sell. The rams are depreciated $7.00 each per year. The flock produces an average of 830 pounds of wool. The flock is provided with 9.9 acres of second year sweet clover pasture, the carrying capacity of which is rated at 10 ewes and their lambs per acre. The 17 young ewes are counted as ewes in computing the number that the pasture will carry.

Capital

The estimated average capital involved in operating the 80-acre farm by each of the 11 systems of farming from 1922 to 1929 is given in *Table IV*. The land (deep phase soil) is valued at $215 per acre. This item, as well as the average value of the 4 work horses, the family cow and the farm flock of hens, remains the same in all the budgets. The estimated value of the improvements and equipment varies in some of the budgets. For example, the value of the potato cellar and the potato digger drop out of the capital in the systems where potatoes are not grown. In like manner the addition of livestock increases the investment not only in the value of the livestock added but also in the extra equipment and improvements needed. In adding the livestock units to System 1, brood sows were valued at $25 per head, milk cows at $115, hens at $1.50, and ewes at $10. The operating capital is the estimated amount needed to operate the farm on a cash basis.

Receipts

Receipts in these budgets are derived only from the sale of crops, livestock, and livestock products. The quantities of the different products sold are shown in *Tables II* and *III*, and the prices received therefor in *Table XV*. Receipts for the 1922-1929 period are itemized in *Table IV* while total receipts for both the 1922-1929 period and for the year 1931 are given in *Table VI*.

Inventories in each of the 11 budgets are the same at the beginning and close of the farm year. Net returns, therefore, are not influenced by either increases or decreases in inventories.

Expenses

Expenses include the estimated amount of cash paid out during the year in conducting the farm business. It includes also sufficient repairs and depreciation or replacement to keep the equipment and improvements in good working condition. Repairs and depreciation on machinery and tools were figured uniformly in each budget at 10 per cent of cash cost if purchased new. The manual labor done by the farm operator and his managerial service are not included in expenses (*Table V*).

Expenses are itemized in *Table V* for the 1922-1929 period while total expenses for both this 8-year period and the year 1931 are given in *Table VI*.

TABLE IV

Estimated Average Capital and Receipts for An 80-Acre "Deep Soil" Farm, Twin Falls Southside Irrigation Project, When Operated by One Man With Four Horses Under Different Systems of Farming, 1922-1929

Item	Crop farming							Crop and livestock farming			
	System 1	System 2	System 3	System 4	System 5	System 6	System 7	System 8 (System 1 and 4 sows)	System 9 (System 1 and 8 cows)	System 10 (System 9 and 400 hens	System 11 (System 1 and 83 ewes
Estimated Capital	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Land	17,200	17,200	17,200	17,200	17,200	17,200	17,200	17,200	17,200	17,200	17,200
Improvements	3,050	2,800	2,800	2,800	3,050	3,050	3,050	3,300	3,500	4,183	3,553
Equipment (livestock excluded)	1,880	1,694	1,689	1,689	1,880	1,899	1,899	1,880	2,088	2,130	1,880
Work horses (4), cow (1), hens (30)	430	430	430	430	430	430	430	430	430	430	430
Dairy cattle								.....	1,370	1,370	.....
Poultry								.....	.....	600	.....
Hogs								100	.....	.....	.....
Sheep								.....	.....	.....	1,060
Operating	804	555	468	419	711	761	746	879	930	1,126	752
Total capital	23,364	22,679	22,587	22,538	23,271	23,340	23,325	23,789	25,518	27,039	24,875
Estimated Receipts											
Wheat	635	635	635	635	.....	635	954	84	444	118	848
Hay	889	889	889	1,434	1,374	61	.....	815	273	162	.....
Potatoes	2,926	.....	.....	.....	2,926	2,926	2,926	2,926	2,926	2,926	2,926
G. N. Beans	2,186	2,186	3,279	2,186	2,186	2,067	2,067	2,186	2,186	2,186	2,186
Sugar beets		1,174				.....	.....	.....	.....	.....	.....
Red clover seed						1,280	1,089	.....	.....	.....	.....
Hogs								655	.....	.....	.....
Dairy cattle									68	68	.....
Butterfat									1,308	1,247	.....
Chickens									.....	155	.....
Eggs									.....	1,066	.....
Lambs and ewes									.....	.....	783
Wool									.....	.....	274
Total receipts	6,636	4,884	4,803	4,255	6,986	6,969	7,036	6,666	7,205	7,928	7,017

Farm Income

Farm income is receipts less expenses. It is derived from two sources, (1) the use of the farm capital, and (2) the services rendered by the operator as a laborer and manager. Farm income for the seven systems of crop farming varies from $2,244 for System 4 to $4,160 for System 7 and for the four systems having livestock and crop production combined from $3,524 for System 8 to $4,158 for System 10.

Interest

Interest for the use of capital was figured at 6 per cent on the estimated value of real estate and 8 per cent on all other capital. Interest for the seven crop farming systems varies but $66. The variation is due to changes in the amounts and values of the improvements and equipment and in the amount of operating capital needed to run the farm by the respective systems. The modification of System 1 in adding the 8-cow dairy and the flock of 400 hens (System 10) increased the interest charge $294.

Labor Income Based on 1922-1929 Prices

The relative merits of the 11 plans for operating the 80-acre farm under 1922-1929 average prices are compared in terms of labor income in *Fig. 5* and *Table VI*. Labor income, as shown in *Table VI*, is farm income less interest on the capital involved in operating the farm under each of the respective systems of farming. In general it is seen there is a wide variation in the labor income from the farm when operated by the different systems, the range being from $841 for System 4 to $2,694 for System 7, the difference between the two extremes being $1,853. System 6, the next to the highest, has a labor income of $2,558 as compared with $1,036 for System 2, the next to the lowest. In this comparison the difference is $1,522. These differ-

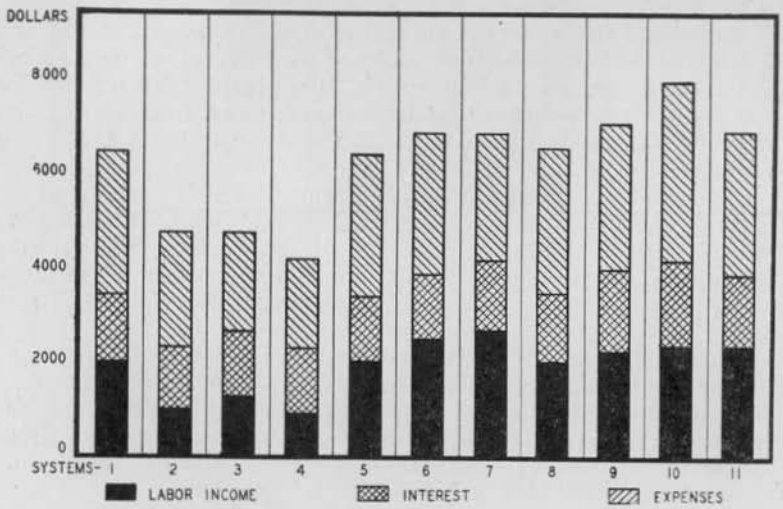

Fig. 5—Estimated labor income from an 80-acre farm operated by each of 11 different systems of farming under 1922-29 average prices and costs.

ences are large enough to be quite significant and it would appear that a careful use of the budgeting method in this area would be very helpful to farmers in choosing crop and livestock enterprises and combining them into well planned production programs.

At this point two things should be remembered: In the first place none of the 11 systems of farming compared in *Tables I to VI* is to be considered as the best that can be worked out for the area covered by this bulletin. There is no end to the number of combinations of enterprises that can be set up and some of them might prove more satisfactory even under 1922-1929 prices than any one of the 11 systems used in the budgets. However, it can be said that each of the systems compared is well suited to maintain the organic content and the physical condition of the soil. Secondly, the comparative labor incomes presented in *Table VI* and *Fig. 5*, obtained by estimating the receipts and expenses for the farm when operated by the different systems of farming, will hold good only so long as the standards of production, prices and in-put factors used in setting up the budgets are held unchanged. If any of these factors are changed the comparative labor income from the different systems will change accordingly.

We now turn to a more detailed examination of the returns from the respective systems of farming in order to ascertain the reasons for the variations in labor income. Labor income for System 1 is $2,186 while that for System 3 is $1,235, the difference being $951. The amount of livestock kept and the cropping plan for the two systems correspond in every detail except that the 12 acres of russett potatoes in System 1 are replaced by 12 acres of Great Northern beans in System 3. Since the two systems are alike in every particular except these two crops, the difference arises because the net return from the 12 acres of potatoes exceeds that from the 12 acres of beans $951 or $79 per acre in round numbers.

Systems 2 and 3 correspond also in every respect except 12 acres of sugar beets in System 2 are replaced by 12 acres of beans in System 3. Labor income for System 3 is $199 greater than that for System 2. This is because the estimated net return from the 12 acres of beans exceeds that from the 12 acres of sugar beets $199 or ap-approximately $17 per acre.

The production plans of System 2 and System 4 correspond crop for crop except that 12 acres of sugar beets in System 2 are replaced by 12 acres of alfalfa in System 4. Labor income for System 2 exceeds that for System 4 by $195 and it follows that the estimated net return from the sugar beets exceeded that from the alfalfa about $16 per acre.

Red clover may be substituted for alfalfa in the area studied as the soil improving crop. The estimated effect of this substitution on labor income is obtained by comparing Systems 1 and 6. The wheat and the potatoes in the two systems correspond in acreage grown, production and amount sold. While 24 acres of beans are produced in each system, the yield is 1.6 bushels less per acre in the red clover rotation than it is in the alfalfa rotation (*See Table XVI*). In addition to competing with the 24 acres of alfalfa in System 1, the 24

TABLE V

Estimated Expenses for An 80-Acre "Deep Soil" Farm, Twin Falls Southside Irrigation Project, When Operated Under Different Systems of Farming, 1922-1929

Expense	Crop Farming							Crop and livestock farming			
	System 1	System 2	System 3	System 4	System 5	System 6	System 7	System 8 (System 1 and 4 sows)	System 9 (System 1 and 8 cows)	System 10 (System 9 and 400 hens	System 11 (System 1 and 83 ewes
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Hired labor for crop	354	302	293	331	422	256	164	354	308	301	240
Contract work:											
Grinding feed	2	2	2	2	2	2	2	33	18	26	2
Cleaning beans and seed	43	43	64	43	42	43	44	43	44	44	44
Threshing and hulling	225	225	306	225	162	324	342	225	243	248	262
Pick and grade potatoes	386	.....	.....	.....	386	386	386	386	386	386	386
Thin, hoe, top and load beets	.....	300	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hauling	228	165	45	36	212	231	239	215	223	223	234
Seed bought	169	158	187	136	188	140	137	169	170	170	168
Feed bought	51	51	51	51	51	51	51	144	127	483	53
Sacks and binding twine	318	58	84	58	310	318	322	318	319	319	321
Telephone and insurance	27	27	27	27	27	27	27	27	30	33	27
Taxes	304	304	304	304	304	304	304	307	326	334	330
Water	136	136	136	136	136	136	136	136	136	136	136
Auto—operation and depreciation	175	175	175	175	175	175	175	175	175	175	175
Repairs and depresiation[1]	502	429	428	428	502	505	502	521	588	659	540
Depreciation—4 horses and 1 cow	58	58	58	58	58	58	58	58	58	58	58
Depreciation—bull, rams	.....	.....	.....	.....	.....	.....	.....	.....	50	50	14
Boar service	.....	.....	.....	.....	.....	.....	.....	18	.....	.....	.....
Vet., medicine, disinfectants	3	1	1	1	1	3	3	13	35	39	27
Dairyherd Imp. Assn.	.....	.....	.....	.....	.....	.....	.....	.....	24	24	.....
Brooder-house fuel	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	.....
Egg crates and cases	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	.....
Baby chicks	.....	.....	.....	.....	.....	.....	.....	.....	.....	104	.....
Sheep shearing	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
Total estimated expense	2,981	2,434	2,161	2,011	2,978	2,959	2,892	3,142	3,260	3,831	3,032

1 Machinery, tools, buildings, fences, etc., included.

TABLE VI

Estimated Receipts, Expenses and Returns from an 80-Acre Farm on the Deep Soil Phase of the Twin Falls Southside Irrigation Project When Operated Under Different Systems of Farming, Based on 1922-1929 Average Prices and Costs

Item	Crop Farming							Crop and livestock farming			
	System 1	System 2	System 3	System 4	System 5	System 6	System 7	System 8 (System 1 and 4 sows)	System 9 (System 1 and 8 cows)	System 10 (System 9 and 400 hens	System 11 (System 1 and 83 ewes
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Receipts	6,636	4,884	4,803	4,255	6,486	6,969	7,036	6,666	7,205	7,928	7,017
Expenses	2,981	2,434	2,161	2,011	2,978	2,944	2,876	3,142	3,260	3,831	3,032
Farm income	3,655	2,450	2,642	2,244	3,508	4,025	4,160	3,524	3,945	4,097	3,985
Interest on capital	1,469	1,414	1,407	1,403	1,462	1,467	1,466	1,503	1,641	1,763	1,590
Labor income	2,186	1,036	1,235	841	2,046	2,558	2,694	2,021	2,304	2,334	2,395
Return to the labor used on livestock[1]								−165	118	148	209
Based on 1931 Prices and Costs											
Receipts	2,556	2,405	1,670	1,858	2,708	2,455	2,436	2,713	2,714	3,470	2,372
Expenses	2,578	2,154	1,888	1,769	2,568	2,553	2,508	2,720	2,836	3,327	2,638
Farm income	−22	251	−218	89	140	−98	−72	− 7	−122	143	−266

[1] Computed as the difference between labor income on System 1 and labor income with the additional livestock.

acres of red clover in System 6 must make up for the decrease of 1.6 bushels of beans per acre on 24 acres or a total of 38.4 bushels. The yields used for red clover in the computations are 286 pounds of clean seed per acre the first year, 210 pounds the second year and 1.1 tons of hay per acre each year as compared with 4.5 tons of alfalfa per acre each year. Labor income for System 6 exceeds that of System 1 by $372 or about $15 more per acre from the clover.

Since the estimated net return of sugar beets is approximately $16 per acre above that of alfalfa and since the net return of red clover is about $15 per acre above that of alfalfa, it follows that the estimated return of sugar beets is about $1 per acre above that of red clover. This, however, is not enough to be of any significance.

The stand of red clover is sometimes damaged so severely by diseases and insect pests as to make it advisable to plow up the clover after harvesting the first crop of seed. System 7 is submitted to show what effect using clover for seed production but one year would have on labor income when based on 1922-1929 average prices. It is to be noted that the cropping system of System 7 is a 4-year rotation, the 72 acres of crop land being divided into four fields of 18 acres each. In this rotation there are 18 acres of wheat, 18 acres of red clover and 18 acres of beans each occupying a field. The other field is divided, potatoes occupying 12 acres and beans 6 acres. This gives the same acreage of potatoes and beans in System 7 as in System 6. Twelve acres of wheat in System 7 cancel the 12 acres of wheat in System 6. This leaves 6 acres of wheat yielding 52.6 bushels and selling for $1.04 per bushel and 18 acres of red clover seed yielding 286 pounds per acre and selling at 22 cents per pound to compete with 12 acres of red clover seed yielding 286 pounds per acre and 12 acres yielding 210 pounds per acre and selling at 22 cents per pound. Labor income for System 7, it is seen, is $136 greater than that for System 6. In order for the 24 acres of red clover in System 6 to give the same net return as the 6 acres of wheat and the 18 acres of red clover in System 7, the 12 acres of second year clover should yield approximately 266 pounds per acre instead of 210 pounds.

The budget for System 5 was prepared to show the increase or decrease in the estimated returns from seeding alfalfa alone and using it for producing hay for three years as compared with seeding it with wheat and using it for hay but two years as in System 1. In comparing Systems 1 and 5 the potatoes and beans produced correspond acre for acre in the two systems. This leaves 12 acres of wheat yielding 52.6 bushels per acre and selling for $1.04 per bushel and 24 acres of alfalfa using 4.5 tons per acre and selling for $10.10 per ton in System 1 to be compared with 12 acres of new alfalfa seeded alone with an estimated yield of three tons per acre and 24 acres of second and third year alfalfa with an estimated yield of 5 tons per acre and selling at $10.10 per ton in System 5, the average yield for the three years being 4.33 tons per acre. Labor income for System 1 exceeds that of System 5 by $140. In order for the alfalfa when seeded alone to give the same net return as when seeded with wheat as in System 1, the average yield for the three years must be increased from 4.33

tons per acre to 4.76 tons, a total increase of 15.2 tons. In arriving at the necessary increase in the yield of the alfalfa when seeded alone, 90 cents per ton was allowed for hired labor for stacking the 15.2 tons of hay.

Summarizing, it may be said that for the 1922-1929 period the estimated net returns per acre for the five crops just compared were approximately as follows: The net return for potatoes averaged about $79 per acre above that for Great Northern Beans; that for beans averaged about $17 per acre above that for sugar beets; that for sugar beets about $1 per acre above that for red clover; and that for red clover about $15 per acre above that for alfalfa, the returns for red clover being based on System 6.

The comparative net returns from the respective crops just presented are based on the money value of the crops when sold at average 1922-1929 prices. It is well known, however, that each of the crops when grown in a crop rotation has more or less influence on the yields of the other crops in the rotation. That influence varies widely for the respective crops and should be considered when making up production plans for the year or years ahead. For the Twin Falls area, however, there is no statistical basis for rating the credit that should be assigned to the different crops. Those interested in this phase of the problem of selecting crop enterprises and combining them into production plans will find helpful information in United States Department of Agriculture Technical Bulletins Nos. 2 and 144 entitled, respectively, *"Irrigated Crop Rotations in Western Nebraska"* and *"Irrigated Crop Rotations in Southern Montana."*

So far the discussion has dealt with a comparison of the estimated returns from the seven systems of crop farming. We now turn to a consideration of Systems 8-11 in which crop and livestock production are combined. Since the cropping plan of System 1 was so modified in setting up the budgets for Systems 8-11 as to provide pasture and the farm grown feed consumed by each unit of livestock added to the organization, the estimated returns from the four crop and livestock systems will be compared with the returns from System 1. However, there is no particular reason why the crop and livestock systems might not be compared with any of the seven systems of crop farming.

It is to be remembered in considering Systems 8-11, first, that the addition of each of the livestock units does not interfere with the production and sales of potatoes and beans; for the same amounts of these two crops are produced and sold in each of the crop and livestock budgets as are produced and sold in System 1. Each of the livestock units competes with either alfalfa or wheat or with both of these crops when grown for sale. The second point to which attention is directed is the fact that no charge has been made for the extra labor required to care for each of the units of livestock added, the final figure being "Return to the labor used in caring for the livestock." Each of the livestock units is too small to require the full time of an extra hired man and it was assumed that the farm operator and members of his family would have to take on this extra work. A third point that should receive consideration is the value

of the animal manure derived from the livestock in a program designed to maintain or build up soil productivity. In these setups, because of the difficulty of making an accurate estimate, the livestock units were given no credit for the value of the manure.

A 4-sow hog unit is included in the farm organization of System 8. The cropping plan for this system is exactly the same as that for System 1, crop for crop. The addition of the hog unit made no change in the sales of potatoes and beans but reduced the sales of alfalfa hay 6.3 tons and wheat 530 bushels. It is thus seen that in this comparison it is very largely a question of selling wheat or feeding it to hogs. The addition of the hogs to the farm increased receipts $30, expenses $161 and interest for the use of the capital $34. The 33 market hogs, the two heavy sows and and the barren gilt were sold in the budget at an average price of $8.98 per 100 pounds and the wheat at $1.04 per bushel.

Labor income for System 8 is $2,021 as compared with $2,186 for System 1. In other words the addition of the 4-sow unit to the farm organization caused a decrease in labor income of $165. In this set-up the receipts might *have been increased from $35 to $40* by cooking and feeding cull potatoes to the hogs and selling the wheat replaced by potatoes.

In this comparison the hogs compete slightly with alfalfa and chiefly with wheat. The accompanying table shows the comparative prices at which wheat and hogs must sell for Systems 1 and 8 to give the same labor incomes, there being no return to the labor used in looking after the hogs.

Comparative Prices of Wheat and Hogs at Which the 80-Acre Farm Operated Under Systems 1 and 8 Should Give Approximately the Same Labor Income

	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
Wheat, per bu.	.25	.40	.55	.70	.85	1.00	1.15	1.30	1.45
Hogs, per 100 lbs.	5.51	6.60	7.69	8.78	9.87	10.96	12.05	13.14	14.23

In computing the comparative prices for wheat and hogs presented in the preceding table all other factors used in setting up the budgets for Systems 1 and 8 are held constant. That is, the prices received for potatoes, beans and hay, and the crop yields and expense items all remain unchanged. If the value of these items changes materially, the comparative prices given in the table for wheat and hogs will also change. The table shows that, with wheat at 25 cents per bushel, hogs would have to sell for $5.51 per 100 lbs. to give about the same net return as wheat; or with wheat at $1.00 per bushel hogs must sell at about $10.96 per 100 pounds. If the value of the wheat were reduced to zero, the hogs would still have to sell for $3.78 per 100 pounds for hogs to break even with wheat, there being no return to the labor used in caring for the hogs. That is, the tankage consumed by the hogs, repairs and upkeep of the hog equipment, interest on the capital in the hog enterprises, service of the boar and other minor hog expenses at the prices used in computations would amount to $3.78 per each 100 pounds of hogs sold.

That hog production on the Twin Falls southside irrigation project was not an attractive enterprise as compared with alternative

lines of production during the period 1922-1929 is substantiated by the experience of farmers, for comparatively few hogs were produced on the project during these eight years. It must not be inferred, however, that no hogs should have been produced. Men skilled in hog production can probably do better than the standard used in these estimates. On the other hand the inexperienced will probably find it difficult to attain them. A few hogs may be raised to advantage on practically every farm. Current retail prices are paid when pork, bacon, and lard are bought for use on the farm. The prices which farmers receive for hogs sold are much lower than retail prices. If a farmer produces the pork products used on his farm, it is like selling them to himself at retail prices.

An 8-cow dairy herd is included in the organization plan for System 9. When compared with System 1, the addition of the dairy herd increased the farm capital $2,154 and the interest charge $172. The addition of the herd also decreased the alfalfa hay sold 61 tons and the wheat sold 184 bushels, but caused no change in the sales of potatoes and beans. The dairy herd, therefore, competes with selling hay at $10.10 per ton and wheat at $1.04. The estimated production per cow is 360 pounds of butterfat which is sold in setting up the budget at an average farm price of 45.6 cents per pound.

Labor income for System 9 is $2,304 as compared with $2,186 for System 1, the difference being $118. This represents the return to the labor used in caring for the dairy herd after deducting $172 as interest for the use of the dairy capital. A saving of about 6 tons of hay might be effected by slicing and feeding cull potatoes to the dairy herd. This would increase labor income and the return to the labor used in caring for the dairy about $60.

Further increases in net returns from the dairy herd might be obtained by increasing the production per cow above 360 pounds of butterfat and by providing pasture that will carry more than two cows per acre.

The dairy herd in System 9 competes with alfalfa and wheat grown as cash crops. The accompanying table was designed to show roughly at what prices the production of (1) alfalfa and wheat, and (2) butterfat would have given about the same net returns in operating the farm under Systems 1 and 9.

In computing the data presented in the foregoing table the necessary labor for caring for the dairy enterprise was not charged as an expense. It should be understoood also that the cost of the feed bought for the dairy herd, the dairy herd improvement association dues, veterinary bill, taxes on dairy capital, upkeep expense of dairy equipment, etc., are all held at the same level throughout the table.

Comparative Prices of (1) Alfalfa Hay and Wheat and (2) Butterfat at Which the 80-Acre Farm Operated by Systems 1 and 9 Should Give Approximately the Same Labor Income

	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
Hay per ton	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00
Wheat per bu.	.40	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40
Butterfat, per lb...	.23	.26	.29	.32	.35	.38	.41	.44	.47	.50	.53

A material change in these items would probably cause the comparative prices of hay, wheat, and butterfat to change.

With these reservations in force it can be said that the operation of the 80-acre farm under Systems 1 and 9 should give about the same labor income when the price of alfalfa is $4.00 per ton, that of wheat 40 cents per bushel, and that of butterfat 23 cents per pound; or when the price of alfalfa hay is $10.00 per ton, that of wheat $1.00 per bushel, and that of butterfat 41 cents per pound. This should be sufficient to make the above table clear.

System 10 is a combination of crop, dairy, and poultry farming. The dairy unit is the same as that in System 9 and the poultry unit consists, on October 1, of 175 hens and 225 pullets just entering their first laying year. There is an average of 317 laying hens on hand during the year and the average production per hen is 163 eggs. In System 9 half the milk produced was sold as whole milk whereas in System 10 all of the milk is separated to provide skim milk for the poultry. This reduces the average price of butterfat from 45.6 cents per pound to 43.5 cents. The eggs are sold at an average price of 24.7 cents per dozen. The budget for System 10 included no charge for labor needed for caring for both the dairy and poultry units.

Labor income for System 10 (*Table VI*) is $2,334 as compared with $2,186 for System 1 and $2,304 for System 9. Adding both the dairy and poultry units to System 1 increased labor income $148 and adding the 400-hen poultry flock to System 9 increased labor income $30. That is equivalent to saying that after paying expenses and 8 per cent on capital, the dairy unit returned $118 and the poultry unit $30, respectively, to the labor used on the two enterprises.

Sheep and crop farming are combined in System 11. The flock, as of November 1, consists of 83 ewes, 17 ewe lambs, and two rams. Comparing System 11 with System 1, the addition of the flock of sheep does not change the sales of potatoes and beans, but decreases the sales of alfalfa 88 tons and increases the sales of wheat from 611 bushels to 815 bushels. During the farm year eight cull ewes are sold at $5.00 each, 79 lambs at $9.40 each, and 830 pounds of wool at 33 cents per pound.

Adding the flock to the organization increased labor income from $2,186 for System 1 to $2,395, a difference of $209. That is, after paying 8 per cent interest on the capital in the sheep enterprise there remained $209 as a return to the labor used in caring for the sheep.

Farm Income Based on 1931 Prices

The estimated returns from the 80-acre farm when operated by 11 different systems of farming under 1922-1929 average price conditions are presented in the upper section of *Table VI*. The picture thus presented is contrasted in the lower section of the same table by showing estimated returns from the farm when operated under 1931 prices and costs. The same crop yields, standards of livestock production, and input factors were used in setting up the budgets for both 1931 and the 8-year period, 1922-1929, the only difference in the computation being the substitution of 1931 prices for the average

prices for the 8-year period. The computations are only carried as far as farm income for the year 1931. This is due to the lack of a satisfactory basis for computing interest for the use of farm capital, and this, in turn, is due to the abrupt shifts which have taken place in values since 1930.

The picture presented for 1931 is very different from that for the period 1922-1929. Farm income for the eleven systems averaged $3,476 for the 1922-1929 period as compared with –$17 for 1931, a difference of $3,493. This illustrates the condition that may arise from violent and unequal price changes (*Fig. 6*).

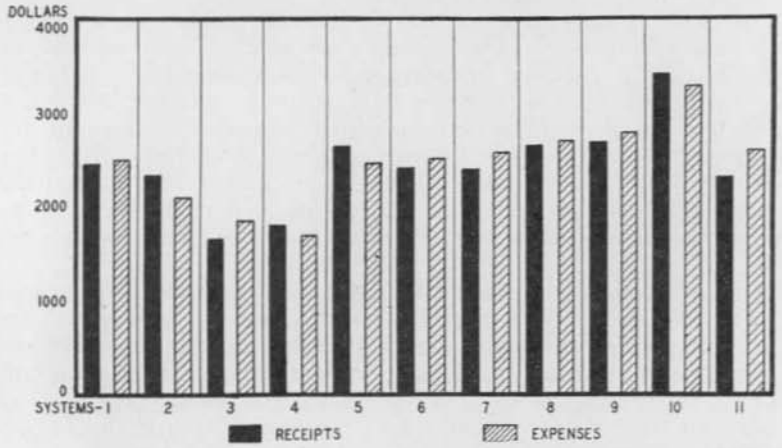

Fig. 6—Estimated receipts and expenses from an 80-acre farm operated by 11 systems of farming under 1931 average prices.

The relative standing of the eleven systems is shown by *Fig. 6*, which presents 1931 receipts and expenses. Receipts exceed expenses only in Systems 2, 4, 5, and 10. System 2, in which 12 acres of sugar beets replace 12 acres of potatoes in System 1, ranks highest with a farm income of $251 as compared with –$22 for System 1. System 10 and System 5, in which alfalfa replaces wheat in System 1, rank second with farm incomes of $143 and $140, respectively. Poultry, the comparisons indicate, appears as the most profitable class of livestock in 1931. The shifting about of the comparative profitableness of the eleven systems of farming, due to the price changes which took place in 1930 and 1931, emphasizes the need of budgeting to determine what appears to be the most profitable production plan for the year ahead.

Prices at Which Five Crops Give About the Same Net Return

Potatoes, beans and sugar beets are competing row-tilled crops on much of the Twin Falls southside irrigation project. That is, in a crop rotation these three crops are readily interchangeable. We have seen also in comparing Systems 1-4 that alfalfa may replace

either potatoes, beans or sugar beets in the six-year rotation by using the alfalfa for hay an additional year. A comparison of Systems 1 and 6 further shows that red clover may replace alfalfa. Prices at which the five crops should give about the same average net return (1) for the 1922-1929 period and (2) for the year 1931 when grown under System 1-4 and System 6 are presented in *Tables VII* and *VIII*.

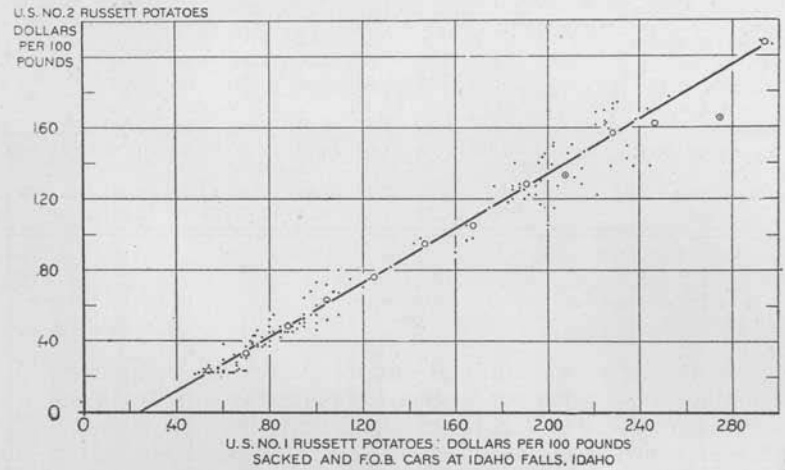

Fig. 7—Relation of the price of U. S. No. 2 Russett potatoes to the price of U. S. No. 1 Russett potatoes, sacked F.O.B. cars, Idaho Falls, Idaho.

Comparative Prices for 1922-1929 Period

Arbitrary prices ranging from 60 cents to $2.00 per 100 pounds were assumed for No. 1 potatoes in constructing *Table VII*. The corresponding prices for No. 2 potatoes were read from *Fig. 7*. The corresponding prices required for the other crops to give approxi-

TABLE VII

Prices at Which Russett Potatoes, Great Northern Beans, Sugar Beets, Alfalfa Hay and Red Clover Seed Should Give Approximately the Same Net Return Per Acre When Grown in Farming Systems 1-4 and in System 6 Under 1922-1929 Prices[1]

Items	Acre yield	Price per unit							
	Cwt.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
Russett potatoes:									
U. S. No. 1	153	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00
U. S. No. 2	31	.28	.43	.58	.73	.88	1.03	1.18	1.33
Culls and shrink	46	--	--	--	--	--	--	--	--
Great Northern Beans	17.58	1.20	3.09	4.98	6.87	8.76	10.65	12.54	14.44
Red clover seed[2]	2.48	3.96	14.37	24.78	35.19	45.60	56.01	66.42	76.83
	Ton								
Alfalfa hay	4.5	1.83	9.22	16.61	24.00	31.39	38.78	46.17	53.56
Sugar beets[3]	12.0	3.30	6.07	8.84	11.61	14.38	17.15	19.92	22.70

[1] If the crop yields or the cost items used in computing the data presented in this table are changed, the comparative prices of the respective crops will also change.
[2] In farming System 6, where red clover replaces alfalfa in the rotation, the yield of beans is 1662 pounds per acre instead of 1758 pounds as it is in the alfalfa rotation.
[3] In budgeting the receipts a credit of $4.80 per acre is given for the beet tops.

TABLE VIII

Prices at Which Russett Potatoes, Great Northern Beans, Sugar Beets, Alfalfa Hay and Red Clover Seed Should Give Approximately the Same Net Returns Per Acre When Grown in Farming Systems 1-4 and 6, Under 1931 Prices[1]

Items	Acre yield	Price per unit							
	Cwt.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
Russett potatoes:									
U. S. No. 1	153	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00
U. S. No. 2	31	.28	.43	.58	.73	.88	1.03	1.18	1.33
Culls and shrink	46	..	..	..	..	..	..	..	..
Great Northern beans[2]	17.58	1.88	3.77	5.67	7.54	9.46	11.36	13.25	15.15
Red clover seed	2.48	7.19	17.60	28.01	38.41	48.83	50.24	69.65	80.06
	Ton								
Alfalfa hay	4.5	5.09	12.48	19.87	27.26	34.65	42.04	49.43	56.82
Sugar beets	12.0	4.34	7.12	9.90	12.67	15.45	18.23	21.01	23.78

1 If the crop yields or the cost items used in computing the data presented in this table are changed, the comparative prices of the respective crops will also change.
2 In farming System 6, where red clover replaces alfalfa in the rotation, the yield of beans is 1662 pounds per acre instead of 1758 pounds as it is in the alfalfa rotation.
3 In budgeting the receipts from sugar beets a credit of $3.60 per acre is given for the tops.

mately the same net return as potatoes were then computed. For example, labor income for System 1 was figured with No. 1 potatoes at 60 cents and No. 2 potatoes at 28 cents per 100 pounds. The price at which beans must sell in order for the labor income for System 3 to equal that for System 1 was then computed. Other prices were figured in a similar manner.

The following should make the significance of the table clear, remembering that the crop yields and cost factors used in setting up the respective budgets must remain unchanged; that is, these factors remain constant throughout the table. Suppose that No. 1 potatoes are 60 cents per 100 pounds and No. 2 potatoes are 28 cents. The corresponding necessary price for each of the other crops to equal potatoes in net return is found in the column headed by 60 cents for No. 1 potatoes. The necessary prices for the other crops, it is seen, are: $1.20 per 100 pounds for beans, $3.84 per 100 pounds for red clover seed, $1.76 per ton for hay, and $3.30 per ton for sugar beets. But when the price of No. 1 potatoes is $1.00 per 100 pounds, the necessary prices for the other crops to "break even" with potatoes are: $4.98 for beans, $24.72 per 100 pounds for red clover seed, $16.57 per ton for alfalfa hay and $8.84 per ton for sugar beets.

Table VII presents average price relationships for five crops for the period 1922-1929. While these relationships have been materially changed, an understanding of the past is generally very helpful in judging the future.

Comparative Prices for 1931

Prices at which potatoes, beans, sugar beets, alfalfa hay and red clover seed should make about the same net return per acre when produced in the cropping plans for Systems 1-4 and System 6 under 1931 average prices and costs are presented in *Table VIII*. The same procedure was followed in preparing *Table VIII* as was followed in preparing *Table VII*.

A comparison of *Tables VII* and *VIII* shows that substituting 1931 prices and costs for those of 1922-1929 caused a considerable shifting in the comparative prices required for the several crops to make the same net returns. This, of course is due to the disproportional shifting of the cost items for the different crops. The unequal shifting of the necessary prices shown in *Table VIII* as compared with those in *Table VII* further emphasizes the necessity of carefully estimating probable returns from alternative production plans for the year ahead.

Budgeting the Program for the Individual Farm

Improvement of the condition of the rank and file of farmers is the end in view of all budgeting studies. Research and extension workers may study out what appears to be improved systems of farming for a given area. The value of such studies, however, should be judged by the extent to which individual farmers respond to the findings which result from these studies and a liberal response should indicate general benefit.

Farm conditions may be improved in two ways by the use of the budgeting method: (1) Basing their calculations on price outlook information, average crop yields, and average cost factors, research workers may study out systems of farming for a given area which appear likely to give the farmers the best results during the years just ahead. Farmers may then follow these systems to the extent that is practicable, without setting up detailed budgets for their individual farms. (2) A better plan of proceduce, however, is for each farmer, working on the suggestions he receives from the general "typical" budgets prepared for his locality by the research and extension agencies, to carefully prepare plans for his own farm and thereby compare the estimated future returns from a few systems which seem most promising of good returns. From these he can then select what appeals to his judgment as the best for his farm.

At this point the question may arise: "Why is it necessary to set up budgets for the individual farm, research workers having worked out systems of farming for the area as a whole?" The answer is that the systems developed by the research workers for the area are genally based on averages or some other type of "representative" figures, whereas the individual farm usually differs from the average quite materially. The individual farm also differs to some degree from every other farm in the area in the physical condition and productivity of the soil; in the crop yields which are obtainable; in the labor, equipment, funds and credit available for use; and finally in the experience, likes, dislikes, and capacity of the farm operator for performing physical work and in planning and directing the operation of the farm. In each of these things the individual farm is either above or below the average. The production program, therefore, should be fitted to the conditions of the individual farm.

The problem of the individual farmer who expects to remain on his farm and operate it indefinitely is to plan each year's business so as to obtain as high a labor income as possible and at the same time maintain or increase the productiveness of his farm. To attain this objective it may be necessary to set up several plans for operat-

ing the farm and then compare their probable net returns by estimating receipts and expenses. The purpose of the discussion which follows is to assist the farmers to a better understanding of the use of the budgeting method.

Perhaps the best time for budgeting the farm business to obtain probable future returns in the Twin Falls area is during the latter part of February and the first part of March; that is just before the spring work begins and just after the United States Department of Agriculture has issued its reports showing the planting and breeding intentions of farmers. Furthermore, at this season of the year the crop and livestock outlook information issued by both the Agricultural Extension Service of the University of Idaho and the United States Department of Agriculture is available.

One of the first things to be considered in making up a production program, especially if it is a long-time program, is the need of soil improvement and what is to be done about it. Individual farms in the Twin Falls area differ widely in this respect. The soil of one farm may be in a very satisfactory state of productiveness while that of another adjoining farm may be in great need of attention and improvement. The cropping system to be followed and the amount of livestock to be kept may hinge on the need of soil improvement.

The next step in deciding what to produce by means of the budgeting method is to set up two or more plans or systems for operating the farm. *Table I*, for example, shows 11 different systems for operating an 80-acre farm. The object, of course, is to estimate the receipts and expenses of each and find out which one seems likely to give the best future returns. If the proposed plans include livestock it is necessary to estimate the pasture and feed that will be needed. *Table XIV*, under the caption "Standards of Production, Prices and Costs," presents the estimated feed needed in operating the 80-acre farm by the eleven different systems. Note that in *Table XIV* the feeds are listed under (1) Home Grown and (2) Purchased. The value of the feeds purchased is carried forward to *Table V* as an expense item. Where livestock is carried in the organization, the cropping system must be planned to provide the necessary home grown feed.

In estimating crop production, yields should be used which can be obtained on the farm for which the budgets are being prepared. If no records have been kept, yields which may be expected will have to be estimated. The amount of each crop to be sold is obtained by deducting from the total amount produced the sum of the amounts used in the home and for seed and feed. *Table II* shows the estimated production and disposal of crops for the 11 different systems of operating the 80-acre farm. If the same amounts of feed, seed and supplies are held at the close of the farm year as were on hand at the beginning of the year, the increase and decrease in the inventories of these items may be avoided.

The production and disposal of livestock and livestock products are handled in precisely the same way as the production and disposal of crops. An estimate must be made as to the pounds of butterfat that can be produced per cow; the number of lambs that can be raised from a given number of ewes; the dozens of eggs that can be

produced from the flock of hens to be kept; and the number of pigs that can be raised per litter and per sow. *Table III* shows the estimated production and disposal of livestock for Systems 8-10. In budgets for individual farms, disposal should include the animals and animal products used in the home. Increase and decrease in livestock inventories can be avoided by carrying the same amounts of livestock at the beginning and close of the year.

Farming is a forward looking business. Crops, livestock and livestock products are generally marketed from six months to one or more years after the crops are seeded and the animals are bred. The producer of farm products (unless operating under a contract) must always take a chance as to what prices will be received for his products when they are ready for market. These prices must be anticipated in budgeting to determine probable future incomes. To decide wisely what prices to use in estimating future receipts requires a thorough knowledge of production trends, consumer demand, price trends, and market outlook; that is, a knowledge of the forces which make prices. The following will be found very helpful in acquiring that knowledge:

1. Idaho Agricultural Situations, issued monthly by the University of Idaho, College of Agriculture.
2. The Agricultural Situation, issued monthly by the United States Department of Agriculture.
3. The Agricultural Outlook, issued annually by the United States Department of Agriculture.
4. Yearbooks, statistical bulletins, and special commodity price studies issued by the United States Department of Agriculture.
5. Market News Service reports issued by the United States Department of Agriculture.

The expense of operating farms, even of the same size, under the management of different men varies considerably. Because of this each case should be handled on its own merits. In estimating future expenses the farm operator must decide how much of the farm work he and the members of his family can do; how much will be done by contract; how much hired labor will be needed; how much seed, fertilizer, disinfectant, twine, sacks, etc., will be required for each crop; what will be the expense of threshing, hauling, hulling, and the cleaning and preparing of the crops for market; how much purchased feed, medicine, veterinary service, etc., will be needed for each class of livestock kept; how much must be spent for repairs on machinery, tools, fences, buildings, etc., and for depreciation or replacement of these items; and to how much taxes, insurance, irrigation water and the operation and upkeep of the farm auto or truck will amount. In other words, the whole realm of farm expenses must be anticipated and estimated.

A good set of farm accounts would furnish much of the information needed in estimating receipts and expenses. The keeping of farm accounts would make it possible to summarize the business at the end of the year and to compare the results obtained with the returns estimated at the beginning of the year. This, in turn, would assist materially in setting up plans and budgets for the years to follow. The Extension Service and the Department of Agricultural

Economics of the University of Idaho, College of Agriculture, are prepared to give assistance in budgeting farm incomes.

Farmers who are interested in using the budgeting method as a means of deciding what to produce will find Idaho Bulletin No 188, "Planning the Farm Business for the Year Ahead," and United States Department of Agriculture Farmers' Bulletins, No. 1139, "A Method of Analyzing the Farm Business," and No. 1564, "Farm Budgeting," very helpful. These bulletins present sets of blank tables which may be used for setting up budgets for both tenant and owner operated farms.

Summary and Conclusions

This bulletin applies especially to the "Deep Soil Phase" of the Twin Falls southside irrigation project of southern Idaho. *Fig. 1* shows the specific area to which the crop yield data presented in *Table XVI* are applicable.

The wide range of crop and livestock enterprises from which to choose when deciding what to produce and the constant changing of prices makes the problem of planning future production programs for this area especially complex and difficult. The study of this area was undertaken to develop a better basis for planning ahead.

This bulletin presents a method of choosing enterprises and planning production programs for both local areas and individual farms. Budgeting is the method presented. Its fullness in deciding what to produce is illustrated by estimating the receipts, expenses and returns from an 80-acre farm operated by each of 11 different systems of farming under average prices and costs for (1) the 1922-1929 period and (2) the year 1931.

The results of these comparisons are given in *Table VI* and *Figs. 5* and *6*. The estimated labor income from the 80-acre farm when operated by the different plans varies from $841 for System 4 to $2,694 for System 7. The variation in labor income is great enough to be quite significant and indicates the possibility of materially increasing net returns in this area by the comparison of carefully preparing budgets for a few of the more promising proluction systems which may be outlined.

Systems 1-7 (*Tables I-VI*) are crop farming organizations whereas Systems 8-11 are combinations of crop and livestock farming. No charge was made in Systems 8-11 for the labor used in caring for the livestock, the final figure being return to the labor used on livestock. This figure was computed as the difference between labor income for System 1 without livestock and labor income for each of the four systems having livestock added. In comparing Systems 8-11 with System 1 (*Tables I-VI*), it is to be remembered that the addition of each unit of livestock interferes with only the production and sales of alfalfa and wheat. In the above comparisons of Systems 8-11 with System 1 livestock enterprises were not credited with the value of the manure.

The estimated average annual return to the labor used in the different units of livestock during the 1922-1929 period are as follows: For the 4-sow hog unit, $165; the 8-cow dairy, $118; the 8-cow dairy and the 400-hen flock, $148 (that to the labor used on the

poultry being $30); and the 100-ewe and ewe lamb flock of sheep, $209. By feeding cull potatoes the return to the labor used on the hogs might have been increased some $35 to $40 and on the dairy herd about $60.

It is not to be inferred that the four classes of livestock could not have been made more remunerative in the area studied during the 1922-1929 period than these figures indicate. This might have been accomplished by obtaining higher production per animal than the standards used in the budgets and other systems of feeding might have given better results. However, 6 pigs raised per litter, 360 pounds of butterfat per cow, 163 eggs per hen and a lamb crop of 120 per cent represent higher standards than the beginner is likely to attain. Experienced husbandmen might do better.

The estimated returns from the 80-acre farm when operated by 11 different systems of farming under 1931 average prices are shown in the lower section of *Table VI*. Farm income for the 11 systems averaged $3,476 for the 1922-29 period as compared with $-17 for 1931, a difference of $3,493. System 2 ranked highest in farm income in 1931 and next to the lowest for the 1922-1929 period. Of the four crop and livestock systems, Number 11 ranked highest in return to labor for the 1922-1929 period, and lowest in farm income for 1931. The shifting about of the comparative profitableness of the 11 systems of farming, due to the price changes which took place in 1930 and 1931 further emphasizes the need of budgeting to determine what production plan is likely to be most satisfactory for the year ahead.

The comparative returns from two or more crop enterprises also may be determined by use of the budgeting method. For example, Systems 2 and 3 (*Table I*) are alike, crop for crop, except that 12 acres of sugar beets in System 2 are replaced by 12 acres of beans in System 3, the receipts and expenses of the wheat and alfalfa in the two systems being equal. The difference in the net return from the 12 acres of sugar beets and 12 acres of beans must equal the difference in the labor incomes for the two systems. Labor income for System 3 exceeds that of System 2 by $199 and it follows that the estimated net return from the 12 acres of beans exceeds that from the 12 acres of sugar beets $199, or approximately $17 per acre. By this process it was found that the estimated average net returns per acre for five crops during the 1922-1929 period are as follows, using round numbers: The net return from russett potatoes average $79 above that from Great Northern beans; that from beans $17 above that from sugar beets; that from sugar beets $1 above that from red clover seed; and that from red clover seed $15 above that from alfalfa.

It is thus seen that by use of the budgeting method a direct comparison can be obtained of the comparative net returns of two or more competing crops which can readily be interchanged in a crop rotation. Having obtained the comparative net return per acre of two or more crops based on constant yields and costs, the prices which are necessary for the crops to give about the same net return per acre are readily calculated. Such prices are presented in *Tables VII* and *VIII*.

The budgeting method may be used in two ways to improve farm conditions. Research workers may study out systems of farming for a given area that seem likely to give the best results either for the years just ahead or during a long-time period. Farmers may then follow these systems in a general way without setting up budgets for their individual farms. A better method of procedure, however, is for each farmer to keep himself well posted on the production trends, price trends, and market outlook for the commodities which may be produced in his community and then to carefully prepare production programs which fit the conditions of his own farm.

Production Standards, Prices and Costs

The basic data used in setting up the budgets for the 11 systems of farming for both the 1922-1929 period and the year 1931 are presented in *Tables IX to XVI*. The footnotes attached to the tables and the references made thereto in the foregoing discussions should make the tables understandable (*Tables IX-XVI*).

TABLE IX

Equipment for An 80-Acre Farm Operated With Four Work Animals

Number	Equipment	Size	Cash value new 1930
			Dollars
	Plows:		
1	Two-way	16 in.	145
1	Walking	14 in.	32
1	Harrow, spike	15 ft.	52
1	Disk, single	8 ft.	93
1	Corrugator	4 row	95
	Drills:		
1	Grain	8 ft.	210
1	Beet and bean	4 row	112
1	Potato planter	1 row	121
	Cultivators:		
1	Bean and beet	4 row	128
1	Potato	1 row	75
1	Garden	1 row	10
1	Binder, grain	6 ft.	280
1	Bean cutter attachments to 4-row cultivator	4 row	81
1	Potato digger	1 row	162
1	Beet lifter	1 row	110
1	Mower	5 ft.	95
1	Windrow attachment to mower	5 ft.	35
1	Dump rake	10 ft.	60
1	Side delivery rake	8 ft.	150
1	Derrick or hay stacker		110
	Hay slips		17
	Hay slings		10
1	Wagon		190
1	Wagon bed		57
1	Hay rack		75
1	Manure spreader		190
1	Cream separator		109
	Small tools		50
4	Harness		160
	Total general machinery[1]		3,014
4	Work animals @ $ 75		300
1	Family cow . . @ $100		100
30	Family hens . @ $ 1		30

[1] In addition to the machinery as here listed, there is an automobile used jointly for the family and the farm. Not all of the machinery is needed unless the cropping system includes hay, grain, beans, sugar beets and potatoes.

TABLE X

Acres Normally Covered Per 10-Hour Day With Horse-Drawn Implements and Hours Required Per Acre Per Operation Over Once

Field operation	Size of implement	Crew		Area covered per 10 hour day	Work required per acre over once	
		Man	Horses		Man	Horse
	Inches	Number	Number	Acres	Hours	Hours
Plowing	14	1	3	2.2	4.55	13.65
Plowing	16	1	4	2.7	3.70	14.81
Plowing alfalfa	16	1	4	1.9	5.26	21.04
Plowing	28	1	6	4.4	2.27	13.63
Plowing alfalfa	28	1	6	2.8	3.57	21.43
	Feet					
Disking, single	6	1	3	10.0	1.00	3.00
Disking, single	8	1	4	15.0	.67	2.66
Disking, tandem	7	1	6	10.0	1.00	6.00
Field Cultivation	8	1	4	12.0	.83	3.33
Harrowing, spike	10	1	3	18.0	.56	11.67
Harrowing, spike	15	1	4	27.0	.37	1.48
Harrowing	20	1	6	36.0	.28	1.67
Leveling	6 & 7	1	3	11.0	1.00	3.00
Leveling	7 & 8	1	4	14.0	.71	2.86
Leveling	8	1	6	16.0	.62	3.75
	Row					
Corrugating, alfalfa, sweet clover and pasture	2	1	2	10.0	1.00	2.00
Corrugating	4	1	2	18.0	.56	1.11
Cut, treat, haul potato seed				1.2	8.63	1.40
Spreading straw, beans and clover		1	2	4.0	2.50	5.00
Planting:						
Beans	4	1	2	14.0	.71	1.42
Potatoes	1	1	2	4.6	2.17	4.35
Sugar beets	4	1	2	11.0	.91	1.82
Corn	2	1	2	14.0	.71	1.42
	Feet					
Small grain	6 & 7	1	3	12.0	.83	2.50
Small grain	7 & 8	1	4	16.0	.63	2.50
	Row					
Cultivating:						
Beans	4	1	2	14.0	.71	1.42
Potatoes	1	1	2	5.0	2.00	4.00
Sugar beets	4	1	2	11.0	.91	1.82
Corn	1	1	2	7.0	1.43	2.86
Hoeing beans		1		2.3	4.35	
Irrigating:						
Beans		1			1.00	
Potatoes		1			1.40	
Sugar beets		1			1.20	
Corn		1			.90	
Small grain		1			1.00	
Alfalfa		1			1.00	
Clover		1			1.00	
Pasture		1			1.00	

TABLE X
(Continued)

Acres Normally Covered Per 10-Hour Day With Horse-Drawn Implements and Hours Required Per Acre Per Operation Over Once

Field operation	Size of implement	Crew		Acres covered per 10 hour day	Work required per acre over once	
		Man	Horses		Man	Horse
	Row	Number	Number	Acres	Hours	Hours
Harvesting:						
Beans: Cutting	4	1	2	15.0	.67	1.34
	Feet					
Raking, side delivery	8	1	2	15.0	.67	1.34
Hand bunching		1		4.1	2.44	
Potatoes:	Row					
Digging	1	1	4	4.1	2.44	9.76
Sugar beets:						
Lifting	1	1	2	2.4	4.17	8.34
Wheat, barley or oats	Feet					
Binding	6 & 7	1	4	10.0	1.00	2.00
Shocking		1		5.0	2.00	
Alfalfa and clover hay:						
Cutting	5	1	2	9.3	1.08	2.16
Raking and bunching	10	1	2	13.7	.74	1.47
Red clover seed:						
Cutting	5	1	2	9.6	1.04	2.08
Hand bunching				2.8	3.57	
Hay: Stacking with slips and slings					[1]3.20	[1]3.20

[1] Hours per ton.

TABLE XI

Hours of Direct Field Work Required Per Acre to Produce Specified Crops Distributed by Half Month Periods, Where Four Horses Furnish the Farm Power[1]

Item	Required hours of man and horse work													
	March		April				May				June			
	1–31		1–15		16–30		1–15		16–31		1–15		16–30	
	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse
Pasture							1.0		1.0		1.0		1.0	
Wheat, barley or oats	2.6	10.1	1.4	4.6					1.0		.8		.6	
Alfalfa	1.0	2.0					1.0		.5		2.3	3.6	5.8	4.6
Red clover	.6	1.1					1.0				2.3	2.5	4.8	6.0
Alsike clover	.3	.6	1.3	.6			.5		.5				1.0	
Potatoes after alfalfa, red clover or sweet clover							.7		15.8	26.0	3.8	8.4	2.0	4.0
Beans after alfalfa, red clover or sweet clover					1.0		7.7	25.6	.4	1.5	.9	1.9	.7	1.4
Beans after beans and rye					5.5	22.1	1.6	1.1	1.7	6.8	1.4	2.8	.7	1.4
Beans after beans, potatoes or s. beets	2.2	8.9	2.2	8.9	1.4	4.9	1.3	.6	2.1	7.5	1.1	2.1	.7	1.4
Sugar beets	10.2	34.5	.6	1.2	.9	1.8	.9	1.8	.9	1.8	2.1	1.8	2.1	1.8
Average hours available for field work	150		110		110		120		120		125		125	

TABLE XI
Continued

Items	Required hours of man and horse work													
	July				August				September				October	
	1–15		16–31		1–15		16–31		1–15		16–30		1–31	
	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse
Pasture	1.0		1.0		1.0		1.0		1.0		1.0			
Wheat, barley or oats	.6		2.0	1.3	3.0	2.7								
Alfalfa			1.9	1.8	5.7	6.5	1.0		4.2	6.0	2.4	2.3		
Red clover	1.0				1.0				3.1	1.4	1.5	.7		
Alsike clover			2.3	1.0	2.3	1.0								
Potatoes after alfalfa, red clover or sweet clover	5.1	6.0	5.1	6.0	2.1		2.1						2.4	9.8
Beans after alfalfa, red clover or sweet clover	1.5	1.0	3.4	1.4	2.7		1.0		3.8	2.7				
Beans after beans and rye	1.5	1.0	3.4	.5	2.7		.5		3.8	2.7				
Beans after beans, potatoes or sugar beets	1.5	1.0	3.4	.5	2.7		.5		3.8	2.7				
Sugar beets	2.4	1.8	1.5		1.2		1.2		.6				4.2	8.3
Average hours available for field work	130		130		130		130		120		120		220	

[1] The following work is done by contract in addition to what is shown in this table: Threshing wheat, oats, barley, and beans from the field; hulling clover seed; picking and grading potatoes; thinning, hoeing, topping, and loading sugar beets; and hauling all crops to market and potatoes to the cellar. The direct field work constitutes approximately 75 per cent and miscellaneous work 25 per cent of the work necessary in farming systems 1-7 inclusive.

TABLE XII

Seed Used Per Acre and Price Per 100 Pounds

Crop	Seed used per acre	Price per 100 pounds	
		Average 1922–1929	Average 1931
	Pounds	Dollars	Dollars
Potatoes, Russett:[1]			
Certified seed	1100	2.50	1.60
No. 1 seed grown from certified seed	1100	1.50	.60
Beans, Great Northern			
Hand picked certified seed[2]	70	6.00	3.25
Alfalfa, common:[2]			
Seeded with grain	12	20.00	20.00
Seeded alone	20	20.00	20.00
Sugar beets[2]	16	15.00	14.00
Sweet clover[2]	14	15.00	15.00
Rye[2]	40	1.40	.80
Wheat[3]	100	1.74	.63
Barley[3]	100	1.30	.76
Oats[3]	100	1.45	.85
Red clover[3]	11	22.00	15.00

1 One-tenth of the potato acreage is planted with purchased certified seed and nine-tenths with No. 1 potatoes grown from certified seed.
2 The seed for planting this crop is purchased.
3 Seed grown on the farm is used for planting this crop.

TABLE XIII

Prices Used in Computing Expenses

Item	Unit	Price per unit	
		Average 1922–29	Average 1931
		Dollars	Dollars
Hired labor (wages cover board and perquisites)			
Day hand on a 10-hour day basis	Day	3.75	2.75
Feed bought:			
Hay	Ton	10.10	8.00
Barley	Cwt.	1.30	.76
Oats	Cwt.	1.45	.85
Grain mash	Cwt.	2.00	1.50
Bran	Cwt.	1.50	.70
Corn	Cwt.	2.25	1.75
Tankage	Cwt.	4.50	3.50
Meat scraps	Cwt.	4.50	4.00
Fish meal	Cwt.	4.50	4.00
Bone meal	Cwt.	3.00	2.75
Cod liver oil	Cwt.	1.60	1.25
Salt	Cwt.	1.00	1.00
Oyster shell	Cwt.	1.25	1.25
Contract work:			
Potatoes:			
Picking	Cwt.	.06	.05
Sorting and grading	Cwt.	.10	.08
Hauling to cellar	Cwt.	.04	.03½
Hauling to market and loading cars	Cwt.	.05	.04½
Sugar beets:			
Blocking and thinning	Acres	8.00	7.50
Hoeing, first	Acres	3.00	2.50
Hoeing, second and third each	Acres	2.00	1.50
Topping and loading	Ton	1.00	.90
Hauling to dump	Ton	.90	.80
Beans:			
Threshing, thresherman puts beans to machine	Bu.	.23	.20
Threshing, farmer puts beans to machine	Bu.	.15	.13
Cleaning beans for market	Cwt.	.10	.10
Hauling, average distance 4 miles	Cwt.	.04½	.03½
Wheat, Oats or Barley:			
Cleaning seed	Cwt.	.10	.10
Threshing, thresherman puts grain to machine	Bu.	.10	.08
Threshing, farmer puts grain to machine	Bu.	.05	.04
Hauling, average distance 4 miles	Cwt.	.04½	.03½
Binding	Acres	1.25	1.00

TABLE XIII
(Continued)
Prices Used in Computing Expense

Item	Unit	Price per unit	
		Average 1922–29	Average 1931
		Dollars	Dollars
Clover seed:			
Hulling, hullerman puts clover to machine	Bu.	1.00	.85
Hauling, average distance 4 miles	Cwt.	.04½	.03½
Milk hauling	Cwt.	.15	.15
Miscellaneous:			
Sacks and twine:			
Potatoes, field sacks	Acre	2.50	1.75
Potatoes, new sacks for marketing crop	Cwt.	.11	.09
Beans, new sacks for marketing crop	Cwt.	.12	.10
Binding twine:			
4.5 lbs. used per acre of grain, deep soil	Lb.	.14	.12
Formaldehyde for treating potato seed	Acre	.11	.11
Copper carbonate, 5 oz. used per acre of small grain	Acre	.10	.10
Fire insurance, Farmers' Mutual	$1000	2.00	2.00
Telephone	Year	24.00	24.00
Water	Acre	1.70	1.70
Depreciation, repairs and operation::			
Automobile for farm use	Farm	175.00	150.00
Farm machinery (ten per cent of cash value new)			
Depreciation of:			
Family cow	Head	10.00	6.00
Work horses	Head	12.00	10.00
Taxes, 4.2 per cent of assessed value			
Baby Chicks	Head	.16	.16

TABLE XIV

Estimated Feed Required Annually for Livestock in System of Farming 1-11, Inclusive [1] [2]

Feed	4 work horses, 1 family cow 30 hens	4 brood sows 1 barren gilt, 24 March pigs, 12 Sept. pigs	8 milk cows, 2 heifers, 2 calves 1 bull	400-hen flock (young stock from 650 baby chicks)	83 ewes, 17 ewe lambs, 2 rams, 96 lambs
	Pounds	Pounds	Pounds	Pounds	Pounds
Farm grown:					
Alfalfa hay	40,000	2,680	60,300	1,200	25,500
Alfalfa leaves				300	
Bean straw			11,440		38,250
Wheat, ground		31,796		3,925	
Wheat, whole				11,875	
Oats, ground			3,213	1,300	
Barley, ground			12,505	3,180	7,280
Barley, whole					
Milk, whole			300		
Milk			2,500	39,000	
Pasture[3]					
Purchased:					
Grain	2,000				
Grain mash	1,000				
Bran			3,213	2,482	
Corn, yellow				7,250	
Tankage		1,827			
Fish meal				550	
Meat scraps				550	
Bone meal		150	790	900	
Salt	180	350	394	265	250
Limestone, ground		150			
Oyster shell	50			2,150	
	Gallon	Gallon	Gallon	Gallon	Gallon
Cod liver oil				31	

1 The 4 work horses, the family cow, and the 30 hens are in the organization of each of the eleven systems of farming. The hog unit is in that of system eight, the dairy unit in system nine, the dairy unit and the poultry unit in system ten, and the sheep unit in system eleven.

2 These estimates of feed requirements have been made with the assistance of the Department of Dairy Husbandry, the Department of Poultry, the Department of Animal Husbandry and the Extension Animal Husbandmen, University of Idaho.

3 Pasture carrying capacity as used in the budgets is two cows or their equivalent, or 10 ewes with their lambs per acre for second year sweet colver.

TABLE XV

Estimated Average Prices Per Unit of Farm Products Sold[1]

Products	Unit	Average 1922–1929	Average 1931
		Dollars	Dollars
Crops:			
Great Northern beans	100 lbs.	5.18	1.16
Russett potatoes, f.o.b. cars:			
U. S. No. 1, farm graded and sacked	"	1.50	.60
U. S. No. 2, farm graded and sacked	"	.94	.27
Wheat	"	1.74	.63
Barley	"	1.30	.76
Oats	"	1.45	.85
Red clover	"	22.00	10.00
Hay (alfalfa and clover) stacked	ton	10.10	8.00
Sugar beets	"	7.75	6.50
Sugar beet tops	acre	4.80	3.60
Livestock and livestock products:			
Butterfat in cream at farm	lb.	.435	.234
Butterfat in whole milk at farm	"	.478	.246
Wool, unwashed	"	.33	.14
Eggs	doz.	.247	.16
Cows, culls	head	50.00	20.00
Calves at birth	"	2.00	1.00
Ewes, culls	"	5.00	.69
Lambs	"	9.40	4.05
Hens, culls	"	.50	.38
Pullets, culls	"	.46	.35
Broilers	"	.26	.25
Hogs (average for February and March)	"	9.13	7.05
Hogs (average for August and September)	"	10.11	5.85
Hogs (average for July)	"	9.45	6.00
Sows, culls (average for July after 4c dockage)	"	5.45	3.00

1 The prices listed for the different commodities were obtained as folows:
Great Northern Beans: The 1922-29 price is the average received by all growers who marketed through the Southern Idaho Bean Growers Association during that period. The 1931 price was obtained by weighting Market News Service dealers' f.o.b. cash track quotations by car lot shipments and deducting 50 cents per 100 pounds to obtain the price to the grower.
Russett Potatoes: Market News Service monthly quotations were weighted by monthly car lot shipments from Twin Falls County.
Wheat, Barley and Oats: The prices used for these crops are based on the yearly average prices paid by local milling and grain company.
Red Clover Seed:Prices furnished by the Div. of Hay, Feed and Seed, B. A. E.
Hay: Computed from Idaho Dec. 15 farm prices as published on Crops and Markets.
Butterfat: Computed from data furnished by local cooperative creamery, assuming that half is sold as fat in cream and half as fat in whole milk at the farm.
Lambs, Ewes and Wool: The prices for these commodities were furnished by E. F. Rinehart, Ext. Animal Husbandman, University of Idaho, represent averages received by southern Idaho producers during 1925-29 and 1931.
Eggs: Computed from data furnished by the Idaho Egg Producers Association.
Hens, Pullets, Broilers: Furnished by C. E. Lampman, Poultry Husbandman, University of Idaho.
Hogs: Computed from quotations given in Crops and Markets for Idaho.

TABLE XVI

Crop Yields: Average Yields Used in Computing Production in Farming Systems 1-11 Inclusive

Item	Records	Average yields per acre[1]
	Number	Bushels
Beans, Great Northern:		
First three crops following alfalfa	64	29.3 ± 0.7
First three crops following clover	99	27.7 ± 0.6
Wheat	237	52.6 ± 0.8
Barley	26	65.2 ± 4.0
Oats	10	87.8 ± 5.2
		100 lbs.
Potatoes, first crop following alfalfa or clover	50	230. ± 7.1
U. S. No. 1		153
U. S. No. 2		31
Culls and shrinkage		46
		Pounds
Red clover:		
First year after seeding with grain	108	286 ±10.0
Second year after seeding with grain		210
		Tons
Hay:		
Alfalfa, first three years after seeding	126	4.5 ± 0.08
Red clover		1.1
Sugar beets[2]		12.0

1 The number following the sign ± represents the standard error of the mean.
2 The yield used for sugar beets is based on the average annual yieldss of all beets delivered to the sugar factory from Twin Falls County from 1922-'29 except in 1924 when the State average yield was used.