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An Economic Analysis of Production Problems on the Flathead Irrigation Project

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An Economic Analysis of Production Problems on the Flathead Irrigation Project

INTRODUCTION

Purpose of the study.—During the years following 1920, the farmers in nearly every part of the country have faced the necessity of reorganizing their business because of the changed economic conditions under which they are operating. Rapid readjustment is especially important in the newer irrigated areas of Montana, because it involves a shifting from a pioneer grain farming type of agriculture to the types of production in which the irrigation farmer has a comparative advantage.

On some of the older irrigated projects this readjustment is well under way. But in the newer areas, and especially on those projects developed under a war stimulus, the farmers are still struggling with the major problems of organizing a size and type of business that will enable them to compete successfully with farmers in other areas and to obtain for themselves a satisfactory income from farming. This study was undertaken with the hope of pointing the way to a more rapid adjustment of the agriculture on the Flathead Project to the natural and economic advantages of this area, and in that way increasing individual farm incomes as well as the prosperity of the area as whole.

Method of study.—Following the economic conference held at Polson in the spring of 1927, plans were laid for a more detailed study of agricultural conditions in this area. Detailed farm accounts were started on some successful farms of different types. Personal visits were made to a number of farms on which some special problems existed or on which some phase of adjustment seemed to be in the process of solution. A study was also made of weather records, census reports, irrigation reports, and the annual farm census taken by the local irrigation officials. Analysis of this material has been attempted with the purpose of showing the development of the agriculture on the project and its present status as well as of pointing out some definite suggestions for future development.

PART I.—DESCRIPTION OF THE AREA AND ITS
AGRICULTURAL DEVELOPMENT

LOCATION AND DESCRIPTION

Location.—The Flathead Irrigation Project occupies the major portion of what is known as the Lower Flathead Valley. This valley lies south of Flathead Lake, the source of the Flathead River, which flows south and west to help form the Clark Fork of the Columbia, near Paradise in Sanders County. To the east of the valley are the rugged, snow-capped mountains of the Mission Range. A low range of hills separates the main valley from the so-called Jocko Valley to the south, and still another range of somewhat higher hills is found between this subdivision and the Missoula Valley. On the west there

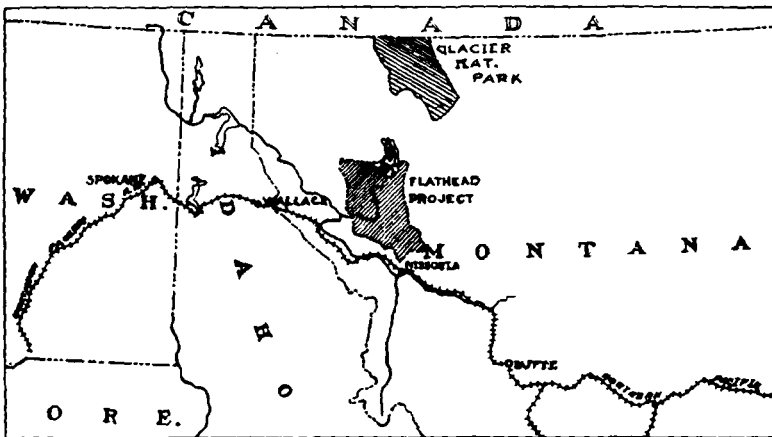


Figure 1—Regional map, showing location of the Flathead Project.

is considerable broken land along the Flathead River, which separates the main valley from the Camas or Lone Pine section. (See fig. 24.)

The Little Bitter Root River flows past the Camas division and a diversion from it furnishes the water supply for the irrigation of this part of the project. The water supply for the main division of the project is obtained from the numerous mountain streams rising in the Mission Mountains. The Jocko River furnishes the water for the Jocko division. Large reservoirs have been built for water storage at convenient locations on the project.

Railroad transportation is available on the main line of the Northern Pacific for the Jocko division. A branch of this line starts at Dixon and goes north to Polson, on Flathead Lake, thus serving the major portion of the project. (See fig. 24.) The Camas division is somewhat handicapped in railroad facilities. Plains and Perma on the Northern Pacific main line are its closest rail connections.

An improved highway connects the project with Missoula to the south and with Kalispell to the north. A stage line makes two trips a day over this route from Missoula to Polson and connects at that point with a Kalispell stage. A stage also runs from these points to Hot Springs in the Camas section. The connecting roads are not as a rule improved, and motor travel on them is difficult in the spring and fall, and after heavy rains.

Climatic conditions.—The climate of this area is representative of the lower intermountain valleys on the Pacific slope. It has a

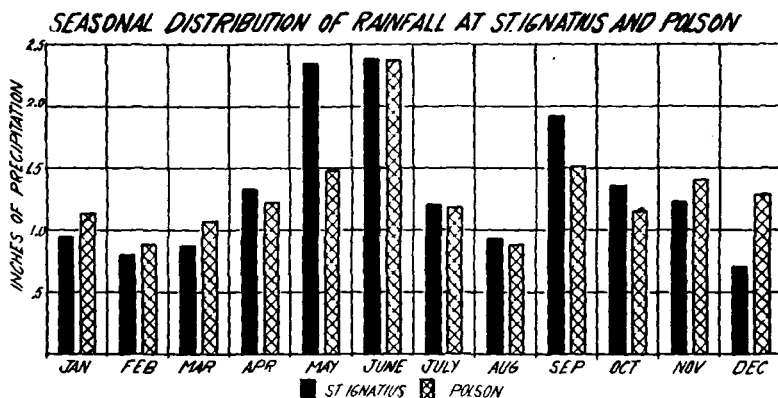


Figure 2.—The average precipitation by months is shown for St. Ignatius and for Polson. Note the relatively high rainfall for May and June.

rather long growing season, averaging 120 to 140 days, with warm summer days and cool nights. The winters are not severe compared with the plains area of Montana. Although there is considerable snowfall, the surrounding mountains protect against high winds. About 50 per cent of the annual precipitation falls in the five months from April 1st to September 1st.

On the whole the climate is very favorable for live-stock production and for growing feed and forage crops under irrigation. Where soil conditions permit, apples, cherries, small fruits, and a

TABLE 1.—SUMMARY OF CLIMATOLOGICAL DATA FOR THE
FLATHEAD PROJECT*

	Polson	St. Ignatius
Elevation (feet)	2920	2911
Length of record (years)	14	16
Precipitation (inches)		
Average annual	15.66	16.08
Apr. 1 to Sept. 1	7.17	8.23
Highest annual	20.94	25.15
Lowest annual	12.38	11.58
Average snowfall	45.00	45.00
Temperature (degrees F.)		
Mean annual	45.0	44.6
Highest recorded	104.0	103.0
Lowest recorded	-18.0	-30.0
Killing frost		
Average date in spring	May 13	May 22
Average date in fall	Sept. 28	Sept. 20
Latest recorded in spring	June 25	June 25
Earliest recorded in fall	Aug. 18	Aug. 25
Growing season (days)		
Average	138	121
Shortest recorded	54	98
Longest recorded	180	160

*Data for the Camas subdivision are not available but it is generally conceded that this section has less rainfall than the eastern part of the project.

wide variety of vegetables can be grown under irrigation. Winter wheat in most years makes a fair crop without irrigation. This largely accounts for a persistent use of a portion of the irrigable area to grow this crop without the use of water. The non-irrigated tillable parts of the valley are devoted almost entirely to winter wheat grown under summer fallow conditions.

Soil and topographical conditions.—The soil on the Flathead Project varies considerably even within each subdivision. In general the portion of the project lying near the Mission Range of mountains between Post and Mission creeks has a deep, dark-colored, gravelly loam soil that is quite fertile. West and northwest of this section the soil becomes lighter in color, has a thinner humus-bearing layer, and also has a heavier and more impermeable clay subsoil. Areas of gray soil and heavy subsoil having some alkali salts are in poor physical condition as well as low in plant foods. Other areas of the project have a silt loam to clay loam surface soil with a clay subsoil. The depth of the humus-bearing or surface soil usually indicates the comparative fertility of these soils. North of Ronan the soils are quite sandy. The Moiese area is quite largely underlain by gravel strata and requires a large amount of water for the production of crops. Much of the land in the Jocko division is quite gravelly,

though a part of this area has a deep, dark loam soil of high productivity. The soil of the Camas division consists quite largely of stratified silts and clays.

The topography of most parts of the project is rolling. In many places the land is cut up with small ridges, knolls, pot-holes, and gullies which impede rapid irrigation, and make the disposal of waste water a problem. A greater expenditure for leveling and preparing the ground for irrigation would eliminate the smaller "rough spots" and undoubtedly effect a saving over a period of time.

AGRICULTURAL DEVELOPMENT

Early settlement and progress.—Catholic missionaries as early as 1854 established a mission for the Flathead Indians at what is now St. Ignatius and began cultivating some of the land near the mission. In 1885 an Indian treaty set aside the Flathead Reservation for the Flathead Indians, to be held by them under joint ownership. This was an area extending about 60 miles north and south and 40 miles east and west, inside of which the Flathead Project is now located. (See fig. 24.) Because white settlement and the development of the area were prevented by this treaty, there was considerable local agitation for opening the reservation. In 1904 a bill introduced by Senator Joseph M. Dixon was passed by Congress, providing for separate Indian allotments and making available to the whites the lands not needed by the Indians. In 1906 a bill providing for the watering of irrigable lands was passed, and actual irrigation construction was begun in 1909. In 1910 the reservation was thrown open to white settlement, the Indians having previously chosen their allotments.¹

The land was disposed of by the lottery method. As in many other areas, when land was thrown open for settlement in this manner, there was the usual swarm of applicants from all walks of life. Most of them knew very little about agriculture, very few had any capital, and many found themselves stranded on a 40-acre tract of land which they had neither the knowledge nor means for developing. Their worst predicament, however, was that the promised water for irrigation was not forthcoming. The settlers were forced to abandon their homesteads or try to farm larger areas by dry-land methods. Fortunately, a series

¹Information from unpublished manuscript by S. J. Coon on the development of the Missoula trade area.

of wet years made it possible to raise wheat quite successfully without irrigation.

The demand for increased food production during the war made it comparatively easy to obtain appropriations for the construction which began in earnest in 1917. Since 1920, however, the appropriations necessary for the completion of the project have been withheld and the settlers have had to wait for a definite understanding as to the completion of the project and the status of their repayment obligations.

In 1928, Congress appropriated funds for completion of the project, and the Department of the Interior drew up a repayment contract which has been signed by the settlers except in the Mission and Jocko Valley districts. The contract provides for the payment of the entire construction cost except that the construction cost of the Camas division shall be the same as that for the Mission Valley division and the excess cost of the Camas division shall be carried in a suspended account that is not a lien upon the land. The rate of payment is determined by the act of Congress of May 10, 1926, which provides that for districts contracting this rate shall be 2½ per cent of the unpaid construction cost at date of public notice. It is expected that this will be about \$45 per acre for the Mission Valley and Camas divisions and about \$20 an acre for the Jocko division. The repayment contract provides that these payments shall continue until the costs before and after the date of public notice have been paid in full. The estimated cost for the Mission Valley division when completed is \$65 per acre and for the Jocko division is \$40 per acre. No interest is charged on deferred payments. The operation and maintenance charge will be approximately 80 cents per acre, except in the Jocko Valley where it will be 50 cents per acre. The total annual charge to be expected on the main division of the project will be somewhat less than \$2 per acre and about \$1 per acre on the Jocko division until the construction charges are paid.²

INDICATIONS OF PROGRESS

Irrigated acreage.—Data on the irrigable acreage and the acres irrigated are available from the annual irrigation census since 1917. Figure 3 gives the comparison between the irrigated area and the

²It is possible that the reclassification of the land will reveal some areas on which construction repayment will be postponed because of low productivity value at the present time.

acreage on which water was actually applied for each year from 1917 to 1928. The irrigable area has been increased about 40 per cent since 1917. The acreage actually irrigated has fluctuated closely around 30 per cent of the irrigable area since 1918, with the exception of the years 1919 and 1923. The year 1919 was exceptionally dry and it is probable that an attempt was made to water crops which

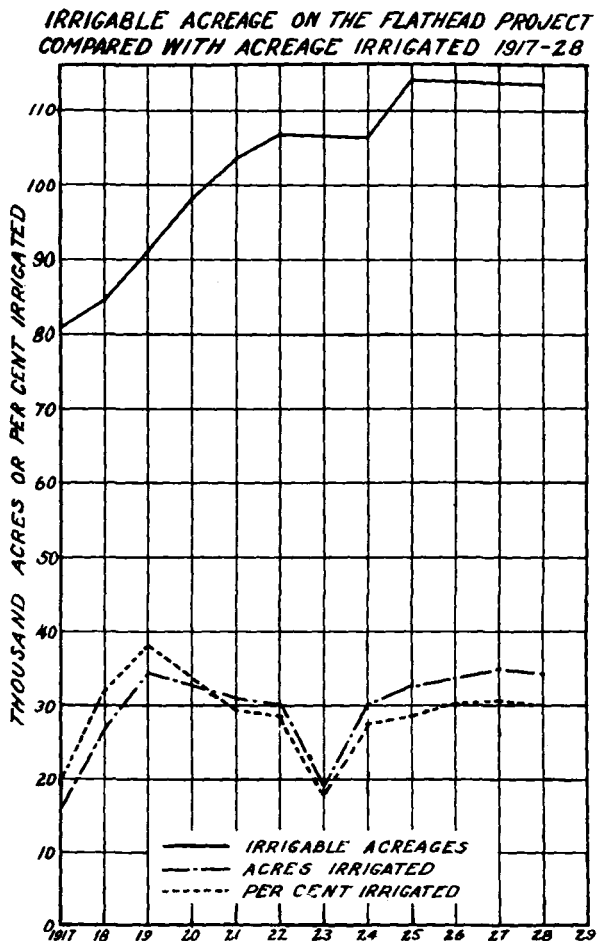


Figure 3—This chart compares irrigable acreage on the project with the amount actually irrigated. Note that, with the exception of 1923, it has averaged close to 30 per cent of the irrigable area.

ordinarily would not have been irrigated. In 1923 the rainfall was much higher than average. Due to the fact that water at that time was not paid for on a flat rate basis, it was possible to save on the payment of irrigation charges by neglecting to water part of the acreage which under lighter rainfall conditions would have been irrigated.

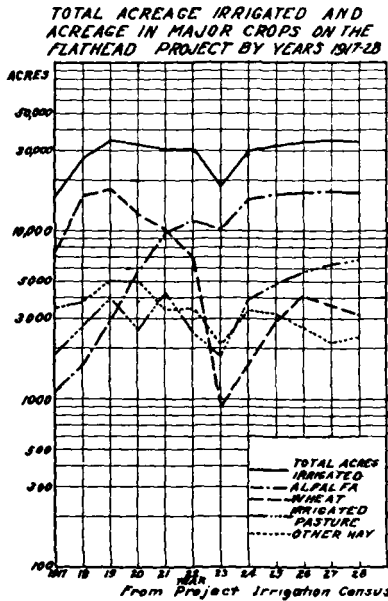


Figure 4—Note that this is a ratio chart. The actual figures are plotted but the changes are on a ratio or percentage basis. The total acreage irrigated, with the exception of 1923, has averaged close to 30,000 acres with some recent tendency to increase. The acreage in alfalfa has increased steadily while the wheat acreage shows a marked decrease. This is also brought out in Figure 5.

to alfalfa rose from 5.7 in 1918 to 49.9 in 1928. In 1927 the acreage of alfalfa irrigated was 17,019. There was a slight reduction in 1928 when the acreage was 16,881.

Wheat represented 57.9 per cent of the total irrigated crop acres in 1918 but only 10.8 per cent in 1928. This reduction in

At the present time approximately 112,000 acres are classed as irrigable and "under the ditch." This would indicate that somewhat less than one-third of the irrigable acreage is actually watered. The proposed land classification will undoubtedly eliminate a small percentage of the land now classed as irrigable. (More land will be placed in classes which will enable owners to defer payment on construction charges until it becomes more productive; estimates run as high as 30 to 40 per cent.) It is evident, however, that a large portion of the good, irrigable land is not being irrigated.

Distribution of major crops.—A study of Figures 4 and 5 will show that both the actual acreage and the relative importance of alfalfa and irrigated pasture have increased during the period under study. On the other hand, both the actual acreage and the relative importance of wheat and of other hay than alfalfa have decreased during the same period. The percentage of total crop acres devoted

*SHIFTS IN RELATIVE IMPORTANCE OF MAJOR CROPS
ON FLATHEAD IRRIGATION PROJECT 1917-1928*

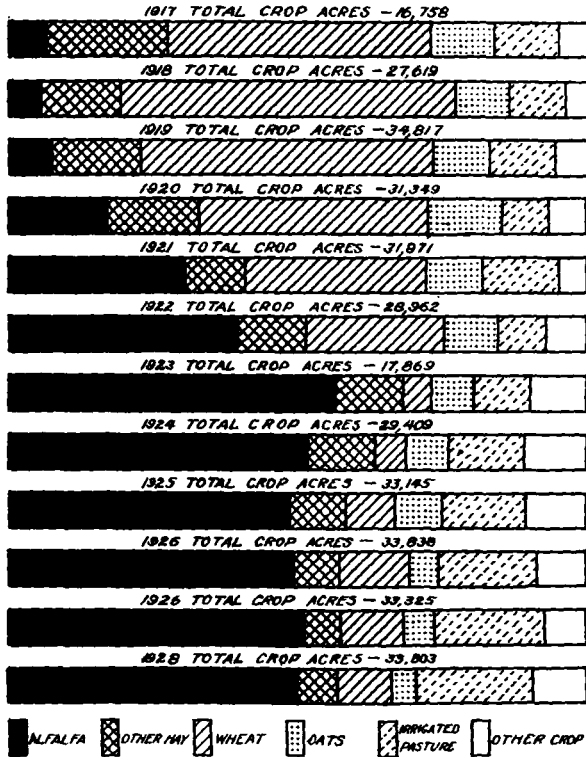


Figure 5.—This chart, showing the percentage of the total crop acreage in the various crops, indicates clearly the increasing importance of alfalfa hay and irrigated pasture in the cropping systems and the declining importance of wheat and other small grains.

irrigated wheat acreage has not been accompanied by an increase in relative importance of the coarse grains. The continuous growing of grain under irrigation has been found an unsuccessful practice, and since no definite crop rotation has been established on most of the land the irrigated acreage devoted to grain in recent years has been small. While no estimates are available on the amount of non-irrigated grain grown on the irrigable land during these years, we know that this practice is still an important factor in many farming systems on the project.

Cultivated crops have so far assumed a very minor role in the agriculture of the project. Sugar beets for the Missoula factory were grown successfully by a few farmers in 1928. The acreage was considerably increased in 1929. Crop rotations including a legume crop will have to be established before consistently good yields of beets can be expected. Distance from shipping point and poor roads preclude the adoption of this crop on many farms.

When the present crop acreage distribution is studied, it is evident that the major part of the acreage is devoted to alfalfa hay and irrigated pasture. Since pasture, and a large share of the alfalfa, have to be fed where grown, the balance between these two crops and the various classes of live stock becomes an important consideration.

Live-stock development.—Figure 6 shows the changes which have occurred in the number of cattle, dairy cattle, hogs, and sheep since the fall of 1916. The increase in “all cattle” and “dairy cattle” has been steady and consistent throughout the whole period. The increase in sheep has been much more pronounced. Starting with only 11 sheep in 1916 the number increased to over 10,000 in 1926.

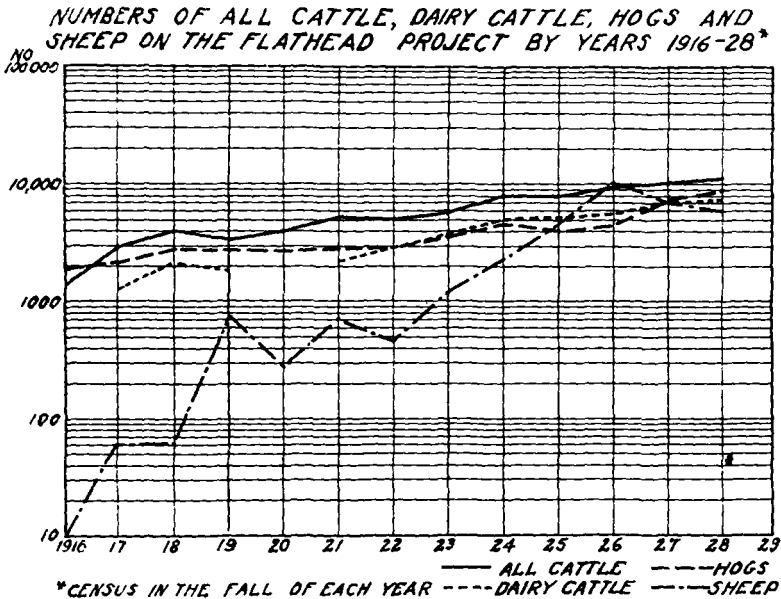


Figure 6—There has been a steady increase in numbers of all cattle, dairy cattle, and hogs throughout the period, and up to 1926 sheep increased very rapidly (ratio chart).

Whether the decreases from that figure which are shown for 1927 and 1928 are actual or merely due to the fact that some of the sheep ordinarily wintered on the project were still on mountain range and thus not included in the irrigation census is hard to determine. Hogs, poultry, and bees have increased quite consistently with the development of the project. There has been a slight decrease in horses since 1924. This may be due to disposal of range horses and also to some displacement by tractors.

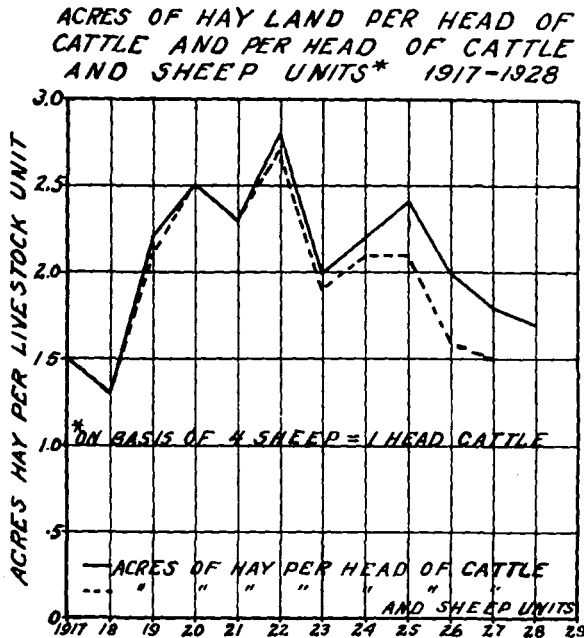


Figure 7—This chart shows the balance between the hay acreage and the numbers of cattle and sheep. In the early part of the period the hay acreage increased faster than live-stock numbers, but since 1922 the cattle and sheep have been increasing more rapidly than the hay acreage.

Figure 7 shows the relationship between numbers of cattle and the hay acreage, and between numbers of cattle and sheep and the hay acreage. To arrive at the latter relationship the number of sheep was divided by four, which approximates the winter feed requirements of sheep in relation to cattle. These sheep equivalents (4 sheep = 1 head cattle) were then added to the total number of cattle for

each year and the total hay acreage was divided by the total cattle and sheep units to arrive at the acreage in hay per cattle and sheep unit.

The resulting ratios show that in the early part of the period there were about 1.5 acres of hay per unit of sheep and cattle. Then the ratio of hay per unit increased until in 1922 about 2.7 acres of hay were grown per unit. Since that time the ratio has decreased until at the present time it is about 1.5 acres or the same as it was at the beginning of the period. With an average yield of 2 tons of hay per acre this would give 3 tons per head, but horses and hogs³ will consume some of this hay so that the amount available is actually less than this. Considering, however, that a large percentage of the cattle are beef cattle and young stock with low hay requirements, and that much supplementary roughage is fed, there is a surplus of hay on the project even with the present acreage and yield relationship.

TABLE 2.—CARLOAD SHIPMENTS OF HAY BY STATIONS ON THE FLATHEAD PROJECT 1924-1928

	Year				
	1924	1925	1926	1927	1928
From					
Arlee	6	33	13	52	26
Flathead	0	7	0	0	1
Ravalli	2	11	7	0	7
Dixon	0	2	5	1	4
Molise	9	22	40	24	41
D'Aste	109	124	137	114	125
Charlo	101	140	223	125	158
Ronan	5	23	47	106	56
Pablo	3	9	7	3	3
Polson	5	3	0	0	0
Total	240	374	479	425	421
Average for five years					397

Table 2 shows the annual shipments of hay by stations on the project for the past five years. These shipments have varied from 240 cars to 479 cars with an annual average of 388. Assuming 13 tons of hay per car there would be an average annual surplus of 4,744 tons under present conditions. At 3 tons per head this would feed about 1600 head of dairy cattle or approximately 20 per cent more than are kept on the project at the present time. This same amount of hay would feed nearly 10,000 sheep, which would double the present sheep population. It would not be advisable to stock the

³Some alfalfa is fed to hogs.

PRODUCTION PROBLEMS ON THE FLATHEAD PROJECT

project so close to the limit of the hay supply, but there is plenty of room for expansion of both the hay and irrigated pasture acreage, to say nothing about increases in yield of hay per acre and the carrying capacity of pastures. (See Part IV for illustrations of increased returns when hay is marketed through live stock.)

Crop yields.—Crop yields reflect the effectiveness with which the irrigated land on the project is utilized. The yield data from the project summaries indicate that development of cropping systems, irrigation methods, and general farm practice on irrigated land

ANNUAL PER ACRE YIELD OF WHEAT, BARLEY, AND OATS
FLATHEAD PROJECT 1917-1928

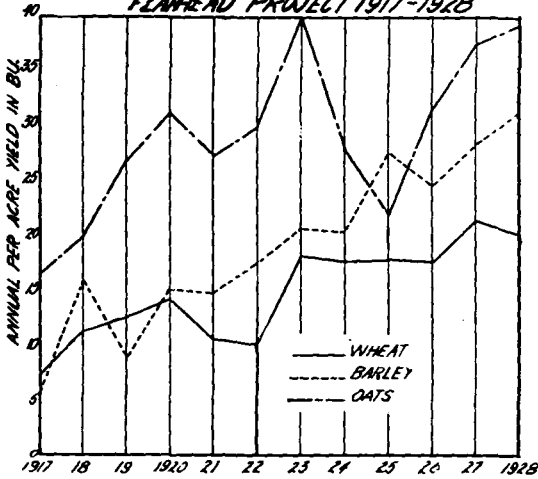


Figure 8—This chart indicates a very pronounced tendency toward higher grain yields in recent years although the yields are still very low for an irrigated section.

have not reached a very high stage of attainment. Progress has been retarded because of the unfamiliarity of the new settler with conditions, because of his financial handicaps, and in many instances on account of the unresponsiveness of the raw land to the establishment of crops which improve soil structure and fertility.

Table 3 shows the average yield per acre of the more important crops on the project for each year since 1917, and also an average per acre yield for the 12-year period. That there has been rather consistent though not rapid progress in improvement of grain yields is shown in Figure 8. However, these yields are still low and indicate that the above mentioned handicaps to the attainment of high production per acre have not yet been overcome. Yields of alfalfa and other hays are somewhat more satisfactory than the grain yields although they do not compare favorably with hay yields in the older irrigated areas of the State. Data on the carrying capacity of irrigated pastures are available only for the year 1927 when native

TABLE 3.—ACRE YIELDS OF VARIOUS CROPS BY YEARS, AND AVERAGE FOR 1917-1928 ON THE FLATHEAD PROJECT—DATA FROM ANNUAL IRRIGATION CENSUS

Crop	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	Av.
Alfalfa hay (tons)	1.38	2.30	2.02	2.00	1.95	2.18	2.03	2.30	3.22	2.32	2.23	2.22	2.18
Clover hay (tons)	1.33	2.30	1.60	1.31	1.33	1.59	1.78	1.81	1.50	1.59	1.47	1.64	1.60
Other hay (tons)	1.04	.95	1.00	1.00	1.20	1.24	1.35	1.52	1.19	1.30	1.50	1.42	1.18
Wheat (bus.)	7.00	11.20	12.30	14.00	10.80	10.10	17.40	18.20	17.70	17.00	21.20	19.90	14.80
Oats (bus.)	16.25	19.40	26.50	31.00	27.00	29.80	27.80	39.40	21.60	31.30	37.20	38.80	28.80
Barley (bus.)	5.00	15.70	8.60	15.00	14.80	17.70	20.40	20.60	27.70	24.30	28.30	31.00	19.10
Rye (bus.)	—	—	—	9.00	—	6.60	15.00	—	—	12.20	—	11.10	10.4
Potatoes (bus.)	70.00	131.00	124.00	125.00	115.00	104.00	77.00	128.00	174.00	155.00	145.00	120.00	122.30
Beets (tons)	4.70	10.20	9.30	—	—	—	—	—	—	—	—	8.20	8.10
Corn (bus.)	—	—	—	—	—	25.50	32.4	20.00	24.70	21.40	26.00	23.70	24.8
Peas (bus.)	(11)	8.50	5.40	11.00	—	—	11.26	7.20	9.60	11.50	—	16.40	10.10
Alfalfa seed (bus.)	(2.0)	—	(1.9)	3.00	1.47	1.54	1.54	2.53	2.68	1.71	3.44	1.00	2.10
Clover seed (bus.)	—	—	—	(5.1)	4.10	—	(2.1)	(3.02)	2.06	2.15	2.91	2.57	2.74

If crop acreage for any crop is less than 50 acres the per-acre yields for that year are shown in parentheses and are not included in final average.

irrigated pasture showed a capacity of 3.7 cattle or horse pasture months. On the basis of a six months' pasture season, this is about 0.6 head per acre. Tame seeded pasture, such as Huntley mixture or sweet clover, showed a carrying capacity of 5.5 to 5.7 months or 0.9 to 1 head per acre on the basis of a six months' pasture season. Under proper care, the carrying capacity of pasture should be nearly double these figures. Data on the number of irrigations show that pastures are not being watered frequently enough to keep up a good growth.



Figure 9—An excellent field of irrigated spring wheat on the Mission subdivision, 1927.

That higher yields per acre of all crops are possible with improved methods has been demonstrated by individual farmers located in typical sections of the project.

Progress on individual farms.—In the summer of 1927 the project census records were examined and a group of farmers in each subdivision of the project who had succeeded in adapting themselves to the situation was picked out for special study. The object was to determine if possible their organization, methods of operation, and the reasons for their success. The annual records of these farmers were traced back for six consecutive years, beginning with 1921, in order to see the changes which had taken place on these farms during



Figure 10—A good crop of oats in the Moiese section, 1927.

this readjustment period. Unfortunately the irrigation census does not give enough information for those years to present a complete picture of individual farm units, but certain interesting facts can be gleaned from these records.

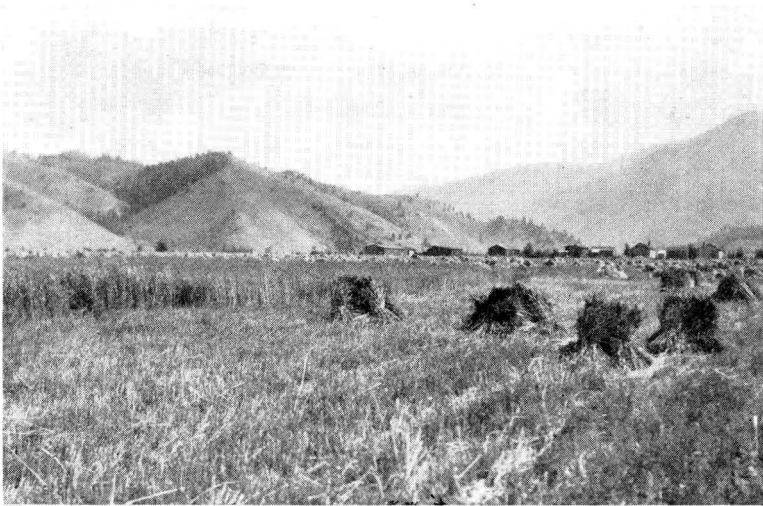


Figure 11—A good crop of wheat and barley at the Jocko irrigation headquarters camp, 1928.

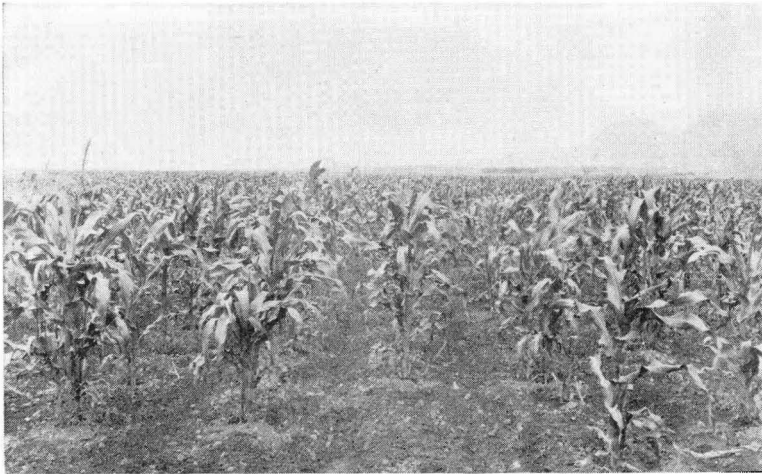


Figure 12—A field of corn on the Mission subdivision, east of St. Ignatius, August 15, 1927.

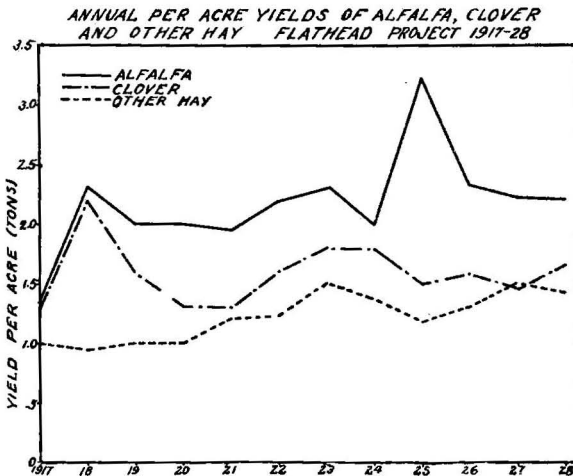


Figure 13—The yields of hay show no decided improvement trend although alfalfa yields seem to have been higher in recent years. The alfalfa yield for 1925 has been checked carefully. It must have been a very favorable year with a large percentage of the fields yielding three crops.

In the first place it is evident that there has been a gradual increase in the size of the unit operated, and a more than proportional increase in the acreage actually irrigated. The alfalfa acreage on some of these farms has increased as much as 400 per cent. Irrigated pasture had increased almost as much as alfalfa. The small-grain acreage has decreased on most of these farms. A study of the crop yields shows considerably higher yields than the project average in all the years. Many farms consistently report 3- and 4-ton acre yields of alfalfa. While grain yields nearly double the project average are also found, they are on the whole disappointing even on the better farms.

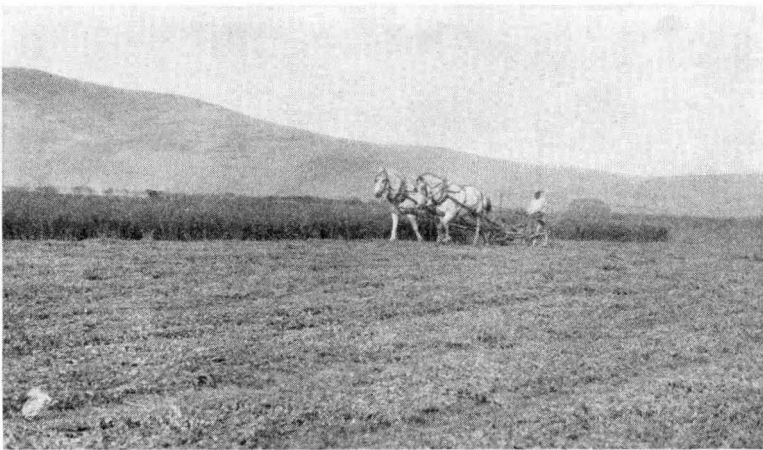


Figure 14—Harvesting the second crop of alfalfa in the Moiese Valley.

There has been a very large increase in the number of dairy cows on most of these farms. Many farms show 300 to 400 per cent increase in the six-year period. On the farms where sheep are kept their numbers have increased even more rapidly than those of dairy cattle. While there has been some increase in the number of hogs the rate has been rather slow compared with sheep and dairy cattle.

All of the trends observed on these better farms point to larger operating units, with the organization built around alfalfa hay and irrigated pasture, and with dairy cattle, sheep, or beef cattle as major sources of income.

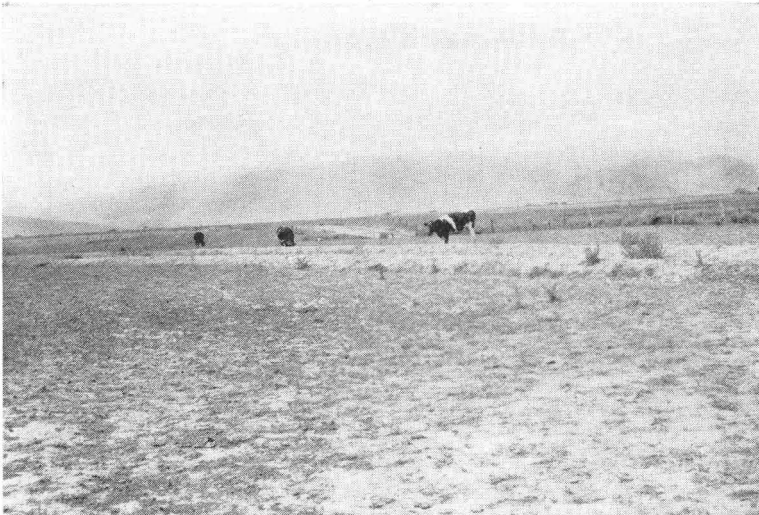
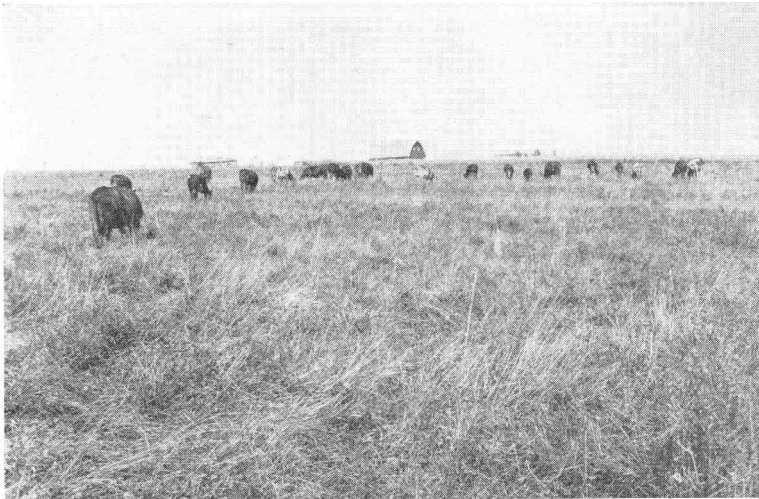


Figure 15—(Above) This 9-acre field of permanent irrigated pasture, divided into two lots, was stated by the owner to have carried about 3 head per acre in the summer of 1927.

(Below) This picture was taken within a few days of the one above. Almost all of the sod covering is eaten off. Note the irrigation ditch, but no water has been applied for some time.

PART II.—PRESENT UTILIZATION OF RESOURCES

AREA LAND UTILIZATION

Total land area.—According to the 1928 report of the State Board of Equalization, Lake County, where the major portion of the Flat-head Project is located, had 281,148 acres of agricultural land and 95,812 acres of timber land on the assessment rolls. The 1925 United States farm census shows a total land area of 963,840 acres in Lake County. Table 4 gives a more detailed classification of Lake County lands.

Agricultural land.—Table 4 indicates that a large percentage of the land in Lake County is not classified as agricultural. A portion of this “unpatented and other land” is unutilized and unproductive at the present time, but the classification also includes unpatented land which is being farmed, but because no title has been given is not taxed. This class also includes lands held in trust for Indians, the national bison range, forest reserves, etc. Much of the land, therefore, even though not classified as agricultural for assessment purposes, is being utilized either for grazing or for more intensive agricultural purposes.

TABLE 4.—PRESENT UTILIZATION OF LAND IN LAKE COUNTY

	Acres	Percentage of total land
All land		
Land area (1925 census)	963,840	100.0
Agricultural land (1928 assessment)	281,148	29.2
Timber land (1928 assessment)	95,812	9.9
Unpatented and other land (balance)	586,880	60.9
	Acres	Percentage of agricultural land
Agricultural land		
All agricultural land	281,148	100.0
Irrigated lands	64,930	23.1
Non-irrigated tillable lands	68,724	24.4
Grazing land	139,273	49.6
State lands (unclassified)	8,221	2.9

The classification of the so-called “agricultural lands” in Lake County shows approximately 65,000 acres, or nearly one-fourth of them, as irrigated. This, of course, includes land irrigated by private ditches outside of the Federal project. The classification “non-irrigated tillable land” contains a somewhat larger acreage than the irrigated. Some of this land is undoubtedly under the ditch and could be irrigated if it were leveled and graded for irrigation. Graz-

ing land occupies about one-half of the area classed as agricultural. In addition the private timber lands and some unpatented lands furnish considerable grazing.

The Camas division of the Flathead Project is located in Sanders County. Irrigation works have been constructed there for approximately 9000 acres. About one-half of this area is irrigated at the present time. This division is admirably situated from the standpoint of utilizing the adjoining foothill and forest range for summer grazing.

LAND UTILIZATION BY TYPES OF FARMS IN EACH SUBDIVISION

Method of classification.—In order to make a detailed study of the land utilization on the project it is necessary to study the various types of crop and live-stock combinations which individual farmers have established in their attempts to adjust themselves to the environment in which they have been working. Fortunately the 1927 irrigation census provides basic information on the organization of individual farms. From these data it is possible to group the farms in each section on the project by size and type of organization.

As a first step in this process all of the farms⁵ on each subdivision of the project were grouped according to size, and then arranged according to the acreage in alfalfa.

Figures 16 to 23 were then constructed. They show the irrigated acreage, and the non-irrigated crop acreage, the acreage in major crops, and the numbers of live stock on each farm.

The classification was made by subdivisions of the project in order to learn the essential differences in farming systems on different parts of the project as well as to determine the prevailing farming systems for the area as a whole.

1. *Nine Pipe Subdivision*.—This is the largest subdivision and is located in the central part of the project. The Missoula-Polson highway skirts its east side, while the railroad cuts through the center. Charlo and D'Aste are the shipping stations. Much of the land in the south end of the division is broken in contour and the soil is heavy and inclined to bake. Excellent crops of alfalfa and irrigated

⁴This method of classification was developed by F. F. Elliott, U. S. Bureau of Agricultural Economics. See *Journal of Farm Economics*, Vol. X, No. 4.

⁵Some farms on which records seemed incomplete as to size of unit, etc., were discarded.

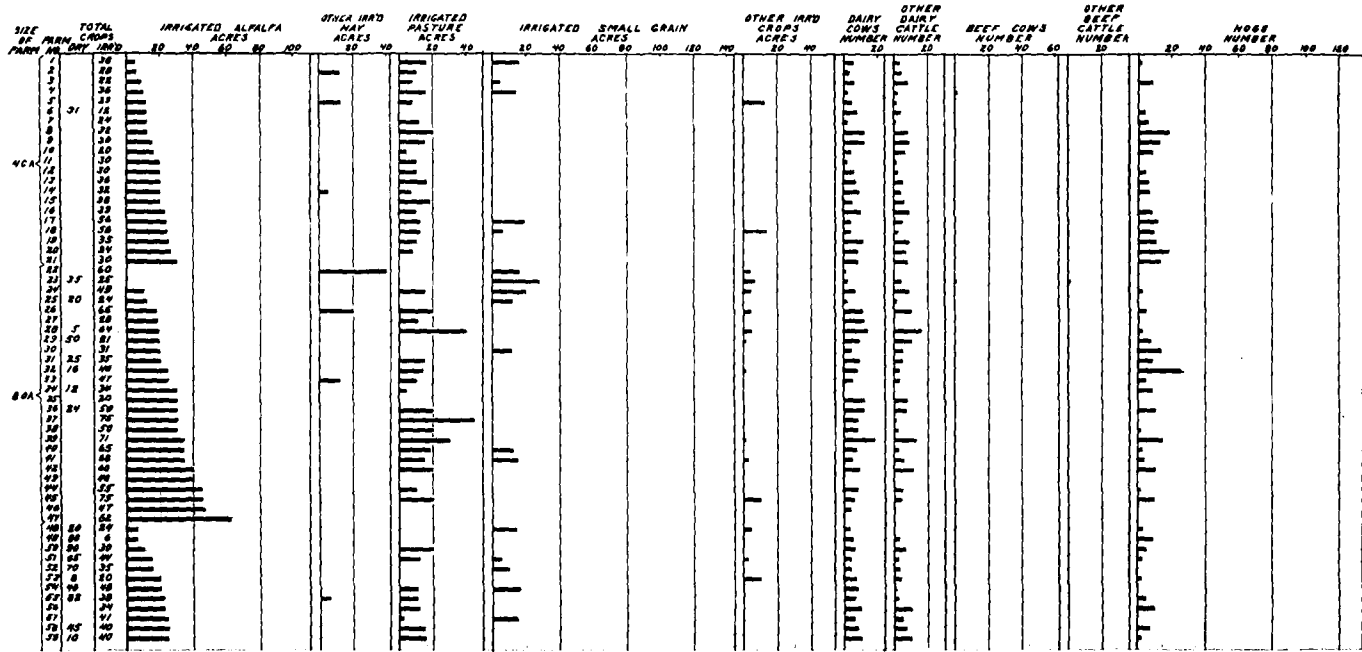


Figure 16—Crop and live-stock combinations on individual farms in the Nine Pipe subdivision.

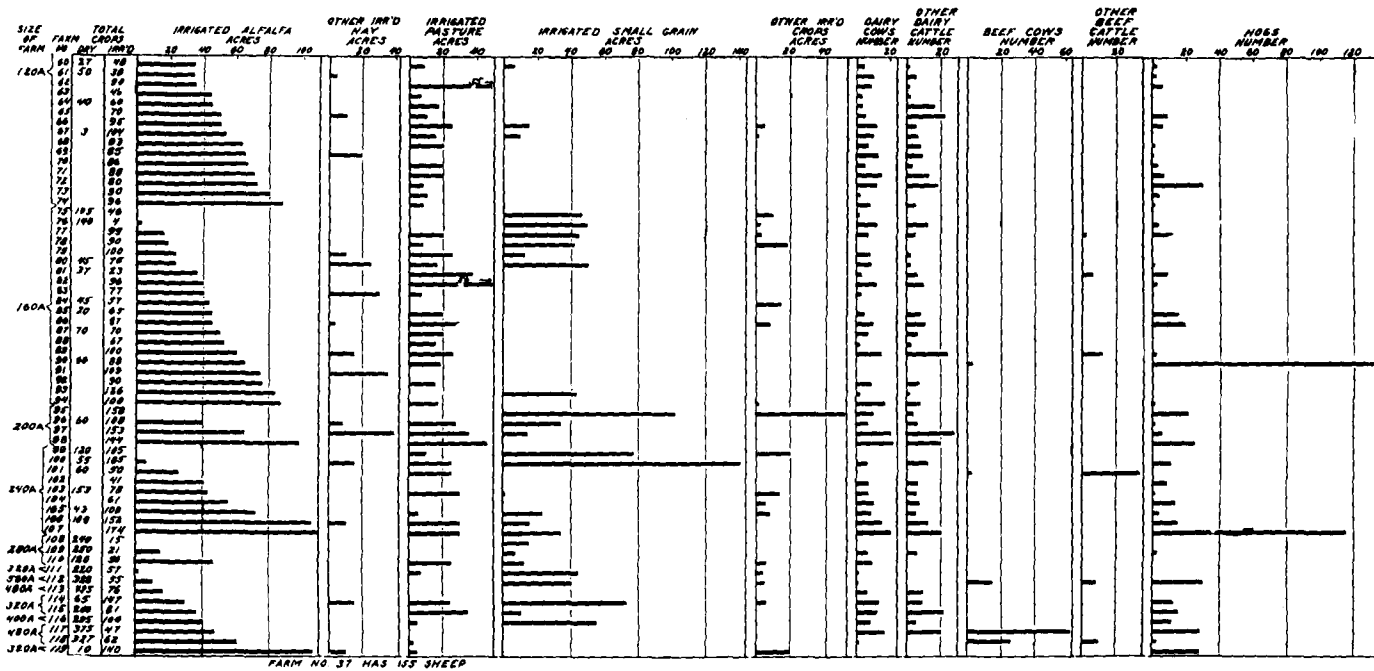


Figure 16—Continued.

pasture can be grown, but small grain has not done well, especially when without a legume in the rotation.

A study of Figure 16 will reveal a distribution of sizes of farms and crop and live-stock systems about as follows:

40-ACRE FARMS

Farms of this size divide themselves into two groups, one with approximately 10 acres and the other with about 20 acres of alfalfa. About 10 acres of irrigated pasture is the rule on both of these groups. Very few farms have any small grain at all, and not much of any other crops besides hay and pasture. From 4 to 6 dairy cows are kept on the farms with the lower alfalfa acreage, and 6 to 10 cows on farms with about 20 acres in alfalfa. These farms with the above crop and live-stock combination are really too small to provide a comfortable income for the farm family unless some outside income supplements it.

80-ACRE FARMS

Farms of this size divide themselves into three groups on the basis of alfalfa acreage—farms with approximately 20 acres, 30 acres, and 40 acres in alfalfa. Some of these farms depend upon outside dry pasture, but most of those with less than 20 acres in alfalfa have 10 to 15 acres in irrigated pasture, and those with 30 to 40 acres in alfalfa have about 20 acres in pasture. There seems to be no increase in the number of dairy cows kept as the alfalfa acreage increases; 10 to 12 cows seems to be the most frequent number. Little if any small grain is grown and no beef cattle are kept on these farms.

120-ACRE FARMS

These divide themselves into one group with about 20 acres in alfalfa and another group with all the way from 40 to 80 acres in alfalfa. The farms with 20 acres in alfalfa have 10 to 15 acres in irrigated pasture, and a few of them raise some irrigated small grain but not much of any other irrigated crops. Some farms report non-irrigated crops—mostly wheat. From 6 to 10 cows seems to be the rule.

The group with 40 to 80 acres in alfalfa usually have no crops raised without irrigation. They have 15 to 20 acres in irrigated pasture, little if any irrigated small grain or other irrigated crops. The number of dairy cows ranges from about 8 to 15.

160-ACRE FARMS

In this size we have farms with 20 acres or less in alfalfa, those with approximately 40 acres, and some with 60 to 80 acres in alfalfa. The group with low alfalfa acreage have quite large acreages of both irrigated and non-irrigated small grain. On farms with higher alfalfa acreage little if any small grain is raised. The acreage in irrigated pasture or the number of cattle does not seem to increase with the alfalfa acreage, indicating that the surplus alfalfa hay is sold. D'Aste, in this subdivision, ships out more hay than any other station on the project. (Table 2, page 16.)

LARGER FARMS

On the farms operating more than 160 acres we find a great variance of crop and live-stock combinations. Most of them combine a rather large acreage of non-irrigated grain with their irrigated crops. A few irrigate large acreages of small grain, others large acreages of alfalfa. No one type of organization is found frequently enough to be given special mention.

2. *Round Butte Subdivision.*—This is next to the largest subdivision on the project. It is located directly west of Ronan and extends westward to the breaks of the Flathead River. Quite large areas of land are broken in contour, making irrigation difficult. The soil is quite variable but small areas often have a clay surface soil. Erosion has removed the surface soil, leaving the clay subsoil exposed. The hard or poor physical condition is mainly due to alkali salts mixed with the clay subsoil. Distance from shipping point in the western part precludes the selling of much alfalfa hay, except to be fed locally. We would therefore expect more live stock to be kept than on the Nine Pipe division.

A study of Figure 17 (see insert, opposite page 32) shows a distribution of farm sizes and crop and live-stock systems about as follows:

40-ACRE FARMS

There are very few farms of this small size. They have 10 to 20 acres of alfalfa, about 10 acres of irrigated pasture, and 4 to 6 dairy cows.

80-ACRE FARMS

There are more farms of this size than of any other. They can be grouped according to alfalfa acreage, into farms with 10 acres,

20 to 25 acres, 30 to 35 acres, and 40 acres and over in alfalfa. There is some tendency for the acreage in irrigated pasture to increase as the alfalfa acreage increases. There is also a slight increase noted in numbers of live stock on farms with the larger alfalfa acreage. Very few beef cattle or sheep are kept and frequently no irrigated small grains are grown. Nearly half of these farms grow some grain without irrigation.

120-ACRE FARMS

There were only a few 120-acre farms. Alfalfa acreage ranged mostly from 20 to 40 acres. Nearly all of these farms grew some small grain without irrigation.

160-ACRE FARMS

These can be divided into those with 20 to 30 acres, and those with 40 to 60 acres in alfalfa. Most of them had some non-irrigated small grains and a few grew small grain under irrigation. Numbers of cattle are not in proportion to alfalfa acreage. Except on a few farms, there is not a large acreage in irrigated pasture.

LARGER FARMS

Most of the farms that are larger than 160 acres have over 40 acres in alfalfa. Some farms have 30 acres or more in irrigated pasture, and there are a few farms with 20 or more dairy cows. A few of these farms also report beef cattle. Sheep are found on 10 farms of various sizes in the division.

3. *Mission Subdivision.*—This subdivision lies south and east of Post Creek, and most of it north of Mission Creek. The land along the Mission Range is of a fertile, dark gravelly loam type. Farther west the soil approaches the heavy clay loam on the south end of the Nine Pipe division. Reclamation headquarters are located at St. Ignatius on this division. A large proportion of this land is held in Indian allotments on which little farming is carried on. Except that the acreage of alfalfa is smaller, the farms as shown in Figure 18 will group themselves approximately the same as those discussed in the Nine Pipe and Round Butte subdivisions. The larger farms, however, show somewhat more irrigated small grain than is indicated in the other two subdivisions.

4. *Moiese Subdivision.*—This subdivision lies directly west of Nine Pipe but on a much lower elevation. It borders the east bank of Flathead River for a distance of 7 or 8 miles. For the most part the

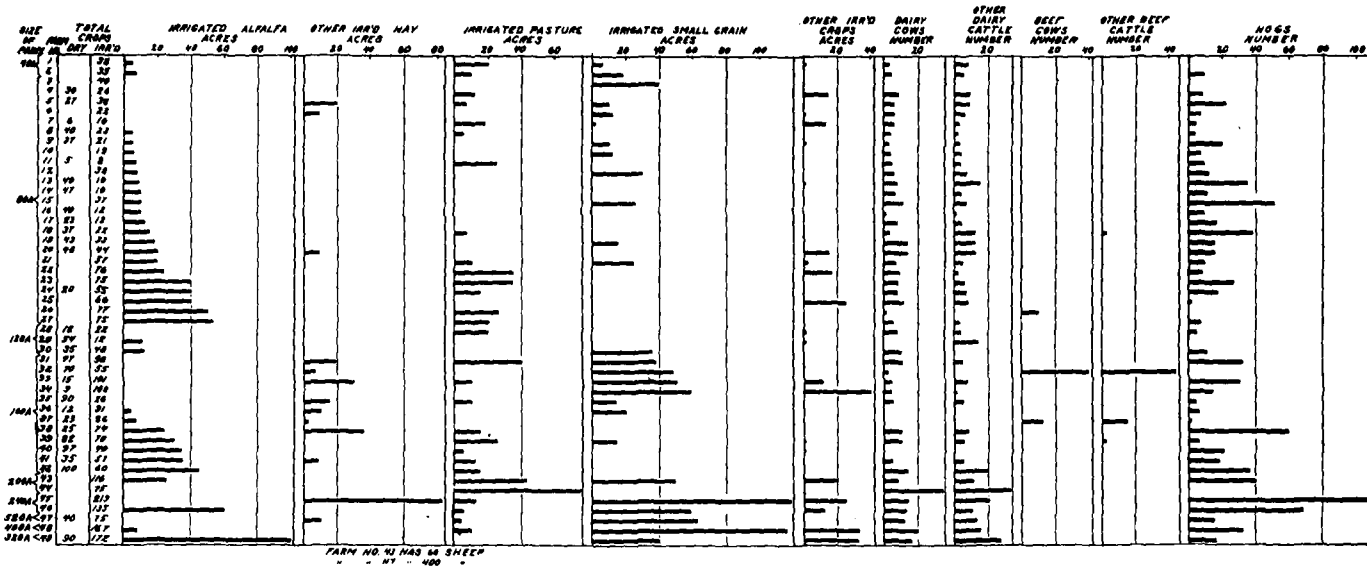


Figure 18--Crop and live-stock combinations on individual farms in the Mission subdivision.

soil is sandy and some of it has a gravelly subsoil. The low elevation and the nature of the soil make possible the growing of corn and other late maturing crops which do not succeed so well on other portions of the project. The farms on this division have more irrigated small grain and more irrigated "other crops" than other parts of the project. Very few farms report any acreage of non-irrigated crops.

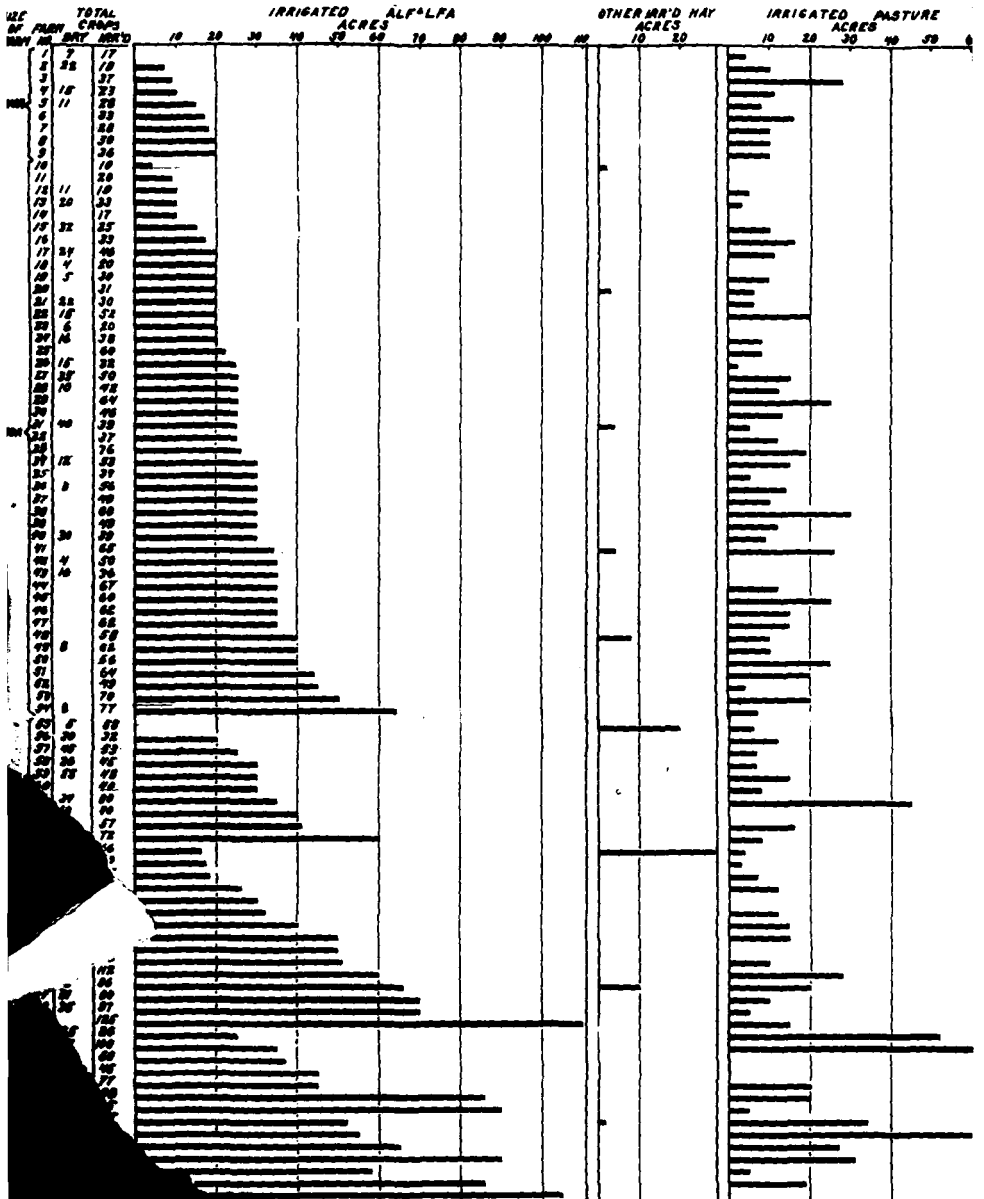
5. (a) *Pablo part of the Pablo Subdivision.*—This is the irrigated land surrounding Pablo and extending westward from there. The soil ranges from a fine sandy loam to soil of more clayey consistency in the western part of the division. Figure 20 indicates no distinct differences in farming systems compared with other divisions of the project.

5. (b) *Polson part of the Pablo Subdivision.*—This is the area adjoining the city of Polson. Much of it is broken up into small tracts of land for truck gardens and small fruits. There is a wide variance in farming systems, and many of the units do not require the full time of the operator. No chart was made for this subdivision.

6. *Valley View Subdivision.*—This part of the project is located south and west of Polson on the east side of the Flathead River. Much of the land is quite level but the soil is light colored and low in organic content. Considerable range is available along both banks of the river. No distinct differences in farming systems are indicated in Figure 21 except that there are a few farmers who keep beef cattle, and a few who have sheep.

7. *Jocko Valley Subdivision.*—This part of the project is divided into a small section lying south and west of Dixon and a larger section on the upper Jocko river adjoining the village of Arlee. Much of this land is rocky and gravelly. Figure 22 shows that the alfalfa hay and irrigated pasture type of farming has not become very well established on this part of the project. Frequently clover and timothy hay are grown instead of alfalfa. Very few farmers attempt to grow any crops here without irrigation. Quite a large proportion of the farmers report irrigated small grains. This subdivision is quite backward in its development. Much of the land is held by Indians.

8. *Camas Subdivision.*—This subdivision, also known as Lone Pine section, is located in Sanders County, west of the Little Bitter Root River. It has a considerably lower rainfall than the territory east of the Flathead River, and very little attempt is made to grow crops without irrigation. The alfalfa and irrigated pasture farming



4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50 HAVE 5, 17, 18, 19, 20, 31, 32, 33 AND 3 SHEEP RESPEC

Figure 17—Crop and live-stock combinations on irrigated acres

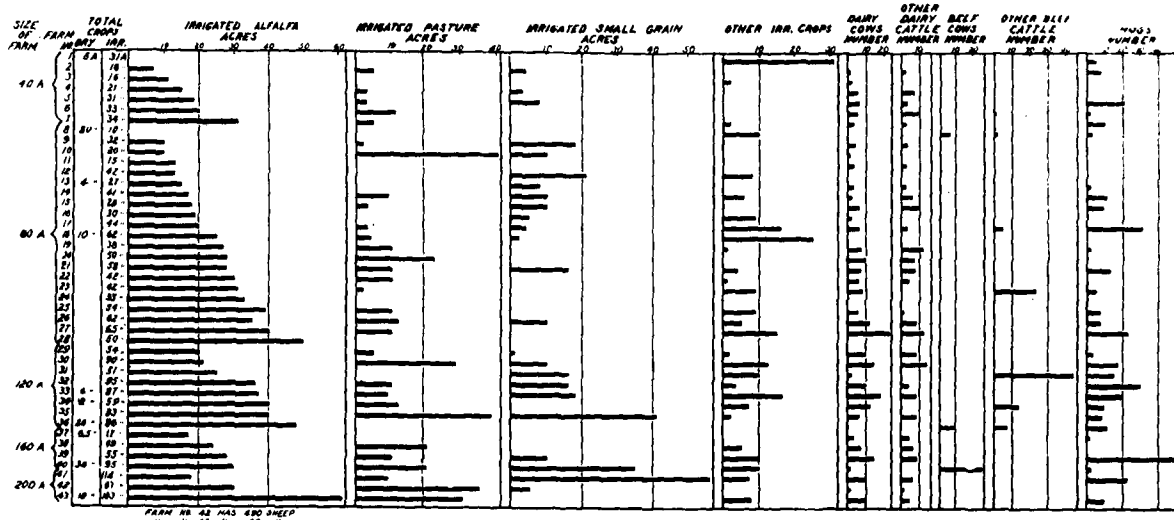


Figure 19—Crop and live-stock combinations on individual farms in the Moiese subdivision.

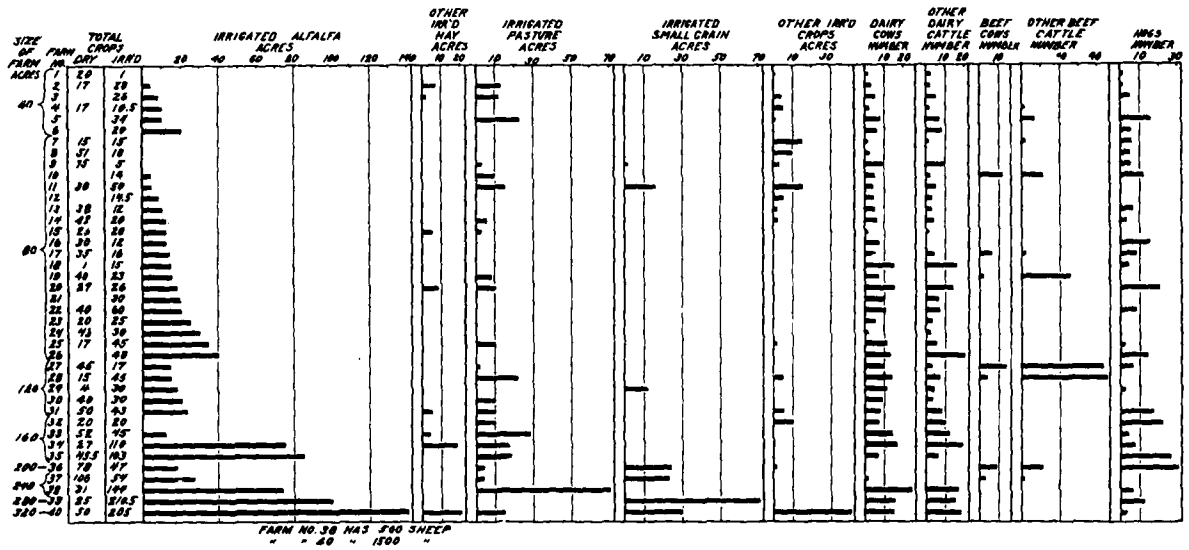


Figure 20—Crop and live-stock combinations on individual farms in the Pablo part of the Pablo subdivision.

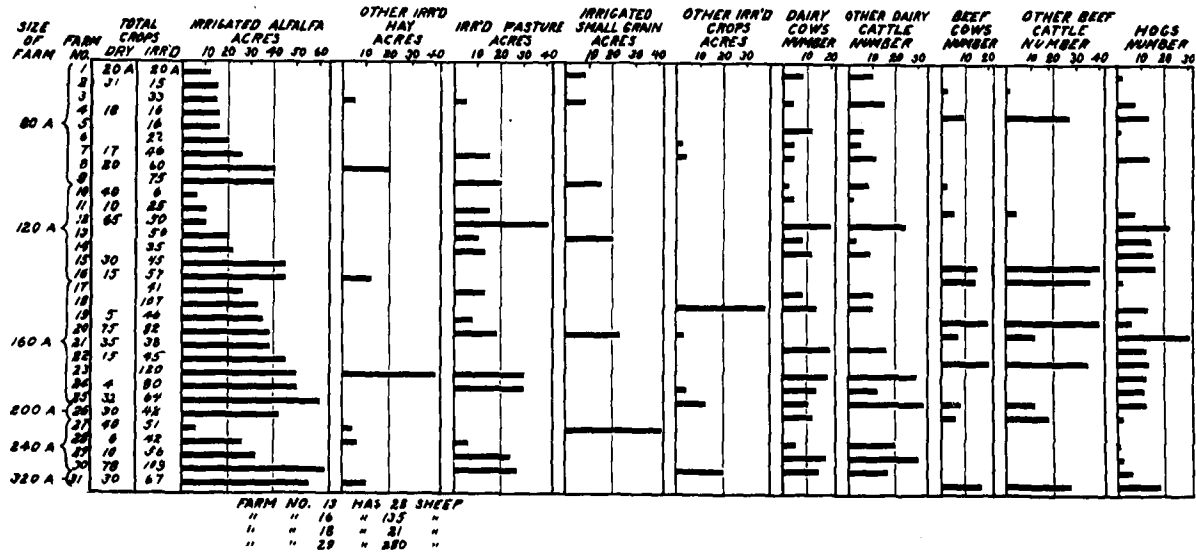


Figure 21--Crop and live-stock combinations on individual farms in the Valley View subdivision.

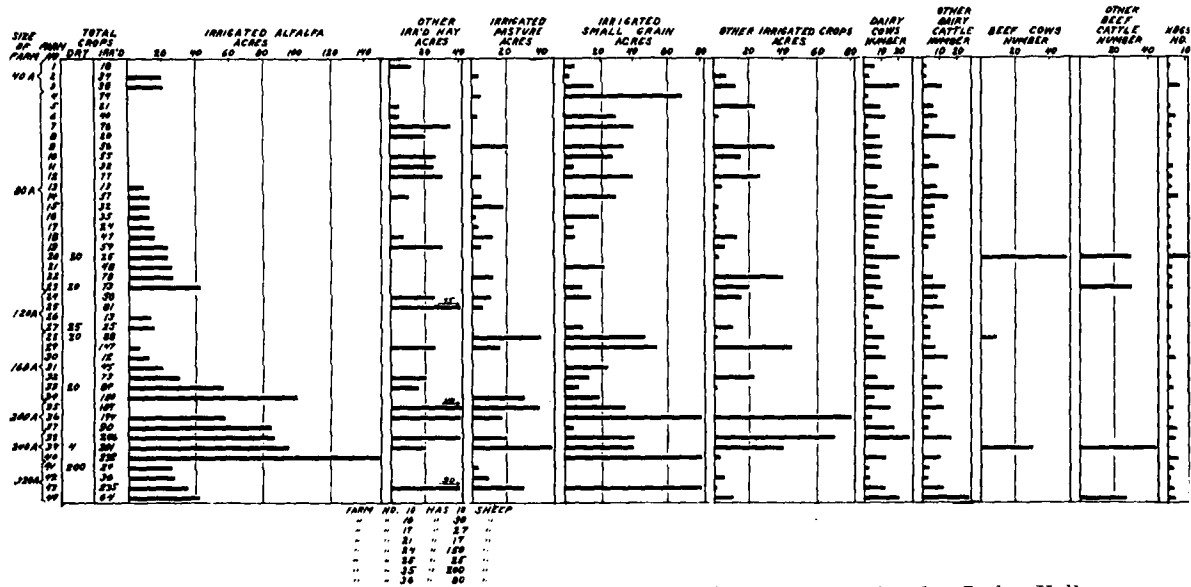


Figure 22--Crop and live-stock combinations on individual farms in the Jocko Valley subdivision.

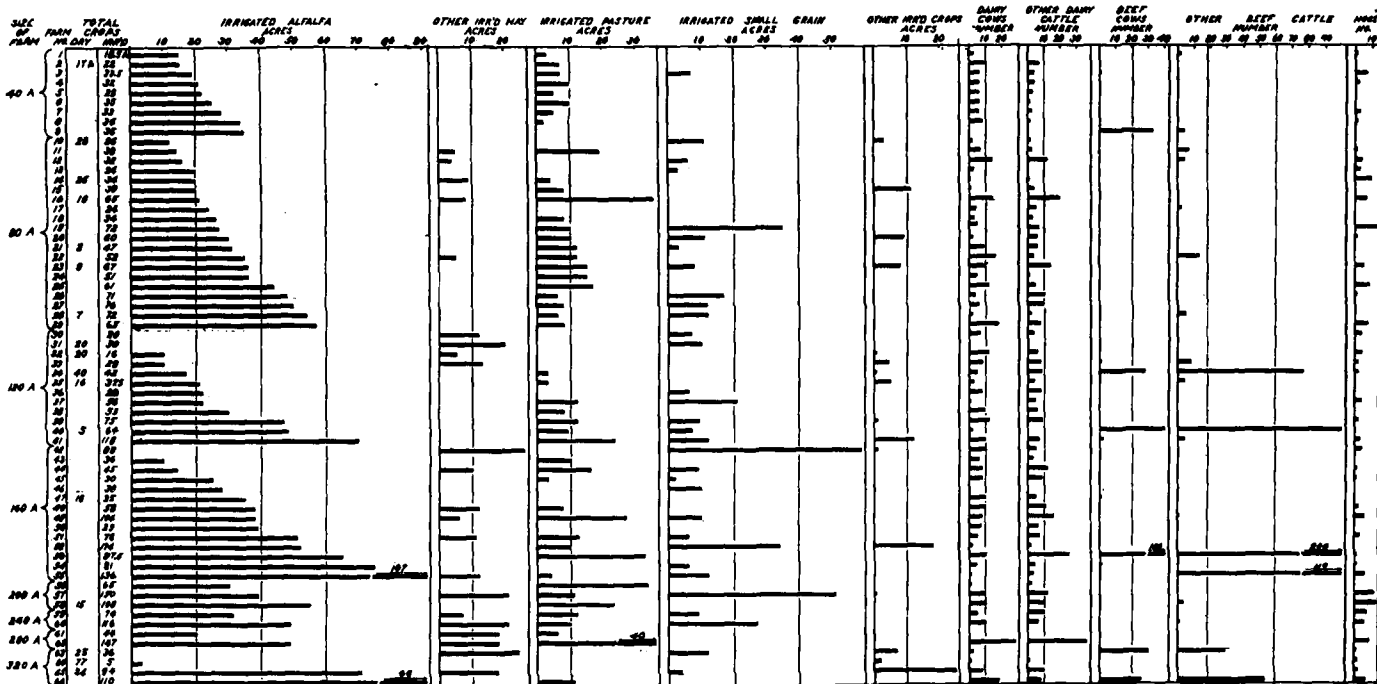


Figure 23—Crop and live-stock combinations on individual farms in the Camas subdivision.

systems shown to prevail on the Nine Pipe and Round Butte divisions are found here except that the distance to shipping point makes it impossible to market alfalfa economically except through live stock. There is considerable winter feeding of sheep and cattle on this division. Some progress in growing clover and alfalfa seed has also been made.

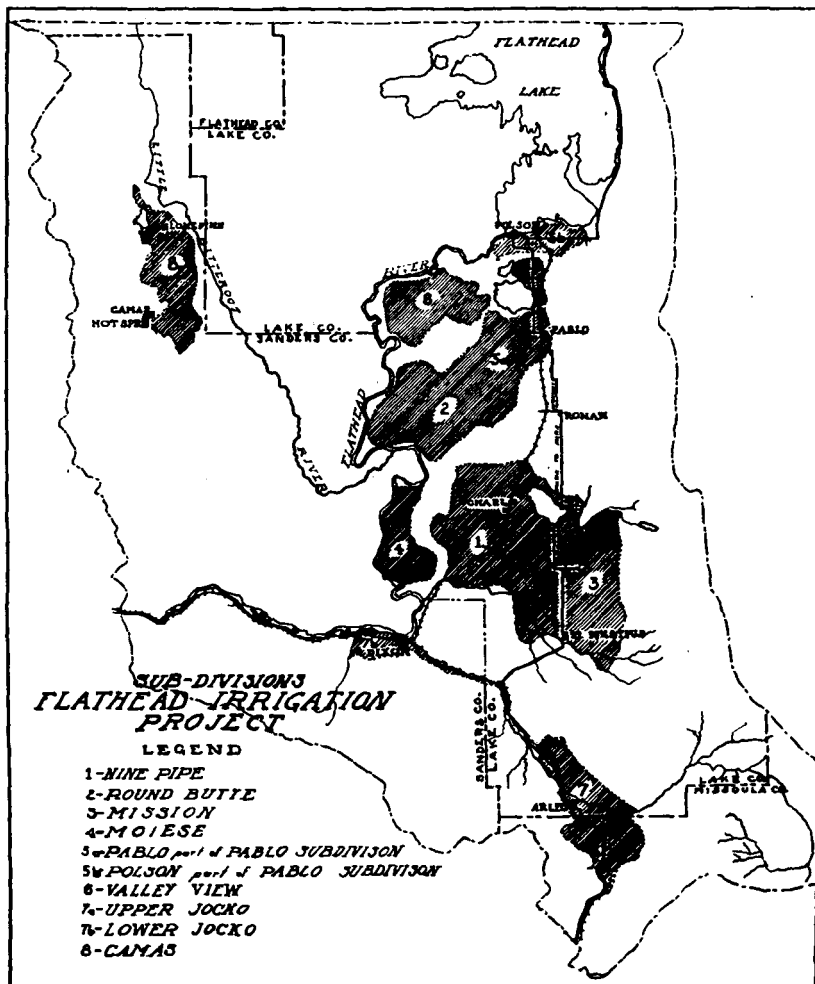


Figure 24—Map showing locations of subdivisions on the Flathead Project. The outside boundary of the map is the old Flathead Indian Reservation boundary.

MOST COMMON TYPES AND SIZES OF FARMS

Method of classification.—A study of farm sizes and the types of crop and live-stock combinations found in each subdivision of the project leads one to the conclusion that in spite of some minor differences in organization, due to somewhat different local conditions, there are certain types and sizes of farms which seem to prevail in all sections of the Flathead Project. In order to classify these most common sizes and types, all farms used in the tabulation by subdivisions were included in a tabulation by sizes and types for the entire project. The farms in each group were again arranged according to the number of acres in alfalfa. Because of the larger numbers of farms in this grouping the different types stand out more clearly than in the subdivision groupings. Tables 5 to 9 and Figure 25 show the results of this grouping. They indicate the principal sizes and types of farms on the project.

Most important variations from the types shown.—No organizations having sheep are shown in Tables 5 to 9. Among approximately 500 farms studied, about 30 of them kept sheep. Most of these had rather small flocks although a few had as many as 500 head or more. Flocks of that size are usually dependent upon range outside of the home farm. There were also about 15 farmers, mostly in the larger-sized groups, who kept herds of beef cattle. These farms frequently have access to grazing areas outside of the home farm. It would seem from the amount of range land adjoining the project that there is some room for expansion of the range sheep and cattle

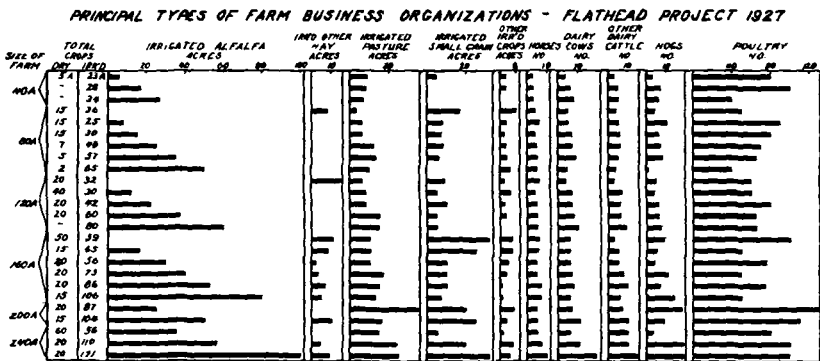


Figure 25—This chart shows the most common sizes and types of farms as indicated by Figures 16 to 23.

enterprises on farms that have access to foothill and mountain range. Farm flocks of sheep offer an alternative to dairying even on the irrigated farms that do not have access to outside range.

TABLE 5.—PRINCIPAL TYPES OF ORGANIZATIONS FOR 40-ACRE FARMS ON THE FLATHEAD PROJECT—1927

Item	Lands in alfalfa		
	10 acres or less	15 to 20 acres	25 to 30 acres
Number of farms	20	26	12
Percentage of irrigable area irrigated .....74	85	85	92
	Acres	Acres	Acres
Dry crops	5	—	—
Irrigable acreage	31	33	37
Irrigated crops	23	28	34
Alfalfa	6	17	27
Pasture	9	8	7
Small grain	5	—	—
Other crops	3	3	—
Live stock	Numbers	Numbers	Numbers
Horses	3	3	3
Dairy cows	4	6	8
Heifers	1	3	2
Calves	2	2	3
Brood sows	1	1	2
Pigs	6	3	3
Other hogs	2	6	4
Poultry	80	100	40

TABLE 6.—PRINCIPAL TYPES OF ORGANIZATION FOR 80-ACRE FARMS ON THE FLATHEAD PROJECT—1927

Item	None	Land in alfalfa				
		Less than 10 acres	15 acres	25 acres	35 acres	Over 40 acres
Number of farms .....22	22	55	42	31	18	
Percentage of irrigable area irrigated .....58	48	51	73	83	93	
	Acres	Acres	Acres	Acres	Acres	
Dry crops	15	15	7	5	2	
Irrigable acreage	62	52	66	69	70	
Irrigated crops	36	25	30	48	65	
Alfalfa	—	8	15	25	50	
Other hay	8	—	—	—	—	
Pasture	3	6	6	12	10	
Small grain	17	8	7	8	6	
Other crops	8	3	2	3	5	
Live stock	Number	Number	Number	Number	Number	
Horses	4	6	4	5	5	
Dairy cows	5	5	7	7	5	
Heifers	2	3	3	3	2	
Calves	2	2	3	3	2	
Brood sows	1	2	2	2	—	
Pigs	7	9	3	7	—	
Other hogs	3	8	4	5	1	
Poultry	50	90	80	70	40	

TABLE 7.—PRINCIPAL TYPES OF ORGANIZATION FOR 120-ACRE FARMS ON THE FLATHEAD PROJECT—1927

Item	Land in alfalfa				
	None	10-15 acres	20-25 acres	30-40 acres	Over 40 acres
Number of farms	10	13	22	18	18
Percentage of irrigable area irrigated	41	36	48	63	80
	Acres	Acres	Acres	Acres	Acres
Dry crops	20	40	20	20	—
Irrigable acreage	79	84	88	96	100
Acres irrigated	32	30	42	60	80
Alfalfa	—	12	22	37	60
Other hay	15	—	—	—	—
Pasture	6	8	8	15	15
Small grain	9	5	10	5	5
Other crops	2	5	2	3	—
Live stock	Number	Number	Number	Number	Number
Horses	6	4	5	5	5
Dairy cows	4	7	7	8	10
Heifers	1	3	4	3	5
Calves	2	4	2	3	4
Brood sows	1	1	1	1	2
Pigs	4	3	5	2	3
Other hogs	4	3	5	5	5
Poultry	60	60	80	65	65

TABLE 8.—PRINCIPAL TYPES OF ORGANIZATION FOR 160-ACRE FARMS ON THE FLATHEAD PROJECT—1927

Item	Land in alfalfa					
	None	10-20 acres	30 acres	40 acres	50-60 acres	Over 60 acres
Number of farms	11	18	16	14	13	15
Percentage of irrigable area irrigated	55	60	50	62	68	79
	Acres	Acres	Acres	Acres	Acres	Acres
Dry crops	50	15	20	20	20	15
Irrigable acreage	107	108	111	117	125	135
Acres irrigated	59	65	56	73	86	106
Alfalfa	—	16	30	40	53	80
Other hay	11	8	2	3	7	5
Pasture	10	10	10	17	15	13
Small grain	32	25	10	10	10	7
Other crops	6	6	4	3	1	1
Live stock	Number	Number	Number	Number	Number	Number
Horses	6	6	5	5	7	7
Dairy cows	6	6	6	7	8	6
Heifers	1	2	3	4	5	3
Calves	2	3	2	4	5	3
Brood sows	1	1	1	3	1	4
Pigs	2	5	2	6	3	8
Other hogs	8	4	3	8	6	10
Poultry	100	50	75	50	75	50

TABLE 9.—PRINCIPAL TYPES OF ORGANIZATION FOR 200-ACRE AND 240-ACRE FARMS ON THE FLATHEAD PROJECT—1927

Item	Land in alfalfa				
	200-acre farms		240-acre farms		
	20-30 acres	40-60 acres	30-40 acres	50-60 acres	Over 70 acres
Number of farms	7	10	7	7	8
Percentage of irrigable area irrigated	65	65	45	63	87
	Acres	Acres	Acres	Acres	Acres
Dry crops	20	15	60	20	20
Irrigable acreage	133	161	124	174	196
Acres irrigated	87	104	56	110	171
Alfalfa	25	50	35	56	100
Other hay	—	10	—	4	9
Pasture	35	16	15	24	25
Small grain	20	25	5	20	32
Other crops	7	3	1	6	5
Live stock	Number	Number	Number	Number	Number
Horses	5	5	5	7	10
Dairy cows	7	11	6	11	20
Helpers	2	6	7	6	10
Calves	5	4	3	4	5
Brood sows	2	3	1	3	4
Pigs	3	9	1	14	10
Other hogs	16	6	2	16	15
Poultry	130	110	80	100	100

BUILDINGS AND EQUIPMENT

Buildings.—Observations on the type of farm buildings in use on the project lead to the impression that in this respect the area is still in the pioneering stage. While many permanent farm homes as well as outside buildings have been erected in the last few years, there are more who expect to rebuild within the next decade.

Buildings are in the nature of permanent and irretrievable investments. Much study and careful thought therefore should be given to the erection of buildings that will be convenient and labor saving in their use without requiring too much of an initial investment. The subject of loafing shed barns will be treated more fully in another report,⁶ but it should be stated here that the housing of dairy cattle to insure their comfort with a minimum of labor and expense is one of the major problems in dairy development on the project.

Machinery.—Machinery investment per crop acre is quite high on the project because of the large number of small farms and the necessity of at least a minimum line of machinery on each farm.

⁶Montana Experiment Station Bulletin on Organization and Practices Affecting Returns on Dairy Farms in Western Montana.



Figure 26—A well-constructed set of farm buildings on the Round Butte subdivision.

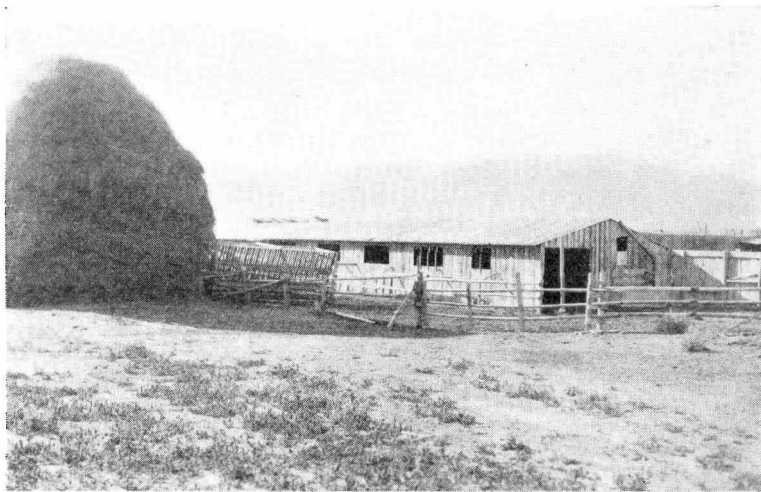


Figure 27—This shed, now used as a sheep shed, served as a loafing-shed barn for two winters when the owner was in the dairy business. Good production was obtained when using this type of shelter.

Where the farms are too small this results in serious duplication of investment, and, what is perhaps more important, the farmers are deprived of many labor-saving machines which represent too large an overhead investment on a small farm but would be very economical on a larger unit.

Since agriculture on the project is built largely around the alfalfa hay crop, it is important that machinery be available for the economical handling of this crop. No labor-saving equipment comparable with the combined harvester-thresher for grain has yet been invented for the alfalfa hay harvest. New developments along this line are very much needed in order that irrigation farmers and farmers depending upon a live-stock type of agriculture may compete on a somewhat equal basis with grain farmers. In the meantime, there is much that farmers on the project can do to improve their present haying equipment and the resulting haying practice.

THE FARM PERSONNEL

The farm operator.—The rapid progress in agricultural technique that has been made in recent years has placed an added burden of responsibility on the man who would succeed as a farm operator. Adoption of constantly improved methods by leading farmers means that relentless competition will eventually force the laggard farmer out of business. New agricultural technique not only calls for more efficient farming in the sense of producing at lower cost, but it often means that in order to take advantage of cost-reducing opportunities operations must be performed on a larger scale than has previously been necessary. Moreover, greater cash outlay and proportionately less non-cash costs are entailed in production than formerly. Mistakes in management therefore are likely to result more quickly in failure of the enterprise. The successful farm operator of today must possess not only high efficiency in supervising farm operations, but must also have capacity to operate a business large enough to take advantage of the economies to be realized by the larger units in the type of farming in which he is engaged.

Farmers, like people in other callings, differ both in capacity for handling a given size of business and in the efficiency with which they can operate. A man, for instance, may not be able to operate a large dairy farm successfully, but because he is especially efficient in his practices and can take excellent care of a smaller number of

cows, he succeeds very well on a smaller farm. He will not make so large an income as if he were capable of operating a larger farm as efficiently as he does the smaller unit, but because he has reached his capacity the smaller farm perhaps represents this man's best alternative.

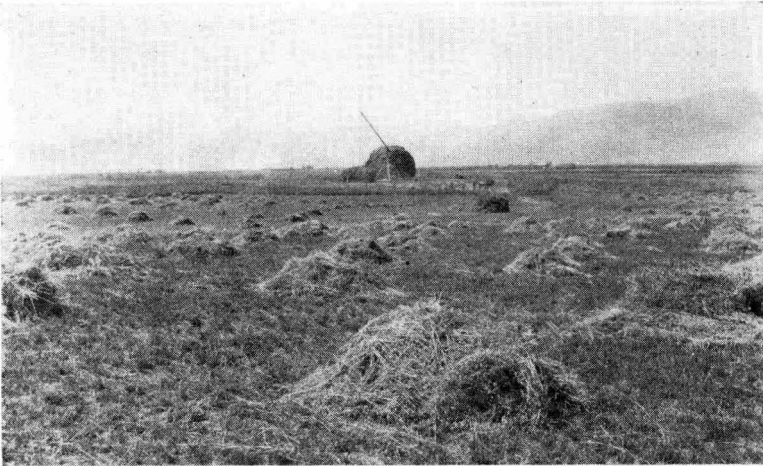


Figure 28—These two pictures of hay fields in the Round Butte subdivision were taken on the same day. They show the difference between careful and careless haying practices. Note below the poorly made stack and the spoiled second crop in the foreground.

The method of land disposal used in settling the Flathead Project (discussed on page 9) was not conducive to bringing in farmers particularly suited to this environment. Some of them had had no experience in any type of farming, the most of them had no experience whatever with farming under irrigation, and the few who had farmed irrigated land found themselves in a new environment, faced with the necessity of developing a different type of farming under what to them were unknown conditions.

It is no wonder that progress at first has been slow. But with the background of experience which the original settlers have established and with a new generation of farmers growing up, who have served part of their farming apprenticeship in this area, more rapid progress can be expected in the future.

Other family labor.—With the exception of a few of the larger units the farms on the Flathead Project are largely family operated. The live-stock type of agriculture in which most of them are engaged enables them to utilize to great advantage the help that the growing children of the family can give even while they are attending school. As long as the work which they do does not interfere with the children's physical and mental development, it is a distinct asset in the farm operations and is a considerable help in increasing the farm income.

Hired labor.—The peak load of labor on most farms of the project comes at haying time. With present methods, the necessity of a large crew at that time forces the hiring of additional labor unless it is possible to exchange work with neighbors. Even then it becomes necessary to hire some work for haying on most farms. Labor at this time commands a high price and is especially hard to get because of competition with the grain harvest in this and other areas. This is especially true of the second cutting of alfalfa. On farms where much grain is grown there is considerable conflict between grain harvest and the second crop of alfalfa.

PART III.—SUGGESTIONS FOR AN AGRICULTURAL
DEVELOPMENT POLICY ON THE FLATHEAD
PROJECT

THE AIM AND BASIS OF A DEVELOPMENT POLICY

The ultimate goal.—It is not within the province of this report to discuss the wisdom of the national reclamation policy as it has been carried out in years past. Suffice it to say that the Federal government has assumed certain responsibilities in the construction of this project and the encouragement of white settlement upon the land. The project undoubtedly was born at an inauspicious time. As a result both the government, which sponsored the project, and the settlers, who were encouraged to come, have had, or will have, to take deflation losses. But this is what has happened in every agricultural region since the war. The only difference is that here the government is involved in a land development program, whereas in most other areas land development is left to private initiative.

Good judgment dictates that the inevitable losses be charged off just as they would be in private business, and that the government cooperate with the settlers to plan a constructive development policy which will enable the latter to pay a just proportion of the construction cost. Such a policy can not be developed immediately nor will its effect become apparent until after it has been in force for some time. More important perhaps than immediate action is the necessity for studying the probable results from any future development policy which is initiated, because whatever is done to hasten readjustments will have far-reaching effects on the economic and social life of this area.

The ultimate goal in any policy which is adopted should be to establish a community with high individual prosperity. Such prosperity should not depend upon continued subsidy, but should be so grounded that after it is once established the farmers can hold their own in competition with farmers in other areas.

The basis of a development policy.—Farm business units adapted to the physical conditions of the area and organized on an economic basis furnish the foundation for the building of a sound development policy. Payment of indebtedness to the government and the placing of the project on a self-sustaining basis are dependent upon individual farmers receiving incomes sufficient to meet such obligations. The foundation for a program of readjustment, therefore, must be the

planning of types of farm business organizations and farm practices which, if adopted, will bring satisfactory incomes to the farmers of the area. The next step is to strive for the adoption of these organizations and methods on as many farms in the area as possible. In other words, payment of project obligations is dependent upon project income, but project income is dependent upon the income of individual farmers. The only way to increase the income of the individual farmer is to work with him on the solution of his own individual problem. This means the working out of types of business organizations and farm practices which (a) are suited to the natural conditions of the area; (b) are likely to prove most profitable in view of expected economic conditions; and (c) are adapted to the varying abilities of farm operators. It means, further, educating individual farmers to the wisdom of a change in organization and methods, and then helping them to find financial means to make the change. Part IV gives a detailed discussion on planning profitable business organizations for the individual farm, but before that discussion is taken up it is necessary to consider some broader problems of land utilization which have a bearing on individual farm organization.

UTILIZATION OF FIXED RESOURCES—A FACTOR IN AREA DEVELOPMENT

Forest and grazing lands.—Certain resources of an area are fixed in character and permit scarcely any alternative in their use. To be sure, a man can decide whether it is economical to utilize them at all or not, but he has little choice as to the use to which they shall be put if he decides to make them serve his needs. Of such character are much of the forest and grazing lands surrounding the Flathead Project. The forests, of course, furnish timber as well as grazing, but from a farming standpoint their only use, perhaps for generations to come, will be for grazing. The same is true of the foothill grazing lands that are too dry or too rough for the growing of crops.

The Flathead Project is the one large area of irrigated land capable of furnishing winter feed for the live stock that can be grazed on the above lands. A development policy for the project must therefore consider the feasibility and the economy of utilizing the surrounding grazing land in connection with this body of irrigated land.

Ranchers located on the Flathead Project have access to forest grazing lands on nearly all sides. The Blackfoot forest can be reached on the north, the Flathead on the east, the Missoula on the south and east, the Lolo (with somewhat more difficulty) to the south, and lastly the Cabinet forest is very accessible to the Camas division of the project. The last-named forest has a carrying capacity of 28,000 sheep for about 4 months and 2,400 cattle for about 5 months¹. Much of this range is unutilized at the present time. We can estimate very roughly that all of the national forest area that is readily accessible to the Flathead Project has a summer carrying capacity of 30,000 sheep and 2,500 cattle. Lake County has in addition approximately 139,000 acres of privately owned grazing land on which we can estimate roughly a carrying capacity of 7,000 cattle and horses, or 28,000 sheep, on the basis of 20 acres per head of cattle and horses or 5 acres per sheep. Some of this will be needed for spring and fall grazing in connection with the forest land, but there are still 95,800 acres of private timber land which should have a summer carrying capacity of about 2,400 cattle or 9,600 sheep. We can figure this as an offset to spring and fall grazing needs on foothill range.

The area of private grazing and timber lands of Sanders County that are accessible to the Flathead Project is hard to estimate. Sanders County has 347,500 acres of grazing land and 187,700 acres of timber land, according to its 1928 assessment rolls. Perhaps only one-fourth of the grazing land and one-fifth of the timber land can be assumed as accessible to the Flathead Project. Figuring on the same basis as in Lake County, this would mean a carrying capacity of about 5,000 head of cattle or 20,000 sheep.

Combining all of these figures, the adjoining range lands have a carrying capacity roughly estimated as 30,000 sheep and 14,000 cattle and horses. This proportion of cattle to sheep is perhaps somewhat higher than the best utilization of this range would warrant, but that makes little difference as far as the immediate discussion is concerned.

If 2 tons of hay per head of cattle and 700 pounds per sheep are needed for winter feeding, it will require a total of 38,500 tons of hay for winter feeding. At an average yield of 2 tons per acre it would require 19,250 acres of irrigated land to supply this feed

¹Report of the Cabinet Forest Supervisor to Sanders County Economic Conference, 1927.

requirement. This is more than half of the land now irrigated on the project, and nearly one-fifth of the acreage classed as irrigable.⁸

Irrigable pasture lands.—There is much land on the project which, although classed as irrigable, is better suited for permanent pasture land than for other crops. It is difficult to estimate the acreage of this class of land but general observation leads to a conclusion that 15 to 20 per cent of the irrigable acreage is a conservative estimate. This would mean about 20,000 acres of this class of land, which with an average carrying capacity of about three-fourths head per acre would mean 15,000 head of cattle. It would require about 20,000 to 22,000 acres of hay to winter this number, assuming that they are dairy cows and young dairy cattle.

Summary of fixed and alternative uses of lands.—If to the 19,250 acres of land needed to furnish winter feed for live stock utilizing the adjoining range, is added the acreage required to supply hay for live stock to be pastured on irrigable land best suited for pastures, over 40,000 acres, or about 35 per cent of the irrigable land on the project, will be used to supplement relatively fixed grazing resources. This 40,000 acres of land plus the 20,000 acres that can best be utilized for pasture equals about 60,000 acres of irrigable land, or over 50 per cent of the land classed as irrigable. In fact, after making some allowance for lands that will be thrown out of the irrigable class when the reclassification is made, it is doubtful whether irrigable lands not needed to supplement relatively fixed resources will include as much as 50,000 acres. Tentatively then, this figure can be used as including the irrigable lands that can be readily shifted to alternative uses. But allowance must also be made for the fact that a considerable portion of this land is held by Indians and development on such land will be very slow. Perhaps a safer figure to use would be about 40,000 acres of land held in white ownership that can be readily shifted to various uses.

IMPROVED ORGANIZATION AND PRACTICES ESSENTIAL TO HIGH INCOMES

The problems involved.—Three major problems present themselves when an attempt is made to suggest methods of procedure in working out a program of development on the Flathead Project. The first problem requiring attention is that of preparing for irri-

⁸There is, however, considerable land in Lake County irrigated from private ditches. See Table 4 for total irrigated land.

gation the land that is now being dry-farmed under the ditch. Inseparably linked with this problem is the development of methods of irrigation that will enable the farmer to avail himself of the use of water at a minimum of labor cost for application. A second major problem is one of developing crop rotation systems and crop practices which will insure increased yields. This involves use of legume rotations, rotation pastures, cultivated crops, application of manure, and to a certain extent improved irrigation technique. The third problem is one of planning and organizing the individual farm in such a manner that the highest possible return is secured from the available resources. This involves the setting up of business units with the size and type of business adapted to the individual farmer's capacity and to the natural and economic advantages of the locality. They must be built on the foundation of successful crop rotations and practices, proper care of live stock, and labor-saving methods of crop production and live-stock management.

*Dry-farming under the ditch.*³—This problem is complicated by the fact that a considerable acreage of the irrigable land not irrigated at the present time is held by Indians and is either dry-farmed or not in crop production at all. As long as leases on these lands favor crop production without irrigation, the practice of leasing them for dry-farming purposes can not be condemned. The only solution seen for this problem is to prepare this land for irrigation and stipulate irrigation farming in the lease. This, however, may not be a paying venture on some of these lands at the present time.

By far the greater portion of the irrigable land being dry-farmed, however, is held in white ownership. A common system of cropping is to grow grain on a portion of the land without irrigation and to irrigate the remainder, on which hay, irrigated pasture, and cultivated crops are grown. There is a prevailing opinion that it does not pay to irrigate the small grains. The average yields of grain secured under irrigation would tend to confirm this opinion if present cropping systems and practices are followed. There is evidence from individual farms on the project, however, and ample evidence from similar irrigated areas, that the present grain yields can be doubled

³It is recognized that there are many acres of non-irrigable land being dry-farmed. Whether such areas are combined with irrigated land in the farm organization or not, this undoubtedly represents the best use of most of such land. In this discussion only irrigable land which is being dry-farmed is considered.

if a legume crop rotation and other improved cropping practices are followed.

If for purposes of comparison a typical 160-acre farm is taken, on which 40 acres of crop land is used for growing wheat without irrigation, and it is assumed that the remainder of the crop land is farmed under irrigation and that the organization and operation are carried on as efficiently as a good farmer can do it, the returns can be compared with those which can be expected when all the crop land is irrigated and good crop and live-stock production is secured. In Part IV, under illustrations for 160-acre farms, the "net return to organization" of \$2346 given under Type 1, assuming normal prices and good crop and live-stock production, can be used as the comparative return when all of the crop land is irrigated. (See page 72.)¹⁰

When 40 acres of crop land is used for non-irrigated wheat, it will be necessary to summer-fallow half of this each year for best results. A yield of 20 bushels per acre on 20 acres of summer-fallowed land is assumed. This leaves 90 acres of crop land for 50 acres of alfalfa hay, 25 acres of irrigated pasture, and 15 acres of irrigated grain. The live stock given in Type 1, page 71, will be reduced in numbers to 20 cows, 8 head of young cattle, and 4 brood sows. If the same overhead expense in water rent and taxes as in Type 1 is assumed but allowances are made for less hired labor and other changes in expenses because of changes in organization, a "net return to organization" of \$1700 is arrived at when 40 acres of the crop land is dry-farmed. This, compared with \$2346 when all of the land is irrigated, leaves a balance of \$646 in favor of the all-irrigated organization.

Since more live stock is kept and better shelters provided when all of the crop land is irrigated, there will be additional investments of about \$2000, which at 10 per cent interest will amount to \$200 each year. But even deducting this item leaves nearly \$450 greater income when all of the irrigable crop land is irrigated.

No doubt a large percentage of the irrigable land now dry-farmed is not in condition for irrigation; but even if it were necessary to spend \$35 per acre for leveling and preparing the land for irriga-

¹⁰By "net returns to organization" is meant the net income from farm sales, assuming no changes in inventory, after normal operating expenses, including machinery and buildings, repairs, and depreciation, have been deducted.

tion, this would represent an investment of only \$1400 for 40 acres, which at 6 per cent interest would amount to \$84 per year. There would still be over \$350 greater return if all of the irrigable crop land were irrigated.¹¹ If a further assumption is made that all of the 40,000 acres of irrigable land that can be readily shifted in its use is divided into 160-acre farms and comparison is made on this basis, there would be about \$96,000 greater net income from this land as a result of irrigating all of the irrigable area.¹²

Much of the land now being irrigated is but poorly prepared for irrigation. If 2 hours of irrigation labor per acre, worth 40 cents per hour, could be saved by better preparation of the land for irrigation, a farmer could afford to spend \$10 per acre for permanent leveling and preparation, assuming 6 per cent interest, and still have a greater return than is possible at the present time.¹³

Improvements in cropping systems and crop practices.—Even though all of the irrigable crop land is irrigated, the net income to the operator from a farm of almost any size is very low if only average crop yields and live-stock production can be depended upon. In Part IV, under Type 1 for 160-acre farms, it is shown that the “net returns to organization” with average crop and live-stock production and normal prices is only \$838. This is not even sufficient to pay a normal interest rate on investment, and leaves no return for the operator’s efforts. (See page 72 for details.) If through better cropping systems and improved crop practices the yield expectancy of crops could be increased to those indicated under “good yields” in Table 14, page 59, the “net returns to the organization” would be increased to \$1780, or an increase of \$942, assuming only average production from live stock. This indicates that the low crop yields are a decided weakness in the present agriculture on the Flathead Project, and that this must be remedied before much financial progress can be made. If it is again assumed that the 40,000 acres of land that can be readily shifted are divided into 160-acre units and that the improvements in crop yields which are assumed under good yields in Table 14, page 59, could be brought about on all of this area, the net increase in income would be about \$235,000.

¹¹A lower rate of interest is assumed when investments are in the form of permanent land improvements.

¹²With the same type and intensity of farming, this total would not vary much with variation in sizes of farms.

¹³Eighty cents labor charge capitalized at 6 per cent gives \$13.33.

Improvements in organization of the farm business.—Even though the above-mentioned improvements are effected, it is highly essential that each individual farm business be organized so as to combine its productive resources to the best advantage. If comparisons are again made in terms of 160-acre farms, a typical farm as listed in Table 8, page 41, of about the same irrigable acreage and the same acreage in alfalfa can be compared with Type 1 of the illustrations of 160-acre organizations in Part IV. The chief differences found are that in the typical farms shown in Table 8 no definite crop rotation systems are evident. Only small herds of dairy cows are kept and few other live stock, making it necessary to depend quite largely upon hay and grain sales for an income. Also some of the irrigable land is dry-farmed.

If the probable net returns to the organization of this type of farm are calculated on the basis shown in Part IV, assuming good crop yields and live-stock production and normal prices, there will be a return of approximately \$1000. Contrasting this with the net return to organization of over \$2300 in Type 1 for 160-acre farms (page 72), an increase of \$1300 is indicated. Not all of this increase could properly be ascribed to differences in the organization of the business unless it is assumed that bringing more land under irrigation is an organization problem as well as a technical problem, which in fact it is. Nevertheless, it must be recognized that part of this increase comes as a result of irrigating all of the irrigable land. An increase of about \$645 in net returns, due to this factor, has already been accounted for. The balance then, or \$655, can be imputed to improvements in organization.

Since there are more live stock kept and better shelters provided in the improved organization, an additional investment of about \$2500 will be necessary, which at 10 per cent interest will amount to \$250 each year. Deducting this sum, however, still leaves over \$400 greater return from the improved organization.

If this increase is again put on the basis of 40,000 acres or 250 farm units of 160 acres each, a gain of \$100,000 is shown from improvements in organization of the business.

AREA INCOME POSSIBILITIES

In the foregoing calculations important gains in farm income to be derived from improvements in irrigation, cropping, and business organizations have been illustrated by means of one type of organ-

ization on 160-acre farms only. It is fully recognized that it would be wholly undesirable to have all farms of one type and size even if it were possible to bring this about. Types and sizes of farms must be flexible enough to fit into particular situations both as to operator's adaptability and different physical and economic conditions. The one type of 160-acre farm was used for comparison because the principles involved could be most conveniently illustrated in that manner. An attempt will now be made to estimate the total increased income that would result from improved organization and practices if they were adopted on varying types and sizes of farms of the area.

The total area unit of 40,000 acres, which was estimated as the area of land on which conditions are such that it can readily be shifted to various uses, will be used. It is assumed that this area is now used according to the sizes and types of farms given in Tables 5 to 9 of Part II. Estimates of the probable incomes from such farms can then be made and these combined for the area according to the relative occurrence of the various types and sizes. The yields and production assumed will be the average as given in Tables 14 and 15 and the prices the normal prices from Table 12. This combined income will be compared with the income resulting when the various types and sizes of business organizations illustrated in Part IV have been combined in the manner shown in Table 10.

TABLE 10.—SIZES AND TYPES OF FARMS ON REORGANIZED BASIS*

Size of farm	No. of farms	Specialized dairy	Sheep and dairy	Beets and dairy
80 acres	150	100	—	50
160 acres	125	75	25	25
240 acres	33	18	8	7

*See Part IV for details of these organizations.

On the reorganized basis, "good crop yields" and "good live-stock production" are assumed. The comparison, therefore, will be on the basis of present farm sizes and types of organization with average yields and production against the sizes and types of organization given above with good yields and production. The same prices for products sold and for cost goods are assumed in both cases.

The increase in returns for the area shown in Table 11 would come as a result of (1) irrigating all of the irrigable land; (2) increasing crop yields and live-stock production per unit; (3) improving business organization and operating practices. It is not to be supposed that such increases in area returns can be brought about in any short period of time. The efficiency assumed in the illustrative organizations is so

TABLE 11.—COMPARISON OF AREA RETURNS

	Present sizes and organizations	Illustrative organ- izations	Increase for area
Total farm sales	\$527,275	\$1,421,100	\$893,825
Total farm expenses	328,245	792,444	464,199
Net returns above expenses	199,030	628,656	429,626
Investment deductions	165,180	224,865	59,685
Net income to farm operators	33,850	403,791	369,941

high that the rank and file of farmers will have difficulty in attaining the goal. On the other hand, the more capable farmers on the good lands will have much better incomes than those assumed. The comparison is most useful in illustrating income possibilities when improved organization and practices are employed as contrasted with present conditions. It brings out the necessity of studying present conditions on individual farms from the point of view of instituting improvements which will increase individual farm incomes and in that way increase the prosperity of the project as a whole.

COLLECTIVE ACTION ON A DEVELOPMENT POLICY

Increased area income, the possibilities of which have been presented above, must come largely as the result of action by farmers on individual farms, but there is much that can be accomplished through collective action in encouraging and hastening the readjustment on the individual farms. Organized groups, both of a civic and a commercial character, can well afford to study the effects of different development policies upon the economic and social structure of the community, and then support those policies which promise the highest stable per capita net income to the people of the area.

If readjustments are to be made which will result in definite increases in area income, credit facilities must be made available which will enable the individual to finance his readjustment program. Group action can do a great deal to improve the present credit situation. It is also possible that, in order to bring under irrigation the areas of irrigable land that are now being dry-farmed, it will be necessary to contrast by actual tests and demonstrations the larger income that can be attained through the use of available water. It might also be economical to use large-scale machinery and proceed on a community basis with leveling and preparing the land for irrigation. It will perhaps be desirable to test and demonstrate increased incomes from better cropping systems and cropping practices and systems of live-

stock management. Tests and demonstrations of means of organizing the farm business so as to combine the available resources on each farm most effectively are also needed.

Organized groups which seek to bring about improvements which will result in greater prosperity on the Flathead Project should bear in mind that permanent prosperity for all groups in the area is dependent upon high and stable net incomes on individual farms. This means that it is not sufficient to increase the volume of agricultural production unless a greater volume means greater net return to the individual producer.

PART IV.—PLANNING EFFECTIVE BUSINESS ORGANIZATIONS FOR THE INDIVIDUAL FARM

THE BASIS OF AN AGRICULTURAL DEVELOPMENT POLICY

In Part III the factors affecting the agricultural development of the project were discussed from the standpoint of the area as a unit. The statement was made, however, that the planning and putting into actual operation of profitable farm business organizations and practices must be the fundamental basis of any successful development policy. It will be the purpose of the following sections to present a method of studying the individual farm business and, where possible, to suggest means for its improvement. The conclusions reached in the final sections of Part III as to area incomes were based upon the detailed farm income analyses which follow as well as upon similar material on income possibilities under present conditions.

TYPES OF INFORMATION NEEDED

Past experience.—Before any worth while study of possibilities in farm business organizations can be made it is necessary to have available certain types of information to be used as a basis for planning the farm business budget. Of such information, the background of experience which has been built up over a period of years by farmers in the area constitutes a very valuable part. It is found, however, that although farmers adapt themselves quite readily to their physical environment as soon as the conditions become known, they are somewhat slower in availing themselves of information on changing economic conditions and in adapting themselves to a changed economic environment.

Price information.—Perhaps the most important of the economic forces which the farmer has to grapple with is the changing price relationship in agricultural products. Changing prices of cost goods

TABLE 12.—PRICES FOR FARM PRODUCTS USED IN FARM ORGANIZATION COMPUTATIONS

	Normal price per unit	High price per unit
Crops		
Wheat (bu.)	\$ 0.90	\$1.15
Barley (100 lbs.)	1.25	1.50
Alfalfa hay (ton)	7.00	9.00
Red clover seed (bu.)	12.00	15.00
Potatoes (100 lbs.) .....	.70	1.00
Sugar beets (ton)	6.00	8.00
Live stock and live-stock products		
Butterfat (lb.) .....	.36	0.45
Hogs, live (lb.) .....	.07½	.09½
Steers, live (lb.) .....	.07	.09
Cull dairy cows (head)	40 to 50	50 to 60
Dry beef cows (head)	60 to 65	70 to 75
Lambs, live (lb.) .....	.08½	.10½
Cull ewes, live (head)	4.50	6.00
Wool (lb.) .....	.25	.32
Eggs (doz.) .....	.25	.32

TABLE 13.—PRICES FOR MAJOR EXPENSE ITEMS USED IN FARM ORGANIZATION COMPUTATIONS

Item	Normal price per unit
Labor	
General farm help—month	\$ 60.00 per month and board
Dairy help—by year	1000.00 per year
Rush season help	3.00 per day
Sugar beet contract labor	27.00 per acre
Sheep shearing .....	.20 per head
Material requirements	
Seed wheat	1.15 per bu.
Seed barley	1.75 per 100 lbs.
Seed potatoes	1.00 per 100 lbs.
Beet seed	2.75 per acre
Alfalfa or red clover seed .....	.30 per lb.
Sweet clover seed .....	.20 per lb.
Twine .....	.17 per lb.
Threshing wheat .....	.05 per bu.
Threshing barley .....	.04 per bu.
Combining grain	3.00 per acre
Threshing and cleaning clover seed	2.50 per bu.
Potato spray and seed treatment	2.50 per acre
Potato sacks .....	.12 per sack
Mill feed	1.60 per cwt.
Chicken feed	2.00 per cwt.
Feed grinding .....	.10 per cwt.
Live stock	
Baby chicks .....	.15 each
Ewes for replacement	12.00 per head
Dairy cows for replacement	90-100 per head
Herd bull	150-200 per head

sequently no grain is provided. The amount of grain required to produce 100 pounds of pork will vary with the kind of pasture and other supplements provided. It is assumed here that the hogs have alfalfa pasture and access to alfalfa hay in the winter. On most farms there will be skim milk available which can be substituted for a part of the grain ration, roughly on the basis of 100 pounds of skim milk to 20 pounds of grain, especially during the growing period. The hay allowance for young stock is an average for calves and yearlings. The skim milk is intended for the young calves. About 200 pounds of whole milk per calf should also be provided and perhaps a small amount of grain should be fed.

Labor requirements and labor distribution.—In order to plan his business the farmer must know approximately the amount of man labor and of power required for each operation on the different farm enterprises, as well as the distribution of such labor and power requirements throughout the season. He is then in a position to plan his labor program so as to eliminate serious conflicts, and to provide for rush season help. He can also judge the effect upon his labor program of shifting the proportions of the different enterprises. While the individual farmer should make his plans on the basis of

TABLE 18.—AMOUNTS OF LABOR AND POWER USED PER ACRE IN THE PRODUCTION OF VARIOUS CROPS

Crop	Man hours	Horse hours	Operating conditions
Wheat	14	25	Fields 20 acres or larger, 4 horse equipment, 2 irrigations
Barley	14	25	3 irrigations, 3 crops
Alfalfa	17	20	3 irrigations, 3 cultivations, 2 sprayings
Potatoes	40	58	
Sugar beets			
Up to harvest	30	70	Acre yields of approximately 10 tons
Lifting and hauling	12	40	

TABLE 19.—AMOUNTS OF LABOR PER UNIT FOR THE DIFFERENT LIVE-STOCK ENTERPRISES

Livestock	Unit	Man hours	Operating conditions
Dairy cows	per head	100	Herds of over 15 cows, barns and equipment conveniently arranged
Young stock	per head	10	
Beef cows	per head	10-15	Herds of approximately 50 cows
Horses	per head	50	Pasture when idle
Sheep	per head	4½	Farm flock
Hogs	per 100 lbs. pork	4	Good sized litters, summer pasture
Chickens	per 100 head	100	Small farm flock

his own methods and his own performance records, the amounts shown in Tables 18 and 19 are used as standards in the illustrative organizations which follow. These tables have been compiled from records kept by farmers of the area and checked with performance in other areas with similar conditions. Work calendars and labor distribution charts which indicate the time of the year when labor is required for the various operations will be shown in later pages.

PLANNING THE FARM BUSINESS

Equipped with information such as has been discussed, the farmer can proceed to plan his business organization, and to make up budgets for carrying out his plans. In the pages which follow illustrative business organizations will be worked out for the sizes of farms indicated in Tables 6 to 9 (pages 40-42)¹. The financial returns that can be expected under the plans and assumptions involved will be shown. These illustrations are not made up to fit any one individual farmer's condition, but rather to illustrate a method of planning the business, and to reveal the main organization problems as well as the alternatives in organization for each size and type of farm. Results are given in later pages for actual farms in the area where records have been kept in cooperation with the Department of Agricultural Economics. Suggestions also are made for increasing the income on these farms.

A.—ILLUSTRATIVE BUSINESS ORGANIZATIONS FOR 80-ACRE FARMS

Type 1.—Dairying the Main Enterprise

In this illustration it is assumed that there are only 65 acres of irrigable crop land but that 8 acres of native pasture land can be given some water. Seven acres would be taken up with buildings, yards, hog lots, ditches, and waste. Each year 15 acres of feed grain would be seeded. If barley yielded more pounds of feed to the acre than soft wheat, it would be substituted for wheat. Sweet clover would be seeded in all grain and 10 acres out of the 15 seeded would be used for pasture the following year. The other 5 acres would go back into wheat or into potatoes the following year. The wheat, pasture, and potato land should be rotated in such a manner that grain is not grown more than two years in succession on any part of the ground. The alfalfa will be left as long as the stand is good, but when it is neces-

¹No business organizations will be shown for 40-acre farms. It is believed that with the type of farming followed, these are too small for adequate returns. For lack of information, organizations for some of the larger farms will also have to be omitted.

TABLE 20.—LAND, CROPS, AND CROP PRODUCTION

Land use	Acres	Average yields	Good yields
Alfalfa	30	75 tons	105 tons
Rotation pasture	10	10 head	18 head
Permanent tame pasture	5	5 head	9 head
Wheat	15	300 bus.	600 bus.
Potatoes	5	375 sacks	625 sacks
Total crop land	65	—	—
Native irrigated pasture	8	5 head	8 head
Farmstead and waste	7	—	—
Total farm	80	—	—

sary to plow up part of the alfalfa field, this should be anticipated and part of the old stand used for pasture one year because the new stand will be seeded in the grain and thus no sweet clover pasture will be available for one year. Care will have to be taken to prevent bloat on alfalfa pasture.¹⁵

Under this crop and live-stock combination, potatoes will be the only crop raised for the market except that a surplus of wheat and hay will be sold if good yields are secured. All seed used is figured as purchases under farm expenses, thus allowing for the purchase of high quality seed.

TABLE 21.—LIVE-STOCK NUMBERS, PRODUCTION, AND SALES

Kind of live stock	Numbers	Average practices		Good practices	
		Production	Sales ^a	Production	Sales ^a
Horses	4	—	—	—	—
Dairy cows	13	2925 lbs.	2725 lbs.	3375 lbs.	3375 lbs.
Yearling heifers	2	—	—	—	—
Calves	2	—	—	—	—
Herd bull	1	—	—	—	—
Brood sows	3 old sows or 6 gilts	30 pigs	—	36 pigs	—
Pigs	30-36	5100 lbs.	4700 lbs.	6840 lbs.	6440 lbs.
Chickens	100	600 doz.	500 doz.	800 doz.	700 doz.

^aDifference between amount produced and amount sold represents allowance for products used in household and also some whole milk fed to calves. In this and following dairy organizations it is assumed that only enough calves are raised to maintain the herd, and that none of the calves is sold for veal. It may be profitable on some of the larger farms to raise more dairy heifers and to plan on having surplus dairy stock for sale.

The farm sales shown in Table 23 are calculated first on the basis of average expectancy both for crop and live-stock production; then for average crop production but higher than average live-stock production; and finally when both crop and live-stock production are above

¹⁵On farms where it seems more desirable to have all permanent irrigated pasture, it is possible that alfalfa sod can be plowed up every 4 or 5 years and in that way a rotation established that includes a legume crop. Growing red clover seed is another possibility.

TABLE 22.—CROP DISPOSAL

	Alfalfa	Wheat	Potatoes
	Tons	Bus.	100 lb. sks.
Production			
Average crop	75	300	375
Good crop	100	600	625
Amount fed			
Average practice	66	300	—
Good practice	72	*366	—
Amount sold			
Average crop and live-stock production	6	—	350
Average crops, good live stock	—	—	350
Good crops, good live stock	33	230	600
Balance	3	4	25

*If only average crops are secured 66 bushels will have to be purchased.

AMOUNT OF LABOR REQUIRED

Operator	entire year
Hired help as follows:	
Haying	25 to 30 days
Potato picking	8 to 10 days
Miscellaneous help	10 to 15 days

WORK CALENDAR

Month	Crop work	Livestock	Miscellaneous
January	None	Chores, hauling hay and manure	Getting out wood and posts, general repair work
February	None	Chores, hauling hay and manure	Getting out wood and posts, general repair work
March	Cleaning seed	Chores, hauling hay, hog farrowing	Repairing machinery and fences
April	Plowing, and seeding grain	Daily chores	Fences and other necessary repairs
May	Irrigating, planting potatoes	Daily chores	Building and fence repairs
June	Cultivating, irrigating, haying in last part	Daily chores	Only most necessary repairs
July	Haying, irrigating cultivating	Daily chores	Only most necessary repairs
August	Grain harvest, haying, irrigating	Daily chores	Only most necessary repairs
September	Threshing, picking potatoes	Daily chores	Only most necessary repairs
October	Potato picking, fall plowing	Daily chores	Only most necessary repairs
November	Finishing fall work	Daily chores	Preparing for winter
December	None	Daily chores	Getting out wood and posts, general repair work

TABLE 23.—FARM SALES

Products sold	Amount sold			Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Alfalfa (tons)	6	—	33	\$ 42	\$ —	\$231
Wheat (bus.)	—	—	230	—	—	207
Potatoes (100 lbs.)	350	350	600	245	245	420
Butter fat (lbs.)	2725	3375	3375	981	1215	1215
Cows or helpers (head)	1	1	1	40	50	50
Hogs, live wt. (lbs.)	4700	6440	6400	352	483	483
Eggs (doz.)	500	700	700	125	175	175
Total value of sales, normal prices				1785	2168	2781
Total value of sales, high prices*				2287	2765	3577

*The high prices used are given in Table 12.

TABLE 24.—FARM EXPENSES

Item	Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Crop expenses			
Seed wheat	\$ 29	\$ 29	\$ 29
Seed potatoes	50	50	50
Grass seed	47	47	47
Potato spray and seed treatment	13	13	13
Potato sacks	42	42	72
Use of potato digger	6	6	7
Combining wheat	45 \$232	45 \$232	45 \$263
Labor			
Haying labor	75	75	90
Potato picking	24	24	30
Miscellaneous help	30 129	35 134	45 165
Live-stock expense			
Purchased feed	163	230	163
Depreciation on bull	25	35	35
Miscellaneous	65 253	85 350	85 283
General farm expenses			
Water rent	145	145	145
Taxes	105	105	105
Machinery repairs and depreciation	260	260	270
Building repairs and depreciation	55	55	55
Fence repairs	15	15	15
Automobile for farm use	100 680	100 680	100 630
Total farm expenses	1294	1396	1401
Net returns to organization, normal prices	491	772	1380
Net returns to organization, high prices	993	1369	2176

INVESTMENT DEDUCTIONS FROM INCOME

Interest on real estate, \$4,000 at 5 per cent	\$200
Interest on one-half of machinery cost, \$1000 at 10 per cent	100
Interest on live stock, \$1800 at 10 per cent	180
Total investment deductions	480

NET INCOME TO OPERATOR

	Normal prices	High prices
(a) Average crops and live stock	\$ 11	\$ 513
(b) Average crops, good live stock	292	889
(c) Good crops, good live stock	900	1680

the average. The yield and production figures used are those given in Tables 14 and 15. Note the high increase in total sales when both crop and live-stock production are above the average.

The "net returns to organization," shown in Table 24, represent the amount the farmer and his family have left at the end of the year as a return for their investment in the business (assuming there are no debts) and for their labor and management. In addition they would have a house to live in and the farm produce used in the household. All labor except that of the operator has been assumed to be hired and charged up in expenses, but no deductions have been made for board of hired help. Normal machinery and building repairs and depreciation have been charged. The farmer and his family could normally expect this return for living expenses and for payment of interest and farm debts.

The "investment deductions from income" represent an attempt to allocate the part of the returns that arises because of investment in the farm business. Interest is charged at prevailing rates. The "net income to the operator" then represents the return for his year's efforts in operating the farm. It is noted that with average crop and live-stock production and normal prices the farmer would have hardly any return for his own efforts. This it is believed would be the actual condition on those 80-acres farms where only average production is secured, if all of these deductions from income are made. There are farms, of course, where unpaid family labor will take the place of hired labor, and where less machinery and building expense will need to be charged, so that the net income to the family will be somewhat increased. Also the prices received for the products sold would perhaps be somewhat more favorable than the normal prices used in the above calculations.

Type 2.—Increased Crop Yields Fed to More Live Stock

On the farms where good crops are secured the net incomes shown in Table 24 could be increased considerably if more cows and hogs were kept instead of selling hay and wheat. There also would be more pasture available than would be used by the live stock figured above.

If a slight adjustment were made between alfalfa and pasture acreage, 10 more head of cows and 2 young cattle could be kept on the increased yields. About 4 more brood sows could also be kept

on the additional grain that would be raised. The additional sales from this combination would be about \$1180, assuming "normal prices," and \$1440, assuming "high prices." From these amounts it might be necessary to deduct about \$300 for the extra labor, leaving \$880 and \$1140 respectively. These figures, however, would bring the "net returns to organization" up to \$2260 with "normal prices" and \$3470 with "high prices." This is a very much more satisfactory income and indicates the greater profitableness of feeding the surplus crops to live stock.¹⁶

Type 3.—Dairy and Sugar-Beet Combination

Since there is a beet sugar factory at Missoula, the growing of sugar beets represents one alternative on those 80-acre farms which have soil suitable for the production of beets and are located on good roads not too far from the shipping point. The calculations in Table 25 show the probable expectancy with a dairy-sugar beet combination.

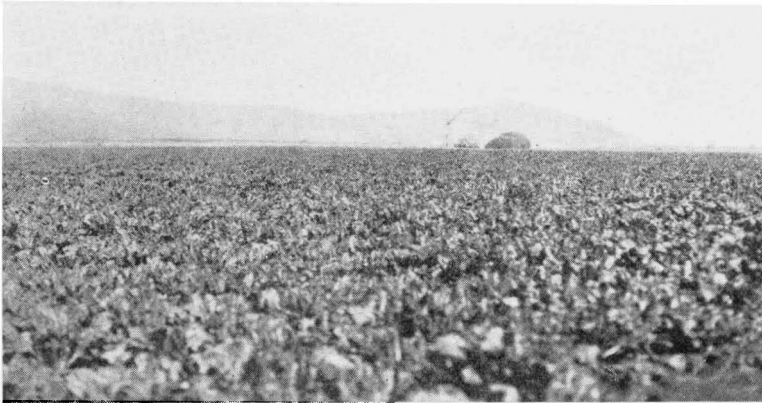


Figure 29—A field of sugar beets on an 80-acre farm near Charlo, 1928.

The rotation with this combination of crops would be two years of beets, followed with wheat seeded down to rotation pasture. Alfalfa would not be plowed up so long as a good stand was maintained.¹⁷

¹⁶Part of this return is due to the fact that the higher carrying capacity of pasture is fully utilized.

¹⁷It may be advisable to plow up at least part of the alfalfa ground every 4 or 5 years even though the stand is still good, because of the beneficial effect on yields of succeeding crops.

With 20 acres of sugar beets the hay and pasture production will be less than in Type 1. Although sugar beet tops will be available for feed it perhaps will be necessary to reduce the dairy herd to 10 cows. Otherwise the numbers of live stock and the sale of live stock and live-stock products can remain the same as in Type 1. More feed will have to be purchased to feed out the same number of hogs because the grain acreage also will be reduced.

The returns shown for this type are somewhat more favorable than the incomes shown under Type 1. There also undoubtedly would be some permanent benefits in the way of increased crop yields because of improved soil tilth. Where the alternative of raising beets presents itself, the adaptability of the operator himself for this enterprise is perhaps the most important factor in the decision. The comparative price relationship that is likely to prevail between beets and alternative crops should also be carefully considered.

TABLE 25.—LAND, CROPS, AND CROP PRODUCTION

Land use	Acres	Production	
		Average yields	Good yields
Alfalfa	25	62 tons	87 tons
Rotation pasture	10	10 head	18 head
Wheat	10	200 bus.	400 bus.
Sugar beets	20	200 tons	280 tons
Total crop acres	65	—	—
Native irrigated pasture	8	5 head	8 head
Farmstead and waste	7	—	—
Total farm	80		

AMOUNT OF LABOR REQUIRED

Operator	entire year
Hired help as follows:	
Contract beet labor	\$27 per acre
Hauling beets	25 to 30 days
Haying	20 to 25 days
Miscellaneous labor	20 to 25 days

WORK CALENDAR FOR BEETS

Preparation of ground and planting	Before May 10th
First cultivation	June 1st
Second cultivation	June 15th
First irrigation	June 20th
Third cultivation	July 1 to 10th
Second irrigation	immediately following third cultivation
Fourth cultivation	5 days after second irrigation
Ditching-out performed at same time	
Irrigations every 10 to 15 days following, up to September 5th	
Beet harvest	October
Thinning and hand cultivation done by beet labor as needed	

One point brought out rather strikingly in both of the foregoing illustrations is that with this size of farm the net income to the operator is small even under the most favorable conditions. While it is undoubtedly true that some men who lack capacity to farm a larger acreage will receive their highest possible returns from this size of farm, nevertheless they must be content with a rather small income, while men who have the capacity to operate larger units will greatly increase their chances for high returns by increasing the acreage farmed.

TABLE 26.—FARM SALES

Product sold	Amount sold			Value at normal prices		
	Av. crops and livestock	Av. crops, good live stock	Good crops, good live stock	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Alfalfa (tons)	6	—	25	\$ 42	\$ —	\$ 175
Sugar beets (tons)	200	200	280	1200	1200	1680
Butterfat (lbs.)	2050	2550	2550	738	918	918
Cows or heifers (head)	1	1	1	40	50	50
Hogs, live wt. (lbs.)	4700	6440	6440	352	483	483
Eggs (doz.)	500	700	700	125	175	175
Total value of sales, normal prices				2497	2826	3481
Total value of sales, high prices				3233	3644	4500

TABLE 27.—FARM EXPENSES

Item	Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Crop expenses			
Seed wheat	\$ 74	\$ 74	\$ 74
Grass seed	47	47	47
Beet seed	55 \$176	55 \$176	55 \$176
Labor			
Contract beet labor	540	540	540
Hauling beets	75	75	90
Haying	60	60	75
Miscellaneous	60 735	65 740	75 780
Live-stock expense	303 303	400 400	283 283
General farm expense	745 745	745 745	820 820
Total farm expenses	1950	2061	2050
Net returns to organization, normal prices	538	765	1422
Net returns to organization, high prices	1274	1583	2450

INVESTMENT DEDUCTIONS FROM INCOME

Interest on real estate, \$4,000 at 5 per cent	\$200
Interest on one-half of machinery cost, \$1250 at 10 per cent	125
Interest on live stock, \$1550 at 10 per cent	155
Total investment deductions	480

NET INCOME TO OPERATOR

	Normal prices	High prices
(a) Average crops and live stock	\$ 58	\$ 794
(b) Average crops, good livestock	285	1103
(c) Good crops, good live stock	942	1970

B.—ILLUSTRATIVE BUSINESS ORGANIZATIONS FOR 160-ACRE FARMS**Type 1.—Dairying the Main Enterprise**

In this organization the alfalfa and the permanent pasture would be left as long as the stand is maintained. The rest of the crop land would have a crop sequence beginning with rotation pasture followed by barley, with half of the barley acreage seeded to red clover so that the third year half of the acreage rotated would be in red clover for seed and half of it in wheat. Sweet clover would be seeded in the wheat and the red clover land would be left for pasture the following year. In order to prevent the possibility of red clover seed becoming mixed with sweet clover, it might be desirable to maintain two separate rotations—one of red clover pasture, barley, and red clover; and the other of sweet clover pasture, barley, and wheat. It would perhaps be necessary to seed some timothy and alsike clover with the red clover in order to assure a stand the second year.

In this illustration it will be noted that although the "net returns to the organization" under average crop and live-stock production and normal prices are \$838 (considerably larger than for the 80-acre farms), when the investment deductions are made the operator has less than nothing for his own labor and management. While it is true that if there are no debts the farmer and his family will have a larger spending income than on an 80-acre farm, the labor and managerial return will not be increased greatly, because the results of inefficient practices are extended over a larger business. These figures tend to prove that the average crop yields and the average live-stock production in this area are altogether too low to give satisfactory returns from farming.

TABLE 28.—LAND, CROPS, AND CROP PRODUCTION

Land use	Acres	Production	
		Average yields	Good yields
Alfalfa	60	150 tons	210 tons
Rotation pasture	20	20 head	36 head
Permanent pasture	10	10 head	18 head
Red clover	10	10 tons hay	15 tons hay
		20 bus. seed	30 bus. seed
Barley	20	500 bus.	1000 bus.
Wheat	10	200 bus.	400 bus.
Total crop land	130	—	—
Native irrigated pasture	15	9 head	15 head
Farmstead and waste	15	—	—
Total farm	160		

TABLE 29.—LIVE-STOCK NUMBERS, PRODUCTION, AND SALES

Kind of livestock	Numbers	Average practices		Good practices	
		Production	Sales*	Production	Sales*
Horses	8	—	—	—	—
Dairy cows	26	5850 lbs.	5550 lbs.	7150 lbs.	6850 lbs.
Yearling heifers	6	—	—	—	—
Calves	6	—	—	—	—
Herd bull	1	—	—	—	—
Brood sows	6 old sows or 12 gilts	60 pigs	—	72 pigs	—
Boar	1	—	—	—	—
Pigs	60-72	10200 lbs.	9700	13680	13180
Chickens	100	600 doz.	500 doz.	800 doz.	700 doz.

*Difference between amount produced and amount sold represents allowance for products used in household and also some whole milk fed to calves.

TABLE 30.—CROP DISPOSAL

	Alfalfa	Red clover	Red clover	Barley	Wheat
	Tons	hay	seed	Bus.	Bus.
Production					
Average crops	150	10	20	500	200
Good crops	210	15	30	1000	400
Amount fed*					
Average practice	125	10	—	500	185
Good practice	138	10	—	500	190
Amount sold					
Average crops and live stock	15	—	20	—	—
Average crops, good live stock	2	—	20	—	—
Good crops, good live stock	62	**5	30	500	200
Balance	10	—	—	—	10-15

*It will be necessary to buy some grain feed in addition to what is allowed here from farm supplies.

**This clover hay will perhaps be fed and an equal amount of alfalfa sold.

AMOUNT OF LABOR REQUIRED

Operator	entire year
Hired man	entire year
Haying labor	35 to 45 days
Miscellaneous labor	20 to 30 days

The sequence of work will be the same as shown in work calendar for Type 1 in 80-acre-farm illustration.

TABLE 31.—FARM SALES

Product sold	Amount sold			Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Alfalfa (tons)	15	2	62	\$ 105	\$ 14	\$ 434
Wheat (bus.)	—	—	200	—	—	180
Barley (100 lbs.)	—	—	250	—	—	312
Red clover seed (bus.)	20	20	30	240	240	360
Butterfat (lbs.)	5550	6850	6850	1998	2466	2466
Cows or heifers (head)	5	5	5	200	250	250
Hogs, live wt. (lbs.)	9700	13180	13180	727	988	988
Eggs (doz.)	500	700	700	125	175	175
Total value of sales, normal prices				3395	4133	5165
Total value of sales, high prices				4263	5158	6471

TABLE 32.—FARM EXPENSES

Item	Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Crop expenses			
Seed wheat	\$ 19	\$ 19	\$ 19
Seed barley	38	38	38
Grass seed	105	105	105
Combining grain	90	90	90
Hulling and cleaning clover seed	50 \$302	50 \$302	75 \$327
Labor			
Hired man by year	720	720	720
Haying labor	105	105	135
Miscellaneous labor	60 885	75 900	90 945
Live-stock expense			
Purchased feed	160	282	282
Depreciation on bull	35	45	45
Miscellaneous	100 295	120 447	120 447
General farm expense			
Water rent	290	290	290
Taxes	180	180	180
Machinery repairs and depreciation	325	325	345
Building repairs and depreciation	100	100	100
Fence repairs	30	35	35
Auto for farm use	150 1075	150 1080	150 1100
Total farm expense	2557	2729	2819
Net returns to organization, normal prices	838	1404	2346
Net returns to organization, high prices	1706	2420	3652

INVESTMENT DEDUCTIONS FROM INCOME

Interest on real estate, \$8000 at 5 per cent	\$400
Interest on one-half of machinery cost, \$1250 at 10 per cent	125
Interest on livestock, \$3600 at 10 per cent	360
Total investment deductions	885

NET INCOME TO OPERATOR

	Normal prices	High prices
(a) Average crops and livestock	\$ 47	\$ 821
(b) Average crops, good livestock	519	1544
(c) Good crops, good livestock	1461	2767

Type 2.—Increased Crop Yields Fed to More Live Stock

When good crop and live-stock production is secured, the return to the operator on this size of farm is quite satisfactory, but it could be increased still further if the larger crops and greater carrying capacity of pasture were fed to more live stock (see Type 2 for 80-acre farms). If this were done on the above farm, 17 more cows, 6 young cattle, and 5 more brood sows could be kept. The additional sales would bring approximately \$1500, assuming "normal prices", and \$1900, assuming "high prices." It might be necessary to figure \$400 for labor and other additional expenses so that the net increase

would be \$1100 and \$1500, respectively. This would mean a net return to organization of \$3446 with "normal prices" and \$5152 with "high prices."

Type 3.—Dairy, Hog, and Sheep Combination

Many farmers on 160-acre farms are not especially adapted to dairying but like to raise sheep and know how to handle them successfully. Farm flocks of sheep offer a good alternative to dairying on irrigated farms. In the illustrative organization which follows, the same cropping plan and crop production as in Type 1 are assumed



Figure 30—A farm flock of sheep on irrigated pasture near Charlo on the Nine Pipe subdivision.

except that the alfalfa area is reduced to 40 acres and 20 acres more of permanent pasture substituted.

The dairy herd is reduced to 6 cows and 2 head of young stock, and 180 ewes and 3 rams are added. Ewes should shear 8 pounds of wool and raise a 100 per cent lamb crop with average care, and shear 10 pounds of wool and raise a 125 per cent lamb crop with better care. All lambs are sold when weighing 70 pounds with average care and 80 pounds with good care. Each year 25 cull ewes are sold and 30 good ewes bought, allowing a margin of 5 ewes for annual death loss.

The "net returns to organization" shown in Table 34 are somewhat less than the income from the specialized dairy combination. Sheep would perhaps require less of the operator's time, however, and less hired help would be needed, which means a saving in board

would be \$1100 and \$1500, respectively. This would mean a net return to organization of \$3446 with "normal prices" and \$5152 with "high prices."

Type 3.—Dairy, Hog, and Sheep Combination

Many farmers on 160-acre farms are not especially adapted to dairying but like to raise sheep and know how to handle them successfully. Farm flocks of sheep offer a good alternative to dairying on irrigated farms. In the illustrative organization which follows, the same cropping plan and crop production as in Type 1 are assumed



Figure 30—A farm flock of sheep on irrigated pasture near Charlo on the Nine Pipe subdivision.

except that the alfalfa area is reduced to 40 acres and 20 acres more of permanent pasture substituted.

The dairy herd is reduced to 6 cows and 2 head of young stock, and 180 ewes and 3 rams are added. Ewes should shear 8 pounds of wool and raise a 100 per cent lamb crop with average care, and shear 10 pounds of wool and raise a 125 per cent lamb crop with better care. All lambs are sold when weighing 70 pounds with average care and 80 pounds with good care. Each year 25 cull ewes are sold and 30 good ewes bought, allowing a margin of 5 ewes for annual death loss.

The "net returns to organization" shown in Table 34, are somewhat less than the income from the specialized dairy combination. Sheep would perhaps require less of the operator's time, however, and less hired help would be needed, which means a saving in board

expense. There are many farmers who, because they are personally adapted for sheep raising, will do much better than the best of these figures indicate and they will do well to choose the sheep alternative in preference to dairying.

TABLE 33.—FARM SALES

Product sold	Amount sold			Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
	Alfalfa (tons)	—	—	40	\$ —	\$ —	$ 280
Wheat (bus.)	—	—	200	—	—	180
Barley (100 lbs.)	—	—	250	—	—	312
Red clover seed (bus. 20)	20	20	30	240	240	300
Lambs, live wt. (lbs.) 12600	12600	18000	18000	1071	1530	1530
Old ewes (head)	25	25	25	112	112	112
Wool (lbs.)	1400	1830	1830	365	457	457
Butterfat (lbs.)	1050	1350	1350	378	486	486
Cows or heifers (head)	0.5	0.5	0.5	20	25	25
Hogs, live wt. lbs....	9700	13180	13180	727	988	988
Eggs (doz.)	500	700	700	125	175	175
Total value of sales, normal prices				3038	4013	4905
Total value of sales, high prices				3818	5039	6154

TABLE 34.—FARM EXPENSES

Item	Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Crop expenses		\$302	\$302
Labor			\$327
Hired man (6 months)		\$300	\$300
Haying labor	70	70	90
Lambing labor	50	50	60
Miscellaneous labor	60	540	90
Live-stock expense		75	555
Purchased feed	400	512	512
Ewes for flock replacement	300	300	300
Rams	40	50	50
Shearing	36	36	36
Miscellaneous expense	100	936	120
General farm expense	1075	1080	1100
Total farm expenses	2853	3015	3105
Net returns to organization, normal prices ..	185	998	1800
Net returns to organization, high prices	965	2024	3049

Type 4.—Sugar Beet and Dairy Combination

If 40 acres of beets are grown on a 160-acre farm, the suggested changes in cropping plan and crop production are indicated in Table 35.

The rotation will be two years of beets, followed by barley and sweet clover or other grass seed sown in the barley to be used for

pasture the following year. Alfalfa will be left as long as the stand is maintained. There will be less hay available than in Type 1. It will be possible to feed beet tops as a substitute for part of the hay, but nevertheless a reduction in the dairy herd to 20 cows and 10 head of young stock might be necessary. There will be less grain feed

TABLE 35.—LAND, CROPS, AND CROP PRODUCTION

Land use	Acres	Average yields	Good yields
Alfalfa	40	100 tons	140 tons
Rotation pasture	20	20 head	36 head
Permanent pasture	10	10 head	18 head
Barley	20	500 bus.	1000 bus.
Beets	40	400 tons	560 tons
Total crop acres	130	—	—
Native pasture, irrigated	15	9 head	15 head
Farmstead and waste	15	—	—
Total farm	160	—	—

TABLE 36.—FARM SALES

Products sold	Amount sold			Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
	Alfalfa (tons)	10	—	40	\$ 70	—	$ 280
Barley (100 lbs.)	—	—	250	—	—	312
Beets (tons)	400	400	560	2400	2400	3360
Butterfat (lbs.)	4200	5200	5200	1512	1872	1872
Cows or heifers (head)	4	4	4	160	200	200
Hogs, live wt. (lbs.)	6300	8620	8620	472	646	646
Eggs (doz.)	500	700	700	125	175	175
Total value of sales at normal prices				4739	5293	6845
Total value of sales at high prices				6138	6823	8838

TABLE 37.—FARM EXPENSES

Item	Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Crop expenses			
Seed grain	\$ 38	\$ 38	\$ 38
Grass seed	75	75	75
Beet seed	110	110	110
Combining grain	60 \$283	60 \$283	60 \$283
Labor			
Man by year	720	720	720
Contract beet labor	1080	1080	1080
Hauling beets	150	150	180
Haying	70	70	90
Miscellaneous	80 2100	90 2110	100 2170
Live-stock expense	311	415	415
General farm expense	1150	1155	1175
Total expenses	3844	3963	4043
Net returns to organization, normal prices	895	1330	2802
Net returns to organization, high prices	2294	2860	4795

available so it would also be advisable to reduce the hogs to 4 sows raising 40 to 48 pigs. Otherwise the live-stock organization will remain the same as in Type 1.

Just as in the illustrative organizations for 80-acre farms, this combination seems to promise a somewhat higher return than the other two types given. It represents a more intensive use of the land and as long as contract labor is available at the price assumed, the efficient operator can undoubtedly realize more for his efforts with this combination.

C.—ILLUSTRATIVE BUSINESS ORGANIZATIONS FOR 240-ACRE FARMS

Type 1.—Dairying the Main Enterprise

This is essentially the same cropping plan as the one suggested for Type 1 under 160-acre farms. The larger farm of course provides opportunity for a larger acreage of each crop. There will thus be feed available for a larger number of livestock than can be kept on a 160-acre farm. An economical size for the dairy herd on this farm would be one large enough to employ special dairy help the year

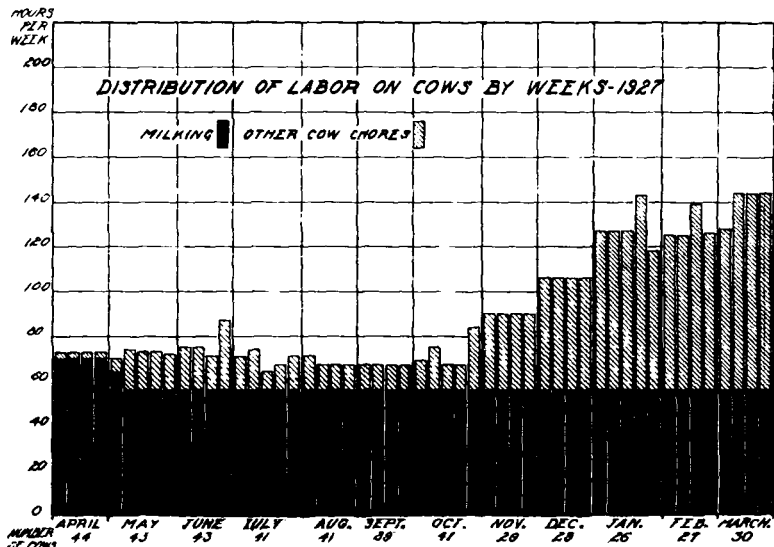


Figure 31—Weekly distribution of milking labor and other cow chores on a large dairy herd in the Round Butte subdivision. About 130 hours of labor per cow were required on this farm.

TABLE 38.—LAND, CROPS, AND CROP PRODUCTION

Land use	Acres	Average yields	Good yields
Alfalfa	90 ..	225 tons	315 tons
Rotation pasture	30	30 head	54 head
Permanent pasture	20	20 head	36 head
Red clover	15	15 tons hay 30 bus. seed	22 tons hay 45 bus. seed
Barley	30	750 bus.	1500 bus.
Wheat	15	300 bus.	600 bus.
Total crop land	200	—	—
Native irrigated pasture	15	9 head	15 head
Dry pasture	5	0.5 head	0.75 head
Farmstead and waste	20	—	—
Total farm	240	—	—

TABLE 39.—LIVE-STOCK NUMBERS, PRODUCTION, AND SALES

Kind of livestock	Numbers	Average practices		Good practices	
		Production	Sales	Production	Sales
Horses	10	—	—	—	—
Dairy cows	45	10125 lbs.	9725 lbs.	12375 lbs.	11975 lbs.
Yearling heifers ..	10	—	—	—	—
Calves	10	—	—	—	—
Herd bull	1	—	—	—	—
Brood sows	10 old sows or 20 gilts	100 pigs	—	120 pigs	—
Boar	1	—	—	—	—
Pigs	100-120	17000 lbs.	16400 lbs.	22800 lbs.	22200 lbs.
Chickens	100	600 doz.	450 doz.	800 doz.	650 doz.

Difference between production and sales represents amount used in household and also some whole milk fed to calves.

TABLE 40.—CROP DISPOSAL

	Alfalfa	Clover hay	Clover seed	Barley	Wheat
	Tons	Tons	Bus.	Bus.	Bus.
Production					
Average crop	225	15	30	750	300
Good crop	315	22	45	1500	600
Amount fed*					
Average practice	207	15	—	750	285
Good practice	222	22	—	750	285
Amount sold					
Average crops and livestock...	12	—	30	—	—
Average crops, good livestock ..	—	—	30	—	—
Good crops, good livestock ..	83	—	45	750	300
Balance	10	—	—	—	15

*It will be necessary to buy some grain feed in addition to what is allowed here from farm supplies.

AMOUNT OF LABOR REQUIRED

Operator	entire year
Hired dairyman	entire year
Hired man	April 15th to October 15th
Extra haying labor	50 to 70 days
Miscellaneous labor	20 to 30 days

TABLE 41.—FARM SALES

Product sold	Amount sold			Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock	Av. crops and live stock	Av. crops, good live stock	Good crops good live stock
	Alfalfa (tons)	12	—	83	\$ 84	—	$ 581
Wheat (bus.)	—	—	300	—	—	270
Barley (100 lbs.)	—	—	375	—	—	458
Clover seed (bus.) ..	30	30	45	360	360	540
Butterfat (lbs.)	9725	11975	11975	3501	4311	4311
Cows or heifers(head)	8	8	8	320	400	400
Hogs, live wt. (lbs.)	16400	22200	22200	1250	1665	1665
Eggs (doz.)	450	650	650	112	162	162
Total value of sales, normal prices				5607	6898	8387
Total value of sales, high prices				7036	8636	10515

TABLE 42.—FARM EXPENSES

Item	Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Crop expenses			
Seed wheat	\$ 28	\$ 28	\$ 28
Seed barley	57	57	57
Grass seed	157	157	157
Combining grain	135	135	135
Hulling and cleaning clover seed ..	75 452	75 452	113 490
Labor			
Dairy help	1000	1000	1000
Month help	360	360	360
Haying labor	150	150	210
Miscellaneous	60 1570	75 1585	90 1660
Live-stock expense			
Purchased feed	168	396	336
Depreciation on bull	100	125	125
Miscellaneous	125 393	150 671	150 611
General farm expense			
Water rent	430	430	430
Taxes	300	300	300
Machinery repairs and depreciation ..	425	425	445
Building repairs and depreciation	140	140	140
Fence repairs	40	50	50
Automobile for farm use	175 1510	175 1520	175 1540
Total farm expenses	3925	4228	4301
Net returns to organization, normal prices	1682	2670	4086
Net returns to organization, high prices	3111	4408	6214

INVESTMENT DEDUCTIONS FROM INCOME

Interest on real estate, \$12,000 at 5 per cent	\$ 600
Interest on one-half of machinery cost, \$1,800 at 10 per cent	180
Interest on live stock, \$5,000 at 10 per cent	500
Total investment deductions	1280

NET INCOME TO OPERATOR

	Normal prices	High prices
(a) Average crops and live stock	\$ 402	\$1831
(b) Average crops, good live stock	1390	3128
(c) Good crops, good live stock	2806	4934

around. A 45-cow dairy is assumed in this illustration, supplemented with other live stock as shown in Table 39.

It will be noted that even on this larger farm the "net returns to the organization" and the "net income to the operator" with the average crop and live-stock production are very low. On the other hand, the income to those who can produce better crops and better live stock than the average is quite satisfactory. Even basing our calculations on conservative "normal prices," the farm would yield a net return to the organization of \$4086, with a net to the operator of \$2806. Under favorable price conditions this would be increased to \$6214 and \$4934, respectively.

A capable farmer on this size of unit should thus have from \$2500 to \$5000 per year for his efforts with an organization of this type.

Type 2.—Increased Crop Yields Fed to More Live Stock

Assuming that the results of higher crop yields and higher carrying capacity of pastures would be fed to more live stock, this income would be increased still further. If we figure on the same basis as shown in Type 2 for 80-acre and 160-acre farms, the cattle could be increased to 65 cows, 28 head of young cattle, and 2 bulls, and the hogs to 20 brood sows. While this would necessitate hiring additional help and some other expenses, the additional return above such expenses would be approximately \$1300 under "normal price" conditions. This would bring the "net returns to the organization" to about \$5400 under "normal price" conditions and about \$8000 under "higher price" conditions.

Type 3.—Dairy, Hog, and Sheep Combination

With this size of farm it would be possible to have a flock of 220 ewes and still maintain a herd of 15 dairy cows and 8 head of young cattle. Other live stock would be the same as in Type 1. The cropping plan would not be changed except that the alfalfa would be reduced to 65 acres and 25 acres of permanent pasture added.

With this combination the returns that could be expected would be about as shown in Table 43. The same basis is used for calculating returns as was used in Type 3 for 160-acre farms.

Just as in this combination for 160-acre farms, it represents a somewhat lower return for the organization than the more intensive

dairy combinations. A skillful sheep man can of course have higher lamb production than is assumed in this illustration. Again, as in Type 2 it would be possible to increase the income by increasing the number of sheep, when higher crop yields and pasture carrying capacity can be depended upon. But because sheep represent a less intensive type of farming, the income possibilities are perhaps somewhat lower unless this enterprise is supplemented with some more intensive enterprises such as sugar beets.

TABLE 43.—FINANCIAL SUMMARY

	Average crops and live stock		Average crops, good live stock		Good crops, good live stock	
	Normal prices	High prices	Normal prices	High prices	Normal prices	High prices
Farm sales	\$4817	\$8051	\$6283	\$7877	\$7716	\$9684
Farm expenses	4408	4408	4571	4571	4707	4707
Net returns to organization	409	1643	1712	3306	3009	4977

Type 4.—Sugar-Beet and Dairy Combination

If we add 40 acres of beets to the combination on this farm we shall have to change the cropping plan somewhat. One suggestion would be to follow rotation pasture with two years of beets, then seed wheat as a nurse crop for the red clover, which would be followed by barley seeded down to rotation pasture again. The results should be about as shown in Table 44.

The number of cattle would be reduced to 36 cows and 16 young stock. Other live stock would remain the same as in Type 1.

Again, for this size of farm there is an increase in income when sugar beets are added to the combination. The efficient operator who is situated so that he can grow them successfully perhaps will increase his income by including beets in his combination of enterprises, especially under present labor, price, and yield conditions. Beets represent an intensive enterprise and are about the only cultivated crop which can be grown extensively on the project. This tends to make them a desirable crop because it is necessary to use the land intensively in order to pay the comparatively high overhead expenses on irrigated land, and it is also desirable to have a cultivated crop in the rotation. Where beets can not be grown, the best alternative perhaps is intensification along live-stock lines and the establishment of a legume crop rotation.

TABLE 44.—LAND, CROPS, AND CROP PRODUCTION

Land use	Acres	Average yields	Good yields
Alfalfa	60	150 tons	210 tons
Rotation pasture	20	20 head	36 head
Permanent pasture	20	20 head	36 head
Red clover	20	20 tons hay 40 bus. seed	15 tons hay 60 bus. seed
Barley	20	500 bus.	1000 bus.
Wheat	20	400 bus.	800 bus.
Beets	40	400 tons	560 tons
Total crop land	200	—	—
Native irrigated pasture	15	9 head	15 head
Dry pasture	5	—	—
Farmstead and waste	20	—	—
Total farm	240	—	—

TABLE 45.—FARM SALES

Product sold	Amount sold			Value at normal prices		
	Av. crops and live stock	Av. crops. good live stock	Good crops good live stock	Av. crops and live stock	Av. crops. good live stock	Good crops. good live stock
	Alfalfa (tons)	15	—	62	\$ 105	\$ —	$ 434
Wheat (bus.)	—	—	400	—	—	360
Barley (100 lbs.)	—	—	250	—	—	312
Clover seed (bus.)	40	40	60	480	480	720
Beets (tons)	400	400	560	2400	2400	3360
Butterfat (lbs.)	7700	9500	9500	2772	3420	3420
Cows or heifers	6	6	6	240	300	300
Hogs, live wt. (lbs.)	16400	22800	22200	1230	1665	1665
Eggs (doz.)	450	650	650	112	162	162
Total value of sales, normal prices				7339	8427	10733
Total value of sales, high prices				9402	10752	13725

TABLE 46.—FARM EXPENSES

Item	Value at normal prices		
	Av. crops and live stock	Av. crops, good live stock	Good crops, good live stock
Crop expenses			
Seed grain	\$ 77	\$ 77	\$ 77
Grass seed	142	142	142
Beet seed	110	110	110
Combining grain	120	120	120
Hulling and cleaning clover seed	100 \$549	100 \$549	150 \$509
Labor			
Dairy help	1000	1000	1000
Month help	420	420	480
Haying labor	105	105	135
Hauling beets	150	150	180
Contract beet labor	1080	1080	1080
Miscellaneous	60 2815	75 2830	90 2965
Livestock expense	728	906	906
General farm expense	1580	1590	1615
Total expenses	5672	5875	6085
Net returns to organization, normal prices	1767	2552	4648
Net returns to organization, high prices	3730	4877	7640

SUMMARY OF ILLUSTRATIVE ORGANIZATIONS

If the adequate data were available it would be possible to work out illustrative business organizations for other types and sizes of farms. It might be especially desirable to show possibilities of lamb and cattle-feeding organizations using beet by-products. Organizations combining range live-stock production with the growing of forage and winter feeding on the irrigated lands also should be shown. Further information is needed, however, before such illustrations can be set up with confidence that they will apply in this area.¹⁸

It might be worth while to summarize the income expectancy on the sizes of farms which have been discussed, and this is done in Table 47. This summary brings out two outstanding conclusions to

TABLE 47.—SUMMARY OF EXPECTED "NET RETURNS TO ORGANIZATIONS"

	Specialized dairy		Dairy and sheep		Dairy and sugar beets	
	Normal prices	High prices	Normal prices	High prices	Normal prices	High prices
80-acre farms						
(a) Average crops and live stock	\$ 491	\$ 993	\$ —	\$ —	\$ 538	\$1274
(b) Average crops, good live stock	772	1369	—	—	765	1583
(c) Good crops, good live stock	1380	2176	—	—	1422	2450
160-acre farms						
(a) Average crops and live stock	838	1706	185	965	895	2294
(b) Average crops, good live stock	1404	2429	998	2024	1330	2860
(c) Good crops, good live stock	2346	3652	1800	3049	2802	4795
240-acre farms						
(a) Average crops and live stock	1682	3111	409	1643	1767	3730
(b) Average crops, good live stock	2670	4408	1712	3306	2552	4877
(c) Good crops, good live stock	4086	6214	3009	4977	4648	7640

be drawn from these illustrative organizations. The first is that on none of these farms is a satisfactory income obtained when only average crop and live-stock production is secured. A man who is not capable of securing higher than average production has very little chance for financial progress regardless of the size of his operation. The second conclusion to be drawn is that even with high production and with high prices the expected returns on 80-acre farms of this

¹⁸A study of the range sheep industry is being started by the Experiment Station at the present time.

type are low and will not permit much financial progress or a high standard of living for the farm family.

While it takes more financial backing and higher managerial capacity to operate the 160-acre farms, the man of ability will nearly double his income opportunities. Likewise, the 240-acre farm offers further opportunities for increased income to the man who can manage that size of unit. Furthermore, there is no reason for believing that 240 acres represents the maximum size for profitable operation on irrigated land. It is highly probable that much of the land on the project can be farmed in still larger units to advantage, especially if the operator is located on some of the poorer land; or if he is engaged in the less intensive enterprises of beef cattle and sheep raising and has access to outside range land. Even with the types of organization on the land which we have assumed, the factor which limits the size of unit that can be operated most profitably is the manager himself. There are many 320-acre and even 640-acre irrigated, specialized dairy farms in western Montana returning highly satisfactory incomes to capable managers.

D.—ILLUSTRATIONS FROM ACCOUNTS KEPT ON ACTUAL FARMS ON THE FLATHEAD PROJECT

In the spring of 1927 several farmers began keeping detailed records of their operations in cooperation with the Department of Agricultural Economics and the local extension service.¹⁹ These records have furnished basic data for the material presented in the preceding illustrative business organizations. It might also be worth while to give one or two case illustrations of actual results on these account farms.

Farm No. 1

This farm is located three miles west of Charlo. The soil is a medium heavy loam and most of it is well drained and quite easily worked. The slope is such that the land is readily irrigated. The buildings consist of a dwelling house, horse barn, and cow shed large enough to shelter the cattle kept at present; also a small poultry house, and granary, garage, and machinery shed. No hired help was needed as a 17-year-old boy helped with the work during the summer months. Tables 48, 49, and 50 show the land use and crop production for the two years, 1927 and 1928.

¹⁹Records have been kept for the past two years by some of the members of the cow-testing association. The work has been supervised by the local tester.

The "net returns to the organization" were lower in 1928 than in 1927 because there was no market for potatoes in 1928. With "normal prices" such as we assumed in the illustrative organizations, the "net returns to organization" on this farm would have been \$1151 in 1927 and \$1148 in 1928.

It is believed that if this farm were reorganized on some basis such as suggested under Types 1 and 2 for 80-acre farms, pages 63 to 72, the returns would be considerably higher than those received in 1927 and 1928. It would perhaps require an additional investment of \$1500 to \$2000 to make the readjustment, but if it could be shown that the income would be increased considerably more than the interest on the additional investment it should not be impossible to secure the necessary funds.

TABLE 48.—LAND USE AND CROP PRODUCTION IN 1927 AND 1928

Land use	1927		1928	
	Acres	Production	Acres	Production
Alfalfa	10	30 tons	10	40 tons
Timothy and clover pasture	7	*	7	*
Sweet clover pasture	4	**	9	**
Spring wheat	20	600 bus.	—	—
Winter wheat	—	—	14	504 bus.
Oats	5	125 bus.	—	—
Barley	—	—	9	450 bus.
Potatoes	4	650 sacks	4.3	500 sacks
Beets	—	—	***5.7	50 tons
Idle crop land	—	—	5.0	—
Summer fallow	14	—	—	—
Total crop acres	64	—	64.0	—
Native irrigated pasture	*8	—	*8	—
Idle land	3	—	3	—
Farmstead and waste	5	—	5	—
Total farm	80	—	80	—

*In addition to the pasture listed above, 80 acres of dry native pasture land was used.

**Four acres were new seeding in 1927 and five acres new seeding in 1928.

***Only above five acres of beets were harvested, wild oats crowded out the rest.

TABLE 49.—LIVE-STOCK NUMBERS AND PRODUCTION IN 1927 AND 1928

Kind	1927		1928	
	Average number	Production	Average number	Production
Work horses	4	—	4	—
Colts	2	—	1	—
Dairy cows	8.2	1372 lbs.	8	1830 lbs.
Yearlings	6	4 head sold	7	1 head sold
Calves	4	—	4	—
Bull	1	—	1	—
Sows	—	—	1	—
Pigs	2	250 lbs. sold	7	1100 lbs.
Chickens	25	—	50	—

TABLE 50.—FINANCIAL RETURNS

	1927	1928
Farm receipts (including inventory adjustments)	\$1736	\$1730
Actual farm expenses	606	720
Net returns to organization	1130	1010

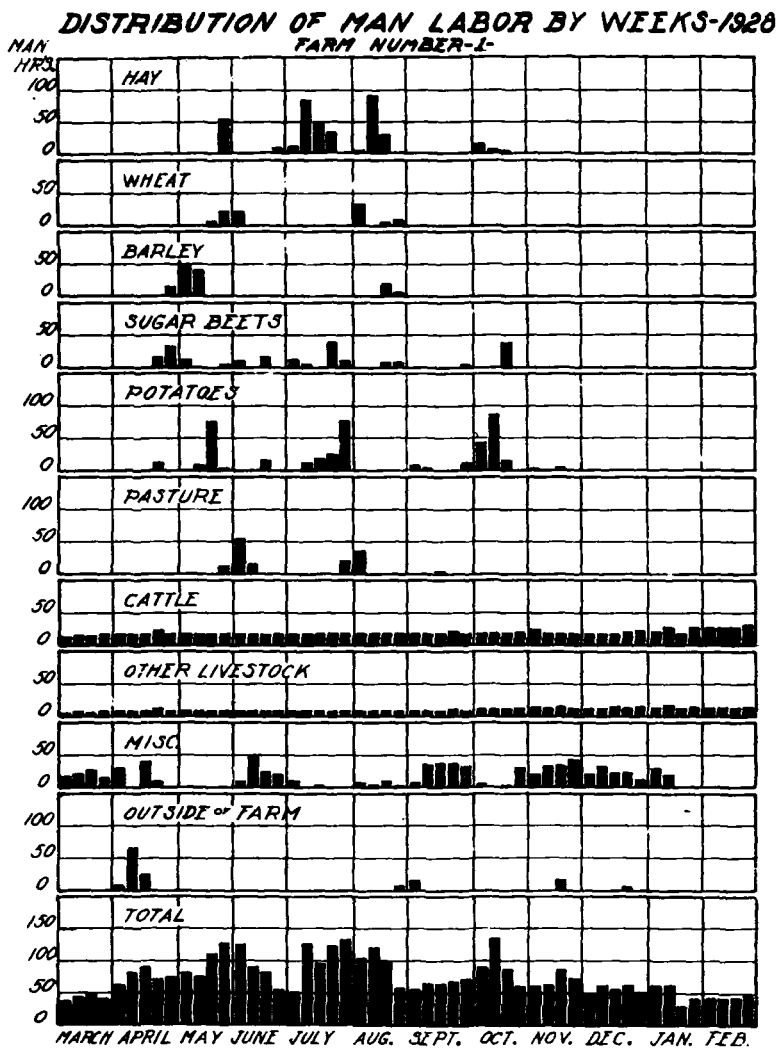


Figure 32—Chart showing distribution of man labor by enterprises and for the farm as a unit on farm Number 1.

Farm No. 2

This combination irrigated and dry-land farm is located about 4 miles northwest of Pablo. The operator owns part of the land and rents the remainder. The farm buildings are on rented land and although they are not elaborate they serve the purpose for the present organization. There are no children old enough to work, but the operator by good management has succeeded in getting along without very much hired labor. Table 51 shows the land use and crop production for 1927 and 1928.

Eighty acres more of land were purchased in the spring of 1928. The operator now owns 160 acres, nearly all of which is irrigable crop land. The rest of the land is rented.

With "normal prices" such as were assumed in the illustrative organization, the "net returns to organization" on this farm would have been \$1674 in 1927 and \$2770 in 1928. Contrasting these returns with those on Farm No. 1, we again have an illustration of the much greater income possibilities for the capable farmer on the larger farm.

While the returns on this farm at the present time are very satisfactory, it would perhaps be possible to increase the net income by irrigating all of the irrigable land and by keeping more live stock. Such a change would mean that more help would have to be hired, but the additional income would undoubtedly more than offset the greater labor expenditure.

If the rented grazing land could be held for a period long enough to warrant the investment, this farm would have the alternative opportunity of raising sheep as well as dairy cattle. Perhaps in that way the dry grazing land would be better utilized than when dairy cattle are pastured on it. Young stock from dual-purpose cows would be another alternative for utilizing the grazing land to advantage.

The income possibilities from the three types of organization—(1) specialized dairy, (2) dairy and sheep, (3) dual-purpose cattle—could be compared in a manner similar to the illustrative organizations presented in this part of the bulletin. Under "normal price" conditions there perhaps would not be a great deal of difference in returns on the three types of organizations. The choice therefore would depend upon the operator's adaptability or preference for one or the other.

10-11-28

PRODUCTION PROBLEMS ON THE FLATHEAD PROJECT

TABLE 51.—LAND USE AND CROP PRODUCTION IN 1927 AND 1928

Land use	Irrigated or dry	1927		1928	
		Acres	Production	Acres	Production
Alfalfa ((tons)	Dry	15	19 tons	*55	45 tons hay 600 lbs. seed
Alfalfa (tons)	Irrigated	33	82 tons	33	82 tons
Timothy (tons)	Irrigated	10	20 tons	10	25 tons
Winter wheat (bus.)	—	—	—	78	1975 bus.
Barley (bus.)	Irrigated	10	311 bus.	—	—
Oats (bus.)	Subirrigated	5	218 bus.	—	—
Oats (bus.)	Dry	11	390 bus.	11	150 bus.
Sweet clover pasture	Irrigated	11	—	12	—
Sweet clover pasture	Subirrigated	24	**	—	—
Summer fallow	—	40	***	—	—
Garden patch	Irrigated	1	—	1	—
Total crop land	—	160	—	200	—
Dry pasture	—	370	—	370	—
Farmstead	—	5	—	5	—
Idle land	—	15	—	15	—
Land rented out	—	—	—	40	—
Total farm	—	550	—	630	—

*Second crop on part of this was sold standing.

**Part of this was plowed July 1 and seeded to winter wheat in fall.

***Seeded to winter wheat.

TABLE 52.—LIVE-STOCK NUMBERS AND PRODUCTION IN 1927 AND 1928

Kind	1927		1928	
	Average number	Production	Average number	Production
Work horses	6	—	6	—
Colts and saddler	5	—	5	—
Dairy cows	18	3336 lbs.	14	2725 lbs.
Young cattle	14	8 head sold	15	12 head sold
Calves	8	7 veals sold	9	4 veals sold
Bull	1	—	1	—
Brood sows	2-3	3325 lbs.	2	2947
Chickens	200	521 lbs. sold 2330 doz. eggs	200	457 lbs. sold 1002 doz. eggs

TABLE 53.—FINANCIAL RETURNS

	1927	1928
Farm receipts (including inventory adjustment)	\$3505	\$5843
Farm expenses	1455	1863
Net returns to organization	2140	3980

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DISTRIBUTION OF MAN LABOR BY WEEKS-1928
FARM NUMBER-2-

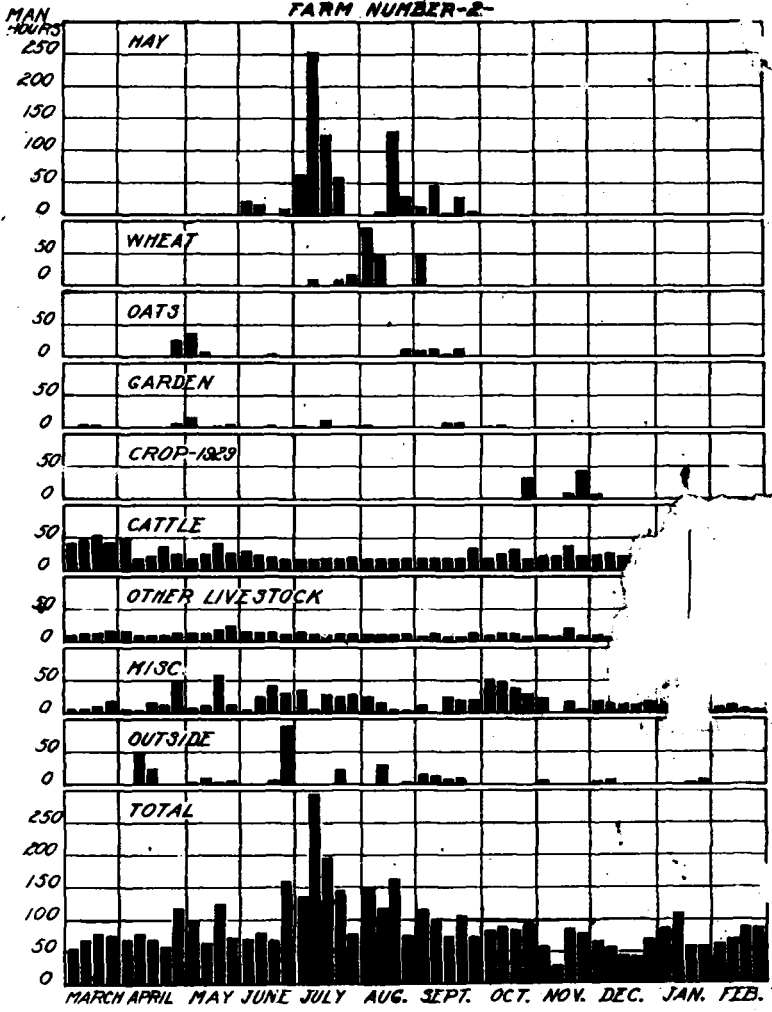


Figure 33—Chart showing distribution of man labor by enterprises and for the farm as a unit on farm Number 2.