

THESIS

On

A Farm Management Plan

For The

Reorganization of a Typical Columbia Basin

"Bonanza" Wheat Farm

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## Introduction

The problem involved in this thesis is to reorganize a typical bonanza wheat farm (the Plateau Farms) in the dry land area of the Columbia Basin, into a profitable and permanent plan of production. This farm is now and has been for some years unprofitable and its management destructive of fertility. It is typical of thousands of farms in the region.

"The present large size of the farm," (in the Columbia Basin) together with the continuous grain cropping on the bonanza scale, and the practices associated therewith, is reducing the fertility of the soil at such a rate as seriously to threaten the permanency of agriculture in this entire region. Associated with these large sized wheat farms, so common in the Columbia Basin in particular, there is a correspondingly scanty population, which in some of the oldest and best farming areas of that region is actually on the decrease.

"The most striking need on the old settled

dry farming lands, both from the fertility and economic standpoints, is for a more intensive and diversified system of farming to maintain or increase fertility, employing a smaller farm unit, thus increasing the population and social and economic development of the rural districts." (Prof. H. D. Scudder in Bulletin No. 119, Oregon Experiment Station).

To grow wheat successfully on the dry land farms, it must be accompanied with some form of animal industry so that certain soil improving rotation systems of crop production can be successfully carried out. If part of the area of the farm under these dry land conditions is devoted to the growing of the field pea and alfalfa, and these crops are fed to hogs and sheep, it is confidently believed that the agriculture of the Columbia Basin will be placed on a permanently profitable basis. Not only will this system afford large and sure returns but the work of the farm will be more evenly distributed throughout the year. The revenues of the farm will also come in more regularly, instead of in a lump sum at the end of the crop year.

### Description of Region

The region this thesis deals with is found in the semi-arid portion of Oregon which lies east of the Cascade Range, comprising roughly two-thirds of the area of the state. The topography of Eastern Oregon, with its resultant effect upon climate, is such as segregates the region in so far as agricultural conditions are concerned into three distinct areas. These three divisions are designated as the Columbia Basin, the Blue Mountain Region, and Central Oregon. The particular region concerned in this thesis is the region known as the Columbia Basin.

Topography. The Columbia Basin area consists of a broad rolling upland with deep, narrow canyons, whose streams, the chief of which are the Deschutes, the John Day, and the Umatilla, flow north into the Columbia River. The elevation of the agricultural lands increases gradually from about 100 feet above sea level at the Columbia River to about 3000 feet as the Blue Mountains



are approached on the east and south, or as the foothills of the Cascade Range are approached on the west. The average elevation of the agricultural lands of the area is about 1500 feet.

Growing Season. The growing season of the Columbia Basin varies a great deal, largely, of course, with the elevation. The last killing frosts of spring range in the different localities from April 15 to May 15, and the first killing frosts of the fall from September 15 to October 15, so that the average growing season is from about May 1 to October 1 for the region as a whole--or about 150 days.

Precipitation. The annual precipitation of the Columbia Basin ranges from 9 to 15 inches over the larger portion, increasing toward the south. In Gilliam County, however, where the Plateau Farms are located, the precipitation approximates that of Sherman County, ranging from 8.75 to 13.43 inches.

The Soils of the Columbia Basin. The characteristic dry farming soil of the Columbia Basin is the silt loam. The soils in this particular

region are the medium type. Commonly the sub-soil is slightly sandier in character than the surface. These soils are very desirable for growing a wide variety of crops. They are moderately high in plant food content as to total phosphorus and potassium, but deficient in nitrogen and humus after long and continued wheat cropping. Physically these soils need improvement. They have been managed with no consideration for maintaining the humus content. Increasing the humus content is very important since it increases water-holding capacity, as well as having a tendency to prevent wind erosion.

#### Present Crops and Cropping Methods

In spite of the fact that the Eastern Oregon lands have been farmed for thirty years or more, grain, largely wheat, is the only crop as yet produced on the dry farming lands; and during all of that period it has been grown alternately with summer fallow. This practice has not been altogether successful, as is shown by the United States Census for 1909. The average yield per acre for Gilliam



Fig. 1--A Thirty-Six Horse Combined Harvester and Thresher at Work in a Columbia Basin  
Wheat Field--Symbolical of the "Bonanza" Type of Wheat Farm

County has been 8.7 bushels of wheat, which is only very slightly more than the cost of production. The fertility of the soil is steadily decreasing and weed pests increasing with alarming rapidity.

Again, with this "one crop" system, the farm income depends upon one product. Should this fail, the farmer would be without an income for the entire year. In addition, this "one crop" system of farming makes necessary the employment of the maximum amount of hired help during the time of the year when labor is scarce.

#### Description of the Plateau Farms

The Plateau Farms, three in number, are located in central Gilliam County, within a radius of twenty miles of Arlington on the Columbia River. These farms are designated by the Company by numbers--Plateau Farm Nos. 1, 2 and 5. They comprise a total area of 4,786 acres, representing a total investment of \$121,400. These farms are owned by three prominent business men living in Portland. In the past, these farms have been managed by a

general superintendent employed by the Company. The superintendent has on each farm a foreman, who has charge of the farming operations on his particular farm. Each foreman is responsible to the superintendent and the superintendent likewise is responsible to the Portland office. The kind of farming practiced has been strictly grain farming, the nature of which has already been discussed. Like many of the grain farms in the Columbia Basin, these farms have not been profitable. In fact, they have been a failure. The reason for this failure is explained as follows:

(1) The crop producing power of the soil has not been maintained.

(2) Weeds have become a very heavy tax on production.

(3) Soil blowing has become increasingly injurious.

(4) The foremen in charge have had too large areas of land to handle all efficiently from the standpoint of production.

(5) The farm income has been dependent



on only one product, wheat, the growing of which is somewhat precarious, at best.

(6) The market value of the land has increased.

Brief Description of Farm No. 1. (See Map, Plate I). The total area of this farm is 1916 acres, most of which is tillable land. What little waste land there is lies along the west boundary. A medium deep canyon running north and south divides the farm naturally into two equal parts. The western portion is also intersected by a county road. Almost every acre of this land can be farmed, although along the western boundary it becomes rather steep. A little shallow soil is found in the northeast corner of this farm, though not extreme, while the best soil lies in the south and central portion.

Brief Description of Farm No. 2. (See Map, Plate III). This farm is rectangular in shape, consisting of 930 acres, most of which is good land. The steep area, consisting of 85 acres, lies along the western boundary. This farm is divided into three portions--beginning on the east boundary, the



O-W.R.& N line running north and south cuts off 211 acres; the next division is caused by a county road, which also runs north and south, cutting off 84 acres. The general contour of this farm is rolling and favorable for all farming operations.

Brief Description of Farm No. 5. (See Map, Plate V). . This farm is rectangular in shape, with a total area of 1840 acres. There is a great variation in soil and topography. The south half of the farm is level and the soil is of excellent quality, but the north half is badly intersected by deep canyons and the soil is shallow. The area of waste land amounts to about 400 acres, most of which is undesirable for agricultural purposes other than grazing.

#### What The New Management Plan Attempts To Do

Since the present system of farming on the Plateau Farms (and frequently on Eastern Oregon dry farms in general) has proved unprofitable, the system herein described has as its subject a remedy for this condition. The primary object of farm planning is to permanently increase profits without proportion-

ately increasing the cost of operation. To accomplish this, in the new management plan the following propositions have been worked out:

(1) Reduction of the farm area to a size suitable for more diversified production.

(2) Devising suitable systems of crop rotation for increasing and maintaining fertility.

(3) Description of successful growing methods for the crops recommended.

(4) Arrangement of fields for the most economic handling.

(5) Introduction of live stock to increase profits and sources of income.

(6) Adjustment of crop production to live stock, in order to utilize capital and labor to the best advantage.

(7) Introduction of cash crops in addition to that of grain to still further diversify production and increase sources of profit and income.

(8) Presentation of farms of record for all the leading projects on the farm.

(9) A plan for a convenient farmstead ar-

rangement suited to the conditions.

(10) Methods of weed control.

(11) Management methods for all business connected with the farming operations, such as labor, marketing of farm produce, etc.

#### Possibility of Carrying Out New Management Plan

There is no part of this new management plan that is beyond the comprehension or practice of the ordinary farmer. The crop yields and the pork and mutton yields per acre given are not theoretical. In each and every case the yields and gains mentioned in this plan have been more than duplicated by the farmers and the experiment stations working under similar conditions in the same region. After giving these farms careful and detailed study, there seems no reason why they should not be put on a permanently profitable basis, and if the management plan as here given is properly carried out the farmer should make a reasonable labor income, in addition to interest on the capital invested. In spite of the fact that the crop yields are not large, this is more than offset by the cheapness of

land, the excellent market for pork and for early lambs, and the unusual demand for the fine quality of field pea and alfalfa seed produced on these dry land farms.

#### The New Farm Layout

Size of Farm Selected. On account of the comparatively low land values and the practice of the "fallowing" system, it naturally follows that more land is required than would be necessary where crops can be grown yearly and where the land is more valuable. Eight hundred acres should prove the most desirable amount of land one farmer should attempt to handle under the present management plan. This size of acreage is selected for the following reasons:

Diversification necessitates more intensive farming; more attention must be given each farm project; less total capital is required; larger profits per acre are possible.

The rural population of the region will be materially increased in this way; community improvements will be fostered; the market facilities

will be improved; and land values will be increased.

#### Division of Present Farms

The present farms are all much too large for profitable management as farm units--hence, they have each been divided into two smaller farms of approximately the size desired. Owing to the necessities of the topography, the division did not in all cases give the resulting farms the most desirable shape or compactness of area, but this could not be avoided. Plates I to VI inclusive show the old and new farm plans, also location of the new farmsteads, new arrangement of fields, and fence lines, rotations, etc.

Division of Plateau Farm No. 1. This farm has been divided into two farms by running a division line north and south as shown (see map, Plate VI). On account of the topography and soil conditions of this farm, this line of division was the most desirable. This line gives each of the divisions about the same acreage and the same amount of waste land in each. The east farm, or Farm No. 1 A, consists





Fig. 2--View Across a Typical Canyon from One of the Plateau Farms,  
Showing the Character of the Country



Fig. 3--Showing Young Field Peas in Rows on Plateau Farms, on Field  
Sloping Down to Canyon, Where Farmstead is Located



of 968 acres, most all of which can be cultivated. The west farm, or Farm No. 1 B, consists of 948 acres, all of which can be cultivated.

Division of Plateau Farm No. 2. Farm No. 2 has been divided into two farms by using as a division line the county road, which runs north and south. In addition, 160 acres were taken off the south boundary by running a division line east and west. (See map, Plate IV). On account of the location of the railroad, county road, and the waste land, this farm could not be divided in a more desirable way. The east farm, or Farm No. 2 A, consists of 402 acres of good land and 48 acres of waste land. However, a part of this waste land can be put under cultivation with little difficulty. The west farm, or Farm No. 2 B, consists of 480 acres, of which 440 acres can be cultivated.

Division of Plateau Farm No. 5. This farm has been divided into two farms by running a division line east and west. (See map, Plate VI). On account of the large acreage of waste land along the northern boundary of this farm, one of the farms has

a greater acreage than the other, but it has at present not as much cultivated land. The south farm, or Farm No. 5 A, consists of 795 acres of good land, all of which can be cultivated. The north farm, or Farm No. 5 B, consists of 1040 acres, of which 625 acres can be cultivated.

Details of Layout of Farm No. 5 A. Since Farm No. 5 A is representative of the others and of that section of the country from the standpoint of soil conditions, size, distance to market, etc., it will be taken as an example of all the new farm units into which the original Plateau Farms have been divided. The plan proposed for this farm will apply equally well on the other new farm units and to farms of Gilliam County and the Columbia Basin in general. Hence, details for the other farm units will not be necessary.

As shown, this farm (No. 5 A) (see Plate VI) has been divided into four fields of approximately equal size--field No. 1, 220 acres; field No. 2, 180 acres; field No. 3, 192 acres; field No. 4, 200 acres; the remainder being used for the farmstead

site. By laying the farm out as the map indicates, the fields are all rectangular in shape and all about the same size. The great advantage of having rectangular fields, as Prof. G. F. Warren brings out, is in the time saved in carrying on the different farm operations. "The time required to plow an acre in a triangular field averaging 7 rods wide was found to be six hours and fifty-one minutes. The time required for a rectangular field of this width to be plowed was six hours and twenty-three minutes." The cost of fencing is also very much higher for irregular fields. Irregular fields have too many corners. By the arrangement shown, the fields are equidistant from the farmstead site, and by having definite fields the rotation of crops becomes a permanent and much more simple practice.

The farmstead has been located in the small canyon along the south boundary, about one-third of the distance from the east boundary. The following are reasons for locating the farmstead as above indicated:

It offers some protection from wind; water is

more easily available; it is equally distant from all fields.

The latter point is very important, since less time will be lost traveling from barn to field and the converse. "If a field is 40 rods from the barn, each round trip would make 80 rods of travel. Such a field would require a mile of extra travel for a man and two miles of extra travel for a horse each year over the time required by a field next to the barn. This will take about one hour of horse time and half an hour of man time. This time should be worth 20 cents a year. This is interest at 5 per cent on \$4. It will, therefore, appear that from the above considerations, a field near the barn is worth \$4 per acre more than a field 40 rods away. Similarly, there would be a difference of \$8 for 80 rods, and \$16 for half a mile." (Warren).

Another great advantage of this location of the farmstead is that it is on the main road, making it nearer town and at the same time adding to the attractiveness and value of the farm.

### Rotation Plan

The rotation under the new farm plan (based on a rotation plan devised and recommended by Prof. H. D. Scudder for Eastern Oregon dry farming lands) is as follows:

Alfalfa, four years; fallow, one year; wheat, one year; field peas, one year; and this (fallow, wheat, peas) repeated three times for a total of twelve years, which makes the rotation complete every sixteen years.

In detail, the rotation is as follows:

<u>Year</u>	<u>Field No. 1</u>	<u>Field No. 2</u>	<u>Field No. 3</u>	<u>Field No. 4</u>
1915	Alfalfa	Wheat	Peas	Fallow
1916	Alfalfa	Peas	Fallow	Wheat
1917	Alfalfa	Fallow	Wheat	Peas
1918	Alfalfa	Wheat	Peas	Fallow
1919	Peas	Alfalfa	Fallow	Wheat
1920	Fallow	Alfalfa	Wheat	Peas
1921	Wheat	Alfalfa	Peas	Fallow
1922	Peas	Alfalfa	Fallow	Wheat
1923	Wheat	Fallow	Alfalfa	Peas
1924	Peas	Wheat	Alfalfa	Fallow
1925	Fallow	Peas	Alfalfa	Wheat
1926	Wheat	Fallow	Alfalfa	Peas
1927	Peas	Wheat	Fallow	Alfalfa
1928	Fallow	Peas	Wheat	Alfalfa
1929	Wheat	Fallow	Peas	Alfalfa
1930	Peas	Wheat	Fallow	Alfalfa



### Soil Fertility Effects of Rotation Plan

The foundation of the material wealth of this community will depend on the permanent productivity of its soil. Under favorable conditions there are four principal methods of controlling the productive capacity. These are (1) correct cultivation, (2) rotation of crops, (3) manuring, and (4) commercial fertilizer application. Of these, cultivation, manuring, and rotation are within reach of the dry farmer, and if these three methods are taken advantage of, the soil will not require the application of commercial fertilizers, which in any case would not be possible because of the cost. In the rotation plan proposed, only the wheat and a portion of the peas and alfalfa as seed will be sold from the farm.

Since these soils are naturally fertile, having a high plant food content, the removal of four wheat crops in every sixteen years, and of only partial seed crops of peas and alfalfa, should not reduce the fertility to the point where limitation of production would result.





Fig. 4--Field Peas in Double Drill Rows on the Plateau Farms--the Most Profitable Crop on the Eastern Oregon Dry Farming Lands, and a Restorer of Soil Fertility

The chief feature of this rotation plan is the increase in the humus and nitrogen content of the soil, as follows:

(1) By use of green manures and crop residues.

(2) By manure accumulations in pasturing.

(3) By direct application of barnyard manures.

Of these three methods of supplying organic matter to the soil, the first and second are the most important practices under these conditions. The application of manure is also important, but only about 50 per cent of the dry matter of feed is returned to the soil.

Nitrogen. Since the nitrogen naturally in the soil is contained largely in the organic matter, any process which tends to decompose or destroy this organic matter, such as nitrification or other forms of oxidation, will also tend to reduce the total stock of nitrogen, whether removed by cropping or lost by leaching. Because of this fact, the matter of restoring nitrogen to the soil becomes of very

great importance. However, when we bear in mind that commercial forms of nitrogen, such as dried blood, sodium nitrate, etc., cost from 15 to 20 cents per pound for the nitrogen contained, it will be seen at once that the purchase of commercial nitrogen cannot be considered practicable in general farming.

Considering these facts, and the additional fact that there are about 75,000,000 pounds of atmospheric nitrogen resting upon every acre of land which can be assimilated by legumes in connection with bacteria, the farmer should make an attempt to take every advantage of restoring the nitrogen wherever possible by growing legumes. That considerable amounts of nitrogen may be assimilated by legumes in connection with bacteria is shown by the investigations of the experiment stations. Crimson clover, according to the New Jersey Station, may take up 200 pounds of nitrogen per acre per year. Similar studies at the Delaware Station with various legumes showed the yields to range from 31 to 140 pounds of nitrogen per acre. Field peas gained 70 pounds in Alabama,

and 35 per cent was left in leaves and stubble if the vines were removed. Like experiments with other legumes showed an average gain of 122 pounds of nitrogen per acre for sixteen states. In the symbiosis of legume plants and nitrogen-fixing bacteria we have a partnership or relationship of immeasurable value to agriculture. Since two out of the three crops to be grown in the new rotation plan belong to this class of plants (legumes) that are capable of consuming or utilizing nitrogen, there is little danger that the nitrogen content of the soil will be reduced to such an extent as to cause limited production due to the absence of the element nitrogen.

In this rotation plan, where only four wheat crops are removed every sixteen years (considering that the average yield is 18 bushels per acre), each bushel of wheat requiring 1.16 pounds of nitrogen every sixteen years, the wheat crop removes 83.52 pounds of nitrogen.

The proportion of total nitrogen of the crops contained in the roots and tops of alfalfa and field peas is as follows:

In tops of alfalfa, 75 pounds; in nine inch depth of roots and stubble of alfalfa, 61 pounds; in tops of field peas, 119 pounds; in nine inch depth of roots and stubble of field peas, 10 pounds.

The above figures apply to one acre of each crop during one season's growth.

Because the nitrogen of the soil is contained in the organic matter and must be applied in that form in general farming, it is very important that the stubble, straw, and manure are returned to the soil.

Under this rotation and management plan, where all the stubble, straw, and manure are returned to the soil, it is quite evident that the nitrogen content of the soil is well maintained.

Summary on Nitrogen Loss. (1) The loss due to the removal of plant food in that portion of the crops which are taken from the land is more than offset by that returned in legume roots and straw and manure. (2) Very little nitrogen is lost through surface washing or through leaching, because of the



low rainfall. (3) Loss by oxidation is slight, because of reduction of the summer fallowed area.

Phosphorus and Potassium. Since nearly all the crops grown (with the exception of one wheat crop every four years) are fed and returned to the soil in the form of manure or crop residues, the phosphorus and potassium content of the soil is fairly well maintained, as the soil is reasonably strong in these elements in the first place.

#### Weed Effects

Weeds are of tremendous economic importance to the farmers of Eastern Oregon. A crop shortage on many farms in Eastern Oregon in part is due to the growth of weeds. Farmers throughout this section could increase their crops at least one-fourth by preventing the growth of weeds. The present agricultural practices are favorable for the growth of weeds for the following reasons:

- (1) Lack of crop rotation.
- (2) The absence of cultivated crops.
- (3) No live stock to graze the stubble before the weed seeds ripen.



Fig. 5--A Very Common Sight in the Columbia Basin--A Wheat Field Infested with Tar Weed, Reducing the Wheat Yield 60 to 75% in this Particular Field

(4) Scattering of weed seeds by means of the "combine".

This new management plan makes possible the control of weeds. The alfalfa and field peas, both being crops which require cultivation, greatly reduce the growth of weeds. In addition, those who have had experience in keeping sheep do not require to be told that where sheep are kept some of the most mischievous forms of weed life soon disappear, that other forms are much crippled in their power of growth and so gradually disappear, while still other forms are weakened and harassed, though they may not be entirely destroyed. The most common and most mischievous weeds in Eastern Oregon are Russian thistle, tumbling mustard, and tarweed, all three of which are annuals and can be controlled very successfully when sheep are allowed to act as scavengers. Sheep will render excellent service in the work of weed extermination when allowed the run of the fields, of summer fallow, on private roads, along fence borders, in stubble where a crop of grain has been reaped, and in corners and by-places generally. There is probably no way in which

weeds can be so profitably used as by turning them into mutton. This general principal of destroying weeds with sheep also applies to the other live stock in lesser degree.

Other points to be observed in controlling weeds are:

(1) The use of a rotation. The rotation that is to be followed in the new management plan is especially desirable in controlling weeds.

(2) Sowing only clean seed. Great care is to be exercised in the purchase of clean seeds, and also in the preparation (fanning, etc.) for sowing of home-grown seed.

(3) Thoroughly cleaning the threshing machine. Threshing machines, especially if these come from a farm with a reputation for uncleanness, are to be carefully swept before being set to work.

(4) Allowing no weed seed to ripen. Fall disk-ing and some fall plowing are to be practiced on these lands.

(5) Burning drifting weeds and fence rows, etc.

(6) Using a header instead of the "combine", which tends to spread weed seed.



## Farm Equipment

### Farm Buildings

It can safely be said that buildings represent not only the more expensive part of the farm equipment but the least negotiable. Leaving out the dwellings, the remainder shows a much greater variation in investment per acre than any other class of equipment. In the study of farm equipment of any kind, it is necessary to determine the relation that should exist between buildings and the farm enterprises in order to reduce the wide variation in investment per acre in buildings designed for the same purpose. With the above consideration, the buildings on this farm have been planned.

Building Requirements of Farm No. 5 A. Barn. The barn on this farm is to be large enough to meet the requirements for 32 horses. This, of course, includes all the young stock. In addition, there should be space enough for five or six head of cattle. A building 80 by 100 feet, allowing 20 feet on either side the full length of the building, should provide ample room for the horses and cattle. This leaves 40 feet



through the center the entire length for the storage of hay and grain, thus affording room to store large quantities of feed, in this way protecting it from the weather. A hay sling will be installed. In this way much labor is saved when the barn is filled with hay. The total cost of this barn should not exceed \$1500, provided the ordinary building material is used.

Granary. There is no other building on the farm that should be more carefully constructed than the granary. By all means this building should be so constructed as to prevent rodents from entering it. This can be accomplished by raising the building from the ground a few feet and placing wire in the floor and up the sides about a foot. The granary should be divided into several bins so that different kinds of grain can be stored. A fairly good grade of lumber should be used so as to prevent the leaking of grain. A granary 32 by 32 feet will be sufficiently large, the cost being about \$350.

Machine Shed. Housing machinery in Eastern Oregon is of paramount importance on account of the excessive

amount of sunshine. A very efficient shed is one that is open on one side, having the roof on the open side project down, leaving an opening from 9 to 12 feet from the ground. A shed 32 by 56 feet will be sufficiently large. The cost of such a machine shed will be about \$250.

Hog House. Probably nothing is more eloquent of the advance along agricultural lines than the new ideas that are now working themselves out into hog houses. Hogs will live anywhere. "As dirty as a pig pen" has become a common phrase. Yet hogs will respond as well as other animals to good care. The principles of good building construction are now applied to quarters for swine, and the quarters should be made as sanitary as possible.

Location of the Hog House. The hog house is to be located where good drainage is possible, where there is plenty of light, where there is protection from wind. A sandy, gravelly, or stony soil is preferable to a clay, silt, or muck soil. Another important point to consider is locating the hog house where the undesirable odors will not reach the dwelling.

Kind of Hog House. As to the kinds of hog house that are best, there is among breeders a wide difference of opinion, and it is natural that there should be. In order that it be sanitary, a hog house should admit the direct rays of the sun to the floor of all the pens, should not allow cold drafts in winter, should be well ventilated, and so arranged as to exclude the hot sun in the summer. A good hog house, figuring on the basis where 30 brood sows are to be kept, is as follows:

The building as a whole is to be 30 feet wide and 150 feet long, with an 8-foot alley running lengthwise through the center. The pens, according to the above dimensions, would be 10 by 11 feet. This is large enough for one sow. From each pen there is to be a doorway leading to the outside, which is closed by a door sliding upward. The partitions between the pens are to be so made that either side of the hog house can be thrown into one large pen. By this means the hog house can be used for a greater number of pigs when they are old enough to be together, and, in addition, less time is required in taking care of the hogs.

Another advantage is the labor saved in cleaning the pen.

Accessibility to Pasture or Yards. It is very important that the hog house should be accessible to pasture or yards. These yards should be more or less level so that straw can be kept in them, in this way preventing them from becoming muddy or dusty under Columbia Basin climatic conditions.

Chicken House. The chicken house is to be built on the same general plan as the hog house, only that there will not be an alley nor will it be necessary to have pens. The chicken house is to face the south, so that the maximum amount of sunlight will be admitted, which is very desirable. The roosts are to be along the north wall, allowing the south side for a feeding place or scratching pen. However, in an arid country the feeding can be done outside a large per cent of the time. For housing 300 chickens, where good ventilation is possible, a house 30 by 60 feet will be large enough. This poultry house will cost about \$150. What has been said with regard to sanitation in the case of hogs applies equally as well to poultry.

Sheep Shed. No expensive equipment is needed in the way of buildings, etc., for sheep. This is especially true where the hay can be stored outside. The sheds necessary for sheep may be constructed with very small expense. A shed 18 feet wide and 120 feet long, closed on three sides, may be erected at a cost of about \$150. Such a shed will provide ample protection for about 100 ewes. It is possible to build such a shed out of straw, but the labor involved from year to year would amount to even more than a shed built out of lumber.

Pump and Work House. A building 32 by 16 feet joining the machine shed at the end nearest the barn will provide ample room for the pump house, and also the work shop. This building can be divided into two parts if the farmer so desires. This building, when equipped with a blacksmith outfit and carpenter tools, will prove a very profitable investment on the farm. The cost of the building will be about \$100.

House. The purposes of a farm dwelling are several--to provide a place for administration of the farm, to afford protection, to house the various goods of



the family, to be a home--that is, a meeting place for the members of the household, where they may come together for the family life. The building should also adorn the landscape. All this requires no elegance or costliness but only a regard for fitness in form and design and, above all, a suggestion of homelikeness, comfort, and cheer within. The planning of the house will be left to the family, however. A very important feature which is so often neglected in farm homes is the bath. On account of the dust in this semi-arid region, the shower bath is invaluable in making the farm life more comfortable. The farm house on a farm of this size is not to cost more than \$2000. This amount is allowed in this management plan.

#### Farm Fences

The fencing problem is a serious one to the farmer. This is especially true in this particular part of the state, where fencing material is high in price. The kind or type of fence that is selected should depend upon the use to which it is to be put. On this farm, where hog-tight fences are necessary,

as well as cattle-, horse-, and sheep-proof fences, a general purpose farm fence 56 inches high and containing woven wire 36 inches high, is satisfactory. There should be, in addition, two barbed wires on top-- the first one 10 inches above the woven wire and the other one 14 inches above the first barbed wire. Cedar posts are to be used and they are to be placed 20 feet apart, with the narrow side supporting the wire. The posts are to be set about 2 feet deep. The soil about the posts is to be thoroughly compacted by tamping.

The amount of fencing material required for this farm, including boundary, portable, and farmstead fencing, is as follows:

Boundary fencing--total rods, 800, requiring:  
Cedar posts--610  
Woven wire--800 rods  
Barbed wire--1600 rods

Farmstead fencing--total rods, 298, requiring:  
Cedar posts--241  
Woven wire--298  
Barbed wire--596

Portable fencing--total rods, 400, requiring:  
Cedar posts--330  
Woven wire--400

Cost of different fencing material per rod:

Cedar posts	18.3
Woven wire	22.5
Barbed wire	7.4
Total cost per rod	48 1/5 cents

Total rods--1,499

Total cost--\$662.83

#### Machinery and Its Upkeep

An itemized list of the machinery required for Farm No. 5 A is shown in the inventory (page 85).

It is very important that all implements and machinery be kept in repair and protected from the weather. The importance of protecting and repairing farm machinery is almost universally overlooked, and this is particularly the practice in Eastern Oregon. The farmers are of the opinion that on account of the small amount of precipitation the machines are quite as well off when exposed to the weather. This, however, is not true--especially not with machinery having many parts made of wood. The intense sunshine more than offsets the slight precipitation in depreciating the value of machinery. It is stated by men who have made a careful study of this subject that the housing undoubtedly doubles the life of the average machine.

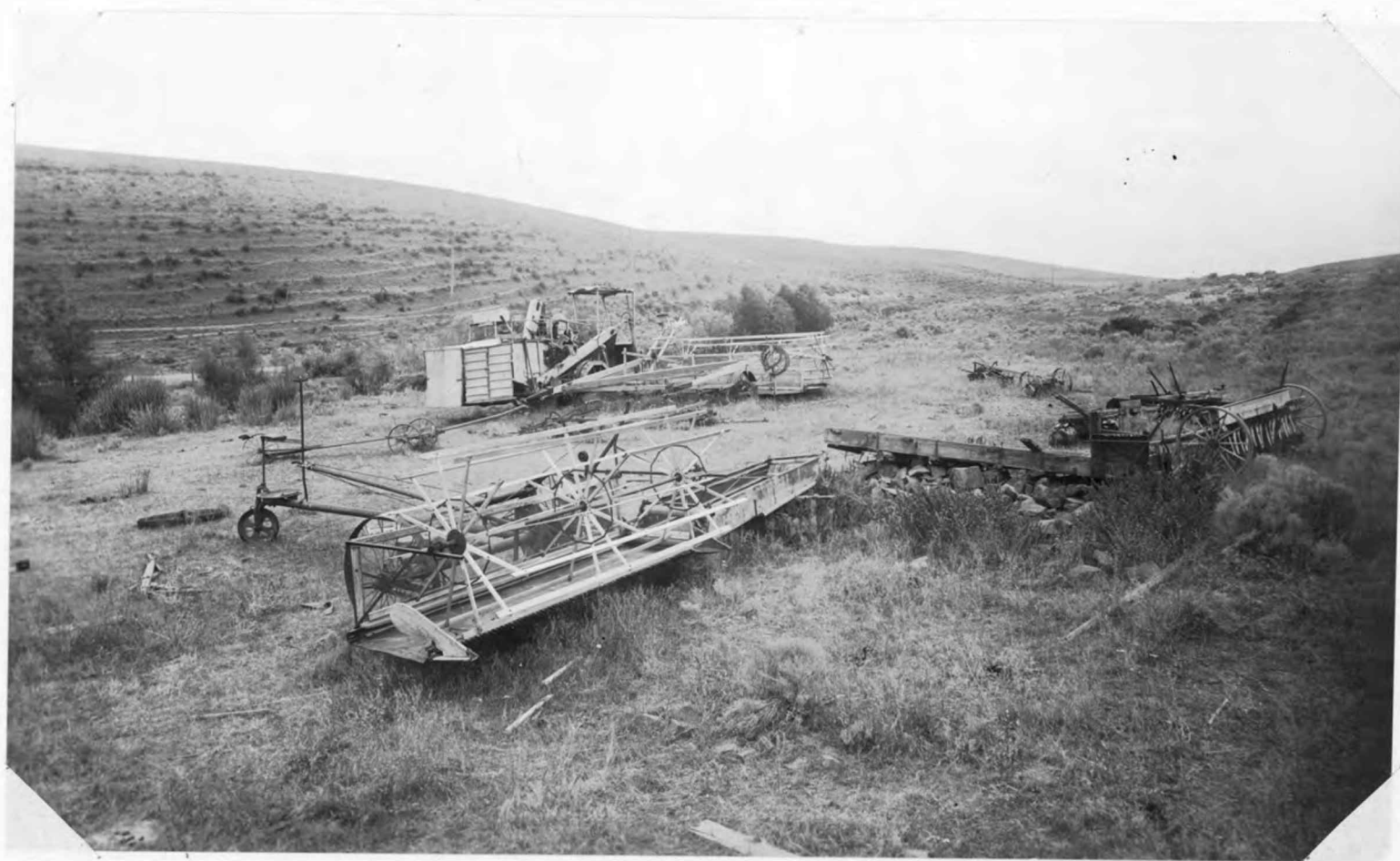


Fig. 6--The "Open Air" Method of Storing Machinery in the Columbia Basin. Several Thousand Dollars Worth of Machinery is Shown in the Picture

This statement, however, may be somewhat exaggerated, but, without question, housing is a very profitable practice. When the implements are not in use they should be placed in the machine shed where they are well protected. Each winter all of the farm machinery should be carefully overhauled and repaired. If this practice is followed, there need be no delay when it comes time to use the various machines.

Before buying machinery of any kind, the farmer should know the merits or demerits of the same. Experimenting with machinery, when carried on by farmers, is a very expensive practice.

The machinery for Farm No. 5 A has been very carefully selected. Investments in machinery should be made only after carefully calculating the probabilities of being able to make each machine pay interest on the investment. This can be done by considering (1) the quality of the work that can be done with and without the machine; (2) the cost of the work with and without the machine (the cost includes interest, depreciation, storage, risk, and repairs); (3) the returns from the same capital invested in live stock, labor, or other



enterprise; and (4) the saving of man and horse labor.

Size of Machinery to Buy. In buying machinery, at least two things should be considered--first, the amount of work to be done; and, second, the motive power available. It is a mistake to buy too small a machine and just as great a mistake to buy a machine so large that the motive power cannot adequately propel the machine. In determining what size to buy, the capacity must be considered. The following example will illustrate:

"A farmer has ten cows, each giving 5,000 pounds of milk yearly. The aggregate amount of milk will be 50,000 pounds a year. Which will be most economical to buy for separating the milk--a separator with a capacity of 450 pounds per hour, costing \$100, or one with a capacity of 600 pounds per hour, for \$125?"

In separating 50,000 pounds of milk with the 450-pound separator, 111 hours will be required, which at 14 cents per hour will cost \$15.54. With the 600-pound machine, 83 hours will be required, costing \$11.62. There will be a gain in labor saved,

therefore, of \$3.92. This, however, is not all profit. There is an additional investment in the machine of \$25, which at 6 per cent would bear \$1.50 interest. The depreciation also must be considered on the additional cost of investment. It is estimated that the depreciation on milk separators is 5 per cent. Five per cent of \$25 will be \$1.25. This, added to the interest on the additional investment, amounts to \$2.75. Subtracting the additional interest and depreciation charge of \$2.75 from \$3.92 saved in labor would leave a net gain of \$1.17 per year in the use of the larger machine. Similar calculation can be made comparing the gain to be made from the purchase of small walking plows or a large gang plow, large or small grain headers, and many other machines used about the farm.

#### Farm Live Stock

##### Amount of Live Stock Kept

Horses. Twelve 1400-pound horses should do all the work on a farm of this size where the crops are diversified. Large horses will show a much greater profit and do more work, provided they are



Fig. 7--Mule Colts on the Plateau Farm--A Valuable Minor Live Stock Crop, Especially Well Adapted to the Columbia Basin Dry Farm

properly managed. It is the opinion that three 1400-pound horses will do more work, eat less, and require less labor and barn room than four horses each weighing 1050 pounds. The other great advantage in keeping large horses is that they will sell for much more per pound than light horses. (M. W. Harper studied the sales of horses on the Chicago market in the fall of 1912. His estimates of sales were: 900- to 1100-pound horses, \$120 to \$150; 1200- to 1400-pound horses, \$175 to \$225; and 1500- to 1800-pound horses, \$250 to \$300).

By keeping twelve horses on a farm of 800 acres, operated as will be shown later, with 600 acres of crop each year, 50 acres of cultivated land would be accounted for by each horse. This average under the present conditions, where only wheat is grown, would without question be too much for one horse, but under the new management plan, where the work is more evenly distributed, the animal units per acre can easily be reduced.

Two driving horses will be kept, since the heavy work horses are too slow for making trips to

town and doing such light work as is necessary on every farm.

Eighteen young horses are counted on, figuring that about 50 per cent of the mares will produce colts each year. It is quite possible that more colts can be raised, but the above number is desirable, where the mares are doing steady hard work eight months out of each year.

Cattle. Two milk cows (milking Short Horns) will produce enough dairy products for home use and at the same time produce beef enough for home consumption.

Hogs. Thirty brood sows producing seven pigs each, annually, making a total of 210 pigs produced each year, will be kept on this farm. During the early summer the main object in keeping hogs on these Eastern Oregon dry land farms is to consume field peas and alfalfa. Experiments of the Oregon Station show that by keeping hogs in this way much labor is saved and at the same time the hogs have made a good profit per acre.

Sheep. One hundred breeding ewes are to be



kept on this farm. By proper care and management, the lamb crop should average near 100 per cent. By keeping the above number of sheep, all the cheap rough feeds grown for which there is no market (pea straw, alfalfa straw, volunteer grain, all grain straw, weeds, stubble, etc.) or which cannot be transported to market profitably are utilized. Spring lambs are fattened on field peas, as are the hogs.

Poultry. Three hundred hens are to be kept on this farm. It is figured that the above number will consume the waste products from the kitchen and other waste produced from the cleaning of grain, etc. Since most of the farm poultry is cared for by the women and children, a nice profit can be secured, provided the poultry is properly managed.

#### Operating Plan

Many types of farming are followed in the State of Oregon, each type being adapted to some particular locality, and each type requires a definite operating plan. The operating plan to be followed on this farm is as follows:

## Management of Field Crops

### Wheat (Winter)

Under this new system of farming, at least 3 to 5 bushels more of wheat can be grown per acre. Winter wheat (Turkey Red) is to be grown, always sowing it on ground that has been fallowed the preceding year. The seeding should be done immediately after the first fall rains. The best rate of seeding is about 40 pounds per acre--more where the rainfall is greater and less where the rainfall is less. Good results may often be obtained where proper conditions permit by harrowing the wheat in the spring. By so doing, a mulch is re-established, conserving moisture, and at the same time many weeds are killed.

Harvesting. This diversified type of farming will not permit the use of "combines". There are arguments both in favor of and against the use of the "combine". One of the main talking points in favor of this machine is that it prevents the loss caused by wheat shattering, but this is no longer a point in favor of the "combine", since Turkey--now one of the leading varieties in Eastern Oregon--can be handled with the header method with absolutely no loss. Be-



Fig. 8--Turkey Wheat on the Plateau Farms--The Highest Yielding Variety for the  
Columbia Basin. Used in the New Management Plan

fore straw became valuable as feed for horses and sheep, some labor was saved by the use of the "combine". Now that the straw must be saved, the labor problem no longer shows favor to the "combine". The more important objections to the "combine" are as follows:

(1) Requires large number of horses.

(2) Scattering of weeds from foul area to clean area.

(3) Large sum of money is invested in a machine that very rapidly depreciates in value.

The header method has advantages in that the harvesting can be done fully as cheaply, ten horses only are required, the straw is saved and is better for feed, there is less investment in machinery. The harvesting is to be done with the header, stacking the grain in large stacks. After the grain is sufficiently dry it is to be threshed. The threshing is to be hired. Where it is at all practicable, the farmers should exchange help, in this way reducing the expense. A very desirable method, where elevators are available, is to handle the wheat loose, as this will save the buy-

ing of bags--an item of expense that amounts to six cents per bushel. The straw is to be carefully stacked, the stacks are to be trimmed, and all loose straw picked up and hauled to the barn. When this is done a fence is to be built around each stack to prevent the stock from wasting it.

Special attention is to be given the seed wheat. Only the best is to be kept for seed each year, only that which is free from weed seeds being selected, and fanning for a high percentage of good plump kernels being done. In every case the seed wheat is to be treated against smut.

#### Field Peas

In this management plan, the ground which is to be devoted to peas, having had a wheat crop the previous year, is to be treated as follows:

After the stock has been pastured in the stubble the ground is to be plowed, this being done preferably in the fall. If plowing cannot be done in the fall, the ground should be fall disked and spring plowing done as early as possible so as not to cause delay in sowing the peas. (It is possible that the ground will



be too dry to permit of fall plowing some years). The ground is to be double-disked and properly harrowed. As early as possible (about the middle of March) the peas are to be seeded. The earlier the seeding is done the less will be the danger from summer drouth. The seeding is to be done with a common grain drill in double drill rows 35 inches apart, sowing about 75 to 100 pounds per acre. It is quite important to sow medium deep. This will protect the peas from drouth and frost. Cultivation is to be done with the harrow. In case the weeds become exceedingly bad, the cultivator is to be used. Often after the land once becomes clean of weeds more than harrowing will be unnecessary. Cases are on record where no harrowing was necessary.

Harvesting. The field peas that are not pastured off by the hogs and lambs should be cut when the pods are so near ripe that they are fairly dry but will not shatter. Up to the present time field peas have been harvested most successfully with the mowing machine, with pea-harvesting attachment and clover buncher. (It is hoped that a machine better

designed for this purpose will soon be on the market). The main objection in using the mower is that the peas shatter too much. However, where hogs are turned into the field, the peas are not wasted. Another method of harvesting peas which promises success is by the use of the header, where the peas are high and stand up well. This means of harvesting will no doubt give success. The harvested peas are to be stacked and the stacks topped with straw and weighted, in this way protecting the peas from rain and from winds. The threshing is to be done with the threshing machine having a pea attachment, but where no pea attachment is available the peas can be threshed with the threshing machine without the attachment, provided enough cylinders and concave teeth are removed and the cylinder speed is sufficiently reduced and the wind maintained.

### Barley

On account of winter-killing, practically no winter barley has been grown in this locality. Spring barley is to be sown on well prepared summer fallow, sowing as early as possible in the spring. By so

doing the crop will mature before summer drouth. Either the Swanneck or Hannchen varieties are to be grown. The above named varieties have given decidedly the best yields on dry land farms. The seeding is to be done at the rate of 50 to 60 pounds per acre. Harvesting barley will be the same as for wheat. On these dry farming lands the yields vary a great deal, where grown in a rotation of this kind. At least 25 to 30 bushels can be counted on (actual yields at Moro, 1911-1913, for Hannchen variety--27 bushels per acre). The selection and treatment of the seed is to be the same as for wheat.

#### Alfalfa

The seed bed is to be very carefully prepared, the method of preparation being the same as for field peas except that the surface is better pulverized and several additional harrowings are given before seeding, as this will conserve moisture and kill weeds. The variety used is to be one that is adapted to dry land farming. The Grimm and Baltic are the best. Seeding is to be done in the spring--about April 15. The row method must be resorted to on account of the



Fig. 9--Alfalfa in Cultivated Rows on the Plateau Farms--The Most Successful Forage Crop Ever Introduced on the Columbia Basin Dry Farming Lands



Fig. 10-Showing Cultivation of Alfalfa in Rows on the Plateau Farms

light rainfall. When grown for forage, sowing in drill rows 35 inches apart will give the best yields. Where alfalfa is grown for seed production the same method is practiced--the only difference being that the drill is set to sow much less, usually being at the thinnest possible rate. The seeding is to be done with a grain drill having the grass seeder attachment or special reducer. The rates are three-fourths of a pound and one and one-half pounds respectively.

Alfalfa grown for seed is to be thinned when 3 to 4 inches high to 24 inches apart in the row. The alfalfa is to be cultivated regularly the first year until all weeds are eradicated, this being done with either the harrow or cultivator, depending on how bad the weeds are. While the plants are short, harrowing does little damage to them. In the years following, only such cultivation is necessary as to maintain a good mulch, disking in the spring and then harrowing as needed.

Harvesting. In case alfalfa is grown for seed production, the reaper or mower and buncher are being





Fig. 11--Single Alfalfa Plant on the Plateau Farms, Showing the Masses of Seed Pods and Great Possibilities for Seed Production

used with fair success. One great precaution not to be overlooked is not to allow the alfalfa to become over ripe. If over ripe, much valuable seed is lost by shattering. Alfalfa for hay is to be cut when it is about one-twentieth in bloom. The curing is best done in the windrow. If cured in this way, few leaves will be lost. It is surprising how short a time is required for the curing of alfalfa hay in Eastern Oregon. Often the curing will be complete in six to seven hours.

As yet no alfalfa seed is being produced in these particular sections of the country, but the experiment stations are working on this problem. Should alfalfa seed production be carried on successfully under these conditions, it would offer a great opportunity for the farmers on the dry land.

### Management of Live Stock

#### Horse Management

By keeping all mares as already indicated and giving them proper care, at least six colts is the minimum average produced each year. In the feeding of a working mare, the essential points are to give

feeds containing a large amount of energy and feed of such nature as will agree with the digestive system under the conditions of severe work. During the winter season---a period of four months, November, December, January, and February---no grain or grain hay is to be fed. Straw, stubble pasture, and the run of waste land and a little alfalfa will rough them through the winter in fair shape. During the working season grain hay and alfalfa chop will make up the ration. There will possibly be some horses among the number that will not do well on the above ration. In a case of this kind the ration is to be altered so as to fit the individual horse.

With the work mare, the time of foaling is to be adjusted to the time when the least loss of working time will result. Also must it be remembered that the mare can do more hard work while pregnant than while suckling the foal. Since only half of the mares will have colts each year, and by having them foal before work begins in the spring, the mares can be worked regardless of producing colts. However, wherever possible the mares that have colts are to be favored.

The young horses are to be disposed of at the age of three or four years. This means that the number of young horses on hand will range from 12 to 18 in number, consisting of six yearlings, six two-year-olds, and six three-year-olds. Where no waste land for grazing purposes is available, the young horses are to be placed in hired pasture or taken to grazing districts during the summer season. Winter feed for the young horses will vary with their age. The yearlings are to be fed alfalfa chop and grain hay. This same ration is to be given the two-year-olds, except that straw will be fed in addition. The three-year-olds are to be managed the same as the work horses.

No definite directions can be given, but success with young horses will depend largely upon how much feed and the kind of care they receive while young. A fair allowance of grain for the colt, measured in oats, is--up to one year of age, from 2 to 3 pounds; from then on to two years of age, 4 to 5 pounds; from two to three years of age, 7 to 8 pounds. A good practice would be to weigh the grain hay, finding out just what

amount need be fed to supply the above amount of grain. This weighing would only be necessary for a few days. After that time the caretaker would be able to estimate the required amount. The feeding of alfalfa chop to young horses cannot be over-emphasized, since they need feeds that will keep the digestive system in good order and at the same time supply protein, which is very essential for growing animals.

The two driving horses are to be fed grain hay and alfalfa chop throughout the entire year, since they will be busy almost every day during the year.

The new care and management of horses is much different from the present management of horses in this section of the state. The following is a brief account of how horses are cared for at the present time on this particular farm:

Throughout the working season the horses are fed on grain hay, this being fed in low mangers which are not properly cleaned out from day to day and therefore causing much waste. In the above ration the horses are not receiving any feed that aids



in keeping their digestive systems in order, and as a result the death rate has been very high throughout Eastern Oregon. The winter keeping of horses, however, has been quite desirable, as it is the general practice to rough horses through on wheat straw and stubble pasture, etc.

The following is a detailed program for feeding horses, showing the amount and kind of feed each horse is to receive per day, and also showing as near as possible the amount of feed required for twelve mares and two driving horses per year.

# Program For Feeding Horses

This table applies only to draft horses weighing  
1400 to 1500 pounds.

	<u>Feed Per Horse</u> <u>Daily</u>	<u>Feed For Twelve</u> <u>Horses Daily</u>	<u>Total By</u> <u>Months</u>
January	Grain & Legume Straw & Stubble Pasture	Grain & Legume Straw & Stubble Pasture	Grain & Legume Straw & Stubble Pasture
February	"	"	"
March	20 lbs. Grain Hay 7 " Alfalfa Chop	240 lbs. Grain Hay 84 " Alfalfa Chop	7,440 lbs. Grain Hay 2,604 " Alfalfa Chop
April	"	"	7,200 " G. Hay 2,520 " A. Chop
May	"	"	7,440 " G. Hay 2,604 " A. Chop
June	"	"	7,200 " G. Hay 2,520 " A. Chop
July	"	"	7,440 " G. Hay 2,604 " A. Chop
August	"	"	7,440 " G. Hay 2,604 " A. Chop
September	"	"	7,200 " G. Hay 2,520 " A. Chop
October	"	"	7,440 " G. Hay 2,604 " A. Chop
November	Grain & Legume Straw & Stubble Pasture	Grain & Legume Straw & Stubble Pasture	Grain & Legume Straw & Stubble Pasture
December	"	"	"

Total for Year for 12 Work Horses--  
Alfalfa Chop-- 10.3 Tons  
Grain Hay 29.4 "

## Feed Allowance for Driving Team:

5 lbs. Alfalfa Chop Each (Daily)--Total for Year, 1.82 Tons.  
15 " Grain Hay Each (Daily)--Total for Year, 5.47 Tons.

## Feed Allowance for 18 Young Horses (figured on basis of 5 months when not in pasture):

5 lbs. Alfalfa Chop Each (Daily)--Total for Year, 6.7 Tons.  
10 " Grain Hay Each (Daily)--Total for Year, 18.5 Tons.

Total Requirement for All Horses:

Grain Hay	53.37 Tons
Alfalfa Chop	18.81 "
Land in Wheat Required	36.25 Acres
Land in Alfalfa Required	25
Total	61.25 "

Sheep Management

The management of sheep on these diversified farms is totally different from that system followed under range conditions. The raising of sheep on these farms, if conducted on a small scale in connection with the other enterprises, so far as has been practiced promises much success. On these farms there are such cheap feeds as pea straw, alfalfa straw, grain hay, etc., that make good feed for sheep. Many of these farms contain a portion of rough land which is difficult to till. This land often makes desirable pasture and can be made to return something of profit by the use of live stock such as sheep.

The ewes are to be wintered on the cheap feeds mentioned, while during the summer they are to be pastured on alfalfa, field peas, stubble, and waste land. Grain feeding is to be practiced only shortly before lambing and

during the period while the lambs are suckling.

Lambing. By having the lambs come about March 1, it is possible to finish them on field peas. Handling sheep in this way makes it possible to finish the lambs for the early market when they will bring a high price. The lambs are to be fed a small amount of grain, as is shown in detail in the feeding program. Watering sheep on the dry land farms is a very simple problem if done by means of a large tank wagon. This tank wagon (500 gallons) hauled once a week to wherever the sheep are being pastured will be sufficient for 200 sheep for a week's time. In this way, watering can be done at slight expense. The water is to be run in watering troughs by means of a hose, thus reducing the labor to the minimum.

Shearing. The time of the year for shearing will vary with the season, but as a rule about the first of May will be the right time.

A safe estimate for the amount of wool pro-

duced per ewe is about eight pounds, and the lambs raised in the way described should weigh near the hundred pound mark.

Housing. The ewes are to be kept in a cheaply constructed barn, in this way being protected from severe winter cold and being in a good place for lambing.

The following tables give in detail the management and feeding program for the ewes and lambs. Where grain is fed it is to consist of half barley and half bran.



# Program For Feeding Breeding Ewes

	<u>Feed Per Ewe Daily</u>	<u>Feed Per 100 Ewes Daily</u>
January	2 lbs. Alfalfa Hay 2 " Pea Hay	200 lbs. Alfalfa Hay 200 " Pea Hay
February	2 " Alfalfa Hay 2 " Pea Hay .25 lb. Bran & Barley (1-14th) .5 " " " " (14-28th)	200 " Alfalfa Hay 200 " Pea Hay 800 " Bran
March	2 lbs. Alfalfa Hay 2 " Pea Hay .5 lb. Bran & Barley	200 " Alfalfa Hay 200 " Pea Hay 1550 " Bran
April	Alfalfa Pasture .5 lb. Bran & Barley	Alfalfa Pasture 1500 lbs. Bran
May	Alfalfa Pasture .5 lb. Bran & Barley (15 days)	Alfalfa Pasture 750 lbs. Bran
June	Alfalfa Pasture	Alfalfa Pasture
July	Wheat, Pea & Alfalfa Stubble	Wheat, Pea & Alfalfa Stubble
August	"	"
September	"	"
October	"	"
November	2 lbs. Alfalfa Hay 2 " Pea Hay	200 lbs. Alfalfa Hay 200 " Pea Hay
December	"	"

Total Requirement per Year--  
2,300 lbs. Bran

48 bu. Barley  
12 T. Alfalfa Hay  
12 T. Field Pea Straw  
20 A. Alfalfa Pasture

The remainder of the forage required will  
be gathered from the fields where crops have been  
harvested.

Land in Barley Required	2 Acres
Land in Alfalfa Hay Required	16 "
Land in Alfalfa Pasture	" 20 "
Total	38 "

Program For Feeding Lambs

	<u>Feed Per Lamb Daily</u>	<u>Feed Per 100 Lambs Daily</u>
January	No Lambs	No Lambs
February	"	"
March	Suckling (no feed)	Suckling (no feed)
April	Suckling Alfalfa Pasture .25 lb. Bran & Barley	Suckling Alfalfa Pasture 25 lbs. Bran & Barley
May	Suckling (1/2 month) Alfalfa Pasture .25 lb. Bran & Barley	Suckling (1/2 month) Alfalfa Pasture 25 lbs. Bran & Barley
June	Alfalfa Pasture .50 lb. Bran & Barley	Alfalfa Pasture 50 lbs. Bran & Barley
July	Lambing Off Field Peas	Lambing Off Field Peas
August	"	"
September	"	"
October	Lambs Sold	Lambs Sold

Total Requirement per Year--

32 bu. Barley  
1512 lbs. Bran

Land in Alfalfa Pasture Required	20 Acres
Land in Field Peas Required	22 "
Land in Barley Required	1.5 "
Total	43.5 "

## Hog Management

Hogs will be raised to consume the field peas and some alfalfa. Since the hogs save labor by doing their own harvesting, they have proved to be very successful on these dry land farms where field peas and alfalfa are grown.

On this 800-acre farm, 30 brood sows will be kept, each producing seven young pigs per year, making a total of 210 young pigs. The sows are to farrow about February 15. If farrowed at this time, the young pigs will be ready for fattening when the field peas are about matured. The sows are to be fed on alfalfa pasture during the summer and on alfalfa hay of good quality during the winter. However, they are to be fed grain shortly before farrowing, and also while the young pigs are suckling. Watering while the hogs are in the field is to be done by means of the tank wagon, the same as for sheep, only that the watering trough will be placed on platforms to keep out dirt. Cross pieces are to be nailed across the trough to prevent the hogs from wasting water by lying in the trough.



Fig. 12--Pigs Pasturing on Row Alfalfa in Eastern Oregon



Fig. 13--Lambs Fattening on Field Peas on the Plateau Farms



Fig. 14--Showing Means of Supplying Water to Hogs and Sheep on Fields Distant from the Well--Plateau Farms

Housing. A hog house when kept clean and dry is a good investment on any farm where hogs are raised. This hog house is to be so constructed that it will make an ideal place for farrowing and offer such winter protection as is necessary. During farrowing time each sow is to be placed in an individual pen. This can be accomplished by means of portable partitions. These partitions can be removed when the young pigs are old enough to protect themselves. The hog runs are to be kept free from dust. This can be very easily accomplished by placing straw in them. When the hogs are placed in the various fields, some sort of shade is to be provided so that they will be protected from the hot sun. Water and shade are not to be far away from the feed. The pigs are to be finished on field peas, beginning in July and continuing until October 1. At that time the pigs will be seven and one-half months old and will weigh about 175 pounds. It will be observed that pigs of the above weight will bring a very high price, especially when finished on field peas, since this pork is of very high quality.



Only very high class brood sows are to be kept. If one sow raises inferior pigs, she is to be disposed of and replaced by one that measures up to the standard.

The following tables give in detail the management and feeding program for sows and young pigs. Where grain is fed, it consists of barley and ground wheat, pound for pound.

Program For Feeding Brood Sows

	<u>Feed Per Sow Daily</u>	<u>Feed For 31 Sows Monthly</u>
January	5 lbs. Alfalfa Hay (1st-16th) 2 lbs. Alfalfa Hay (16th-31st) 5 lbs. Grain (15 days)	3317 lbs. Alfalfa Hay 155 " Grain (15th-31st)
February	2 lbs. Alfalfa Hay 5 " Grain (15 days) 10 " " (14 days)	1726 lbs. Alfalfa Hay 155 " Grain (1st-15th) 310 " " (15th-28th)
March	2 " Alfalfa Hay 10 " Grain	1922 " Alfalfa Hay 310 " Grain
April	Alfalfa & Pea Pasture 10 lbs. Grain	Alfalfa & Pea Pasture 310 lbs. Grain
May	Alfalfa & Pea Pasture	Alfalfa & Pea Pasture
June	Alfalfa & Pea Pasture	Alfalfa & Pea Pasture
July	Alfalfa & Pea Pasture	Alfalfa & Pea Pasture
August	Alfalfa & Pea Pasture	Alfalfa & Pea Pasture
September	Alfalfa & Pea Pasture	Alfalfa & Pea Pasture
October	5 lbs. Alfalfa Hay	4805 lbs. Alfalfa Hay
November	5 " Alfalfa Hay	4650 " Alfalfa Hay
December	5 " Alfalfa Hay	4605 " Alfalfa Hay

Total Requirement per Year--

232 bu. Wheat  
289 bu. Barley  
10.6 T. Alfalfa Hay

Land in Alfalfa Hay Required	14.16 Acres
Land in Alfalfa Pasture Required	20.00 "
Land in Barley Required	11.20 "
Land in Wheat Required	13.00 "
Total	58.36 "

Other pasture, such as pea and grain,  
not figured.

Program For Feeding Young Swine

(Farrowed February 15--Finish For Market  
October 1).

	<u>Amount of Feed</u>	<u>Weight of Pigs</u>	<u>Amount of Feed Daily</u>
January	No Young Pigs		
February	Born 15th, Suckling		
March	Suckling		
April	Suckling		
May	5 lbs. Grain for Each Pound of Pork Alfalfa Pasture	35 lbs.	365.7 lbs.
June	"	59 "	649 "
July	Hogging Off Field Peas	Will Gain 1 lb. per Day	Field Pea Pasture
August	"	"	"
September	"	"	"
October	Pigs Sold		

Kind of Feed--Ground Wheat & Barley, Equal Parts.

Total Requirement per Year--

258 bu. Wheat

322 bu. Barley

Land in Field Peas Required	105 Acres
Land in Wheat Required	14.5 "
Land in Barley Required	13 "
Land in Alfalfa Pasture Required	20 "
Total	<u>152.5 "</u>

## Cattle Management

Since cattle raising is not profitable on these dry land farms, only such numbers as will furnish milk and butter for family use are to be kept. Two cows, preferably grade Short Horns, are to be kept. By keeping dual purpose animals, both milk and beef for home consumption will be supplied. The cows are to be fed grain and alfalfa hay during the winter, while during the summer they are to be pastured on alfalfa and stubble pasture. The young stock is to be managed in the same way as the cows.

Housing. One corner of the horse barn is to be used for housing the cattle.

Feed Required. Figuring that the young stock will be slaughtered at two years, the average amount of stock on hand will be five head. For the above number of cows and young stock, four tons each of alfalfa and grain hay in addition to the pasture will be ample.

## Poultry Management

Poultry use a considerable amount of cheap feed that would have little value for other purposes, and

often most of the poultry can be taken care of by the women and children. With the above in mind, poultry will be profitable on these dry land farms, However, it will not be profitable to go to an extreme in keeping poultry. Three hundred hens are to be kept on this farm, raising at least three hundred young chickens for market. Another great advantage in poultry keeping on these farms is the well established fact that poultry will not permit waste of any kind. In addition, chickens will gather a great many insects while roaming in the fields. Also, all waste from the kitchen can be fed to the poultry.

Since poultry is to be kept only on a small scale, natural brooding is to be followed. The common V-shaped coop is quite satisfactory in warm weather, or even in cold weather, if it is placed in a sheltered location, or in a shed. Young chicks can often be kept in an unused stable. The sheep or hog barn will serve for this purpose, being empty during the summer.

Housing. The poultry house should be warm, dry, light, and well ventilated, without draughts. A neglect of any of these requirements is enough to destroy the usefulness of the house, in part at least.



Yarding. As perfect sanitation is one of the principal requisites for success, the larger the yards and the more space afforded, the easier it will be to maintain healthful conditions among the flock. On a farm of this kind, however, yarding is not of much importance, since the poultry is to have free range. On the other hand, the poultry must be protected at night from coyotes and other wild animals.

Feeding. Amount required for one hen per year:

Wheat	60 lbs.
Cut Bone	10 "
Alfalfa Hay	15 "

Amount of feed required for 300 hens per year:

Wheat	300 bu.
Cut Bone	3000 "
Alfalfa Hay	2 1/4 T.

Acreage required:

Land in Wheat	16.5 Acres
Land in Alfalfa	
Hay	<u>3</u> "
Total	19.5 "

The amount of feed required for the young chickens is not considered, since the waste products resulting from cleaning grain, kitchen garbage, etc., have not been taken into consideration in the feeding of the laying hens.

### Marketing Poultry and Poultry Products. A

large part of the profit in poultry keeping often depends on the marketing of the products, and the producer should know the business of marketing.

On account of the scarcity of poultry in Eastern Oregon, the local market will usually demand all the poultry products at good prices.

### Manure Management

Even though manure is regarded highly as a fertilizer, there is probably no product on the farm of equal value which is so much neglected and so poorly cared for, especially on the dry land farm. The first great source of loss is through incomplete absorption of the urine, the second is the loss by leaching, and the third loss is that incurred by heating and fermentation.

The first step to be taken in the care of manure, so as to prevent the losses mentioned, is to provide sufficient bedding or litter in the stable to absorb and save all the liquid parts. In order to reduce the loss in manure to a minimum, and also to economize in handling it, the general aim and practice should be to

haul it directly from the stable to the field and spread at once. On this farm, however, it will be impossible during the busy season to haul the manure directly to the field, and this will necessitate having some manure accumulate. The manure, however, is very easily stored by making use of a manure yard.

Such a yard is very easily built, since all that is necessary is to have a solid board wall for sides, leaving an opening on one side, in this way allowing the stock to trample over the surface. This packing of the manure will prevent fermentation. This manure yard prevents the manure from being spread over large areas and finally being carried away by wind. This management of the manure causes the pile to become compact, in this way excluding the air and thus reducing the loss due to fermentation. The loss by leaching is too small to be of importance, since the rainfall is so light.

The manure which accumulates during the busy season is to be hauled during the winter, the spreading being done with the manure spreader at the rate of from 4 to 6 tons per acre on alfalfa stubble to be

plowed for summer fallow. Or, the manure can be spread as a top dressing on either wheat or alfalfa, or applied to the stubble and disked in before plowing.

### Labor Management

Man Labor. The proper adjustment of the labor involved on the farm usually is a very difficult problem. In this new management plan, the effort has been to quite evenly distribute the labor throughout the year. The contention is that two men will be sufficient on this farm with the exception of during the harvest season, during which time it will be necessary to employ extra help. All labor that is employed is to be by contract, and in no case are men to be hired that are not dependable. If necessary, more will be paid to get dependable men. The only correct way to get the most work done on the farm is to have a definite labor program made out in advance, so that just what work there is to be done from day to day and from week to week may be known. Rarely if ever during the growing season will the two men on this farm be idle.

During the winter, however, work will not be so plentiful. On the other hand, the two men will find enough work to keep them busy if the work is properly planned. There is, however, a possibility that one man could do the work during the winter months.

The advantages in hiring men by the year are that better men can be secured, and at the same time the salary for the year usually is only slightly more than the same man would cost for nine months.

The following is a list of winter work:

Repairing machinery, buildings, and fences; hauling all manure that has accumulated during the summer; oiling and repairing harnesses; sharpening tools; cleaning seed grain and testing same; caring for live stock.

During the winter season the farmer should take his vacation, and shorter work hours should be arranged for.

Horse Labor. The economical use of horse labor is as important as that of man labor. With this in mind, the horse labor needs careful attention. During



the summer all the horses will be busy almost every day, and this busy period is about eight months in length. During the winter only a part of the horses will be busy. A good scheme is to use different horses from day to day. In this way each horse will be doing the same amount of work, or, putting it the other way, each horse will receive the same amount of rest.

The Work Schedule. On a farm of this kind, where a definite cropping system is followed, it is possible to make out at least a rough schedule of work to be done during each month of the coming season. A very good plan is to divide each month into two periods--the first period being the fifteen days of the first of the month, and the second the remainder of the month. A chart can then be made, having the dates in the left hand column and the various crops or other enterprises for the headings of the remaining columns. Under each heading may be inserted in each fifteen-day period the work to be done on that particular enterprise during the period. It will, of course, not be possible, on

account of the vagaries of the weather, to follow such a schedule blindly, but the schedule will be of great service in keeping track of the farm work. It is especially helpful as a means of foreseeing what teams and men and equipment will be needed at particular times, and this enables the farmer to be prepared for work at the time it should be done.

Such a schedule is also helpful in the management of labor, especially at this time, when the men are inclined to shirk. If the schedule is based on generally recognized standards of farm labor, the laborer who fails to keep up with it is then shown to be doing inefficient work. It is also a good plan in connection with the work schedule, or even where no definite schedule is maintained for the ordinary field work, to keep on hand a list of things to be done at times when, on account of the weather, breakdowns, etc., the field work is intercepted.

### The Farmstead (See Map, Plate VII)

Location. In locating the farmstead on these farms, not all the factors could be considered, since the location in every case is confined to the canyons where water can be more easily obtained and where the buildings will be protected from the winds.

General Plan. In planning the farmstead, plenty of space should be included for yards, gardens, orchard, trees for windbreaks, live stock yards, drives, buildings, etc. Where land is cheap, ample room should be allowed. Under these conditions the farmstead should occupy about eight acres of land. This same general plan (which is discussed in detail elsewhere) will be used on all the farms. Slight changes, however, will possibly be necessary where canyons are exceedingly steep, and in some cases special conditions might necessitate changes. The plan submitted allows a distance of 150 feet between the house and barn and proportionate distances, as shown, between the other buildings,--far enough apart for security in case of fire, and yet not too far for doing chores conveniently.



Fig. 15--Buildings and Farmstead on Plateau Farm No. 5, Showing Poorly Planned Arrangement and Lack of Effort to Make Attractive Surroundings

This affords room for a grove four rods wide on the north and west sides, which should be provided for protection from wind. The trees are to be black locust. The planting is to be done in rows, and the rows are to be one rod apart and the trees planted two rods apart in the rows. The above method of planting will permit thorough cultivation, which is very essential for successful tree growth under dry land conditions.

Ample room is provided for the orchard and garden, the location being in the enclosed corner, where the fruit trees and vegetables will be protected. On account of the climatic conditions it will not be necessary to provide a spacious lawn. If at all possible, a few shrubs are to be grown on the lawn.

Orchard. The family orchard is to consist of the following:

Apples--Yellow Transparent, Gravenstein, Rome Beauty, and Jonathan.

Pears--Bartlett and Anjou.

Plums--Bradshaw, Tragedy, Giant, and Italian.





Fig. 16--A Black Locust on Plateau Farm No. 5. The Best  
Shade Tree for the Columbia Basin Dry Farm

Cherries--Royal Ann, Bing, and Late Duke.

Bush Fruits--Perfection Currants, Champion  
Gooseberries, Cuthbert Raspberries.

By giving the family orchard proper attention, the above named varieties of each of the above fruits should supply the family the entire year. On account of the dry climate, it is very essential that the trees be planted far apart (two rods each way). The orchard is to be cultivated quite frequently, in this way killing weeds and conserving moisture.

Vegetable Garden. Factors affecting success in growing vegetables for one's own use are largely as follows:

- (1) Selection of small area of land well fertilized.
- (2) Ample protection of area from strong winds.
- (3) Planting of crops such as are hardy under these arid conditions.
- (4) The use of hot bed and cold frame in the spring to forward young plants and to protect those of more tender nature.

It is necessary under these conditions that

the vegetables grow as rapidly as possible. Hence, the soil is to be fertilized with old stable manure. If the soil is properly managed and the right varieties used, there is little danger of a total failure in growing vegetables for home use.

In selecting vegetables for the garden under arid conditions, the following suggestions should be noted:

For greens that grow rapidly and are hardy, spinach and Swiss chard are best.

Lettuce which will do for spring or fall--Tennis Ball, May King, and New York.

Peas planted very early in the spring will do well--Alaska and Nott's Excelsior.

Onions will find a suitable place and should be grown from sets planted early in the spring.

All of the members of the cabbage family succeed well at high elevations, as they are hardy to cold.

Detailed directions for growing these crops cannot be given here. The contention is that if the farmer uses judgment he should have no great difficulty in growing vegetables for family use.

#### Arrangement of Yards and Buildings. A

road leading from the farm road, or the public road, as the case may be, connects the barn, granary, tool and pump house, workshop, machine shed, and also the hog house. From this road all of the fields can be reached in the most direct manner. The house, barn, and machine shed, with work shop included, are near together and are located on the main road leading to the fields. By this arrangement the farmer first goes to the horse barn for his teams, and from there to the machine shed for the implements he is to use, and then direct to the field. The granary, where the feed supplies are kept, is located midway between the barn and the hog house, so that the feed there stored will be near by for both. The tool and pump house, workshop, and machine shed are all grouped. This saves a great many trips from the tool house to the machine shed. In general, the work shop is located where it is most frequently in demand.

The poultry yard is placed near the orchard. The orchard, garden, and poultry are placed near the

house to make easy the many trips of the housewife. This arrangement also permits the poultry to have the run of the orchard and garden whenever possible.

The yards for the horses and cattle are of good size, permitting room for exercise without danger of the animals getting into the wire. A separate yard for the horses and cattle is arranged for, as quite often horses and cattle do not get along well in the same yard.

The piggery is placed a considerable distance from the house to avoid disagreeable odors. Good sized hog runs are provided, in which some forage crop is to be sown and where the hogs can be more or less confined if necessary.

Since the farmstead is to be the permanent home of the family, too much attention can hardly be given to making it attractive as well as comfortable and convenient.



The following are the dimensions of the  
farmstead's several parts:

Windbreak--1122' x 16.5'

Orchard--231' x 132'

Kitchen Garden--105.5' x 198'

Chicken Run--231' x 66'

House Lot--198' x 231'

Hog Run--132' x 165'

Cattle Yard--79' x 138'

Horse Yard--118' x 138'

Sheep Run--132' x 165'

Buildings

Barn--80' x 100'

House--32' x 32'

Granary--32' x 32'

Machine Shed--32' x 56'

Hog House--30' x 150'

Poultry House--30' x 60'

Sheep Shed--18' x 120'

Summary of Production and Disposition of Field

Crops--Farm No. 5 A

Grain--Wheat and Barley

78.05	Acres	Wheat	@	18	bu.--	1404.9	bu.	Cash Crop
13.00	"	"	"	"	"	--	234.0	" for Sows
13.50	"	"	"	"	"	--	251.0	" for Pigs
16.50	"	"	"	"	"	--	297.0	" for Poultry
7.25	"	"	"	"	"	--	130.5	" for Seed
36.25	"	"	"	1 $\frac{1}{2}$	T.--	54.37	T.	Wheat Hay for Horses
2.00	"	Barley	@	25	bu.--	50.00	bu.	for Ewes
1.50	"	"	"	"	"	--	37.50	" for Lambs
11.20	"	"	"	"	"	--	280.00	" for Sows
13.00	"	"	"	"	"	--	325.00	" for Pigs
2.00	"	"	"	"	"	--	50.00	" for Seed

Total Acreage--195

Alfalfa

25.00	Acres	@	.75	ton--	18.55	tons	for Horses
16.00	"	"	"	"	--	12.00	" for Ewes
20.00	"	of	Pasture	for Ewes			
20.00	"	"	"	for Lambs			
20.00	"	"	"	for Sows			
20.00	"	"	"	for Pigs			
14.16	"	@	.75	ton--	10.72	tons	for Sows
3.00	"	"	"	"	--	2.25	" " Poultry
5.00	"	"	"	"	--	3.75	" " Cattle
51.84	"	"	100	lbs. Seed--	5184	lbs.	Cash Crop

Total Acreage--195

Summary of Production and Disposition of Field

Crops--Farm No. 5 A Cont'd.

Field Peas

105 Acres of Pasture for Pigs  
27 " " " for Lambs  
27 " @ 12 bu.--324 bu. for Seed  
36 " " " " --432 " for Cash Crop

Total Acreage--195

Totals

Alfalfa, 195 Acres

Total Acreage of Alfalfa Pasture--80.00

" " " " Hay-- 47.25

" Pounds " " Seed--5,184.00

Wheat and Barley, 195 Acres

Total Bushels of Wheat--2,309.40

" Tons of Grain Hay-- 54.37

" Bushels of Barley-- 742.50

Field Peas, 195 Acres

Total Pea Pasture--132 Acres

" Bushels of Peas--756

Summer Fallow, 195 Acres

Farmstead and Roads, 15 Acres

Total Farm, 795 Acres

Financial Statement of Farm No. 5 A Under  
Old Management Plan

Inventory

Real Estate

795 Acres Land @ \$22	\$17,490.00
Buildings	<u>3,975.00</u>
Total Value	\$21,465.00

Live Stock

12 Draft Horses	2,400.00
6 Young Horses	450.00
2 Cows	100.00
100 Chickens	<u>50.00</u>
Total Value	3,000.00

Machinery

1 Grain Header	250.00
2 Header Boxes	40.00
3 Wagons	300.00
2 Wagon Boxes	50.00
1 Water Tank (500 gallons)	25.00
1 Hack (two-seated)	75.00
2 Cultivators (double row)	120.00
1 Gang Plow (three-bottom)	100.00
2 Harrows (20-ft. iron)	60.00
1 Disk (double cutaway)	75.00
1 Weeder	35.00
1 Corn Planter	45.00
2 Grain Drills	180.00
1 Campbell Packer	50.00
7 Sets Double Harness	280.00
2 Saddles	40.00
1 Sickle Grinder	5.00
2 Weeders	30.00
1 Reaper	84.00
1 Blacksmith Outfit	75.00
Shovels, Scoops, Hoes, Rakes, Pitch-Forks, Log Chains, and Other Small Tools	<u>100.00</u>
Total Value	2019.50

### Total Inventory

Value of Real Estate, Live Stock, and Machinery	\$26,484.50
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### Expenses

Labor--One Man the Entire Year	400.00
Labor--Extra Help Harvesting Wheat	160.00
Board Furnished Hired Men (61 weeks @ \$3.00)	183.00
Bags (wheat) @ 5¢ per Bushel	238.00
Threshing of Wheat Crop @ 7¢ per Bushel	333.20
Breeding Fees	34.00
Incidental Expense	300.00
Depreciation on Machinery (figured at 10%)	301.95
Depreciation on Horses (figured at 10%)	240.00
Depreciation on Buildings (figured at 5%)	198.75
<u>Total Expense</u>	<u>\$2288.70</u>

### Receipts

Wheat--4,500 Bushels @ 80¢	\$3600.00
Two Horses--@ \$150	300.00
Two Cattle--@ \$50	100.00
Poultry	100.00
<u>Total Receipts</u>	<u>\$4100.00</u>

### Financial Summary

Total Capital Invested	\$26,480.00
Total Receipts	4,100.00
Total Expense	2,288.90
Farm Income	1,811.10
Interest on Capital @ 6%	1,589.07
Farmer's Labor Income	222.03



Financial Statement of Farm No. 5 A Under  
New Management Plan

Inventory

Real Estate

795 Acres Land @ \$22	\$17,490.00
Buildings	4,825.00
Total Value	<u>\$22,315.00</u>

Live Stock

12 Draft Horses @ \$200	2,400.00
2 Driving Horses @ \$75	150.00
12 Young Horses @ \$75	900.00
2 Cows @ \$50	100.00
3 Young Cattle @ \$25	75.00
30 Brood Sows @ \$25	750.00
2 Young Pigs @ \$10	20.00
1 Boar	25.00
300 Laying Hens @ 50¢	150.00
100 Breeding Ewes @ \$7	700.00
Total Value	<u>\$5,260.00</u>

Machinery

1 Grain Drill	125.00
1 Grain Header	250.00
1 Gang Plow (three-bottom)	100.00
1 Gang Plow (two-bottom)	75.00
1 Walking Plow	17.00
1 Harrow (six-horse)	35.00
1 Harrow (two-horse)	12.00
3 Wagons @ \$100	300.00
2 Header Boxes @ \$20	40.00
2 Wagon Boxes @ \$25	50.00
2 Cultivators (two-row)	120.00
1 Cultivator (one-horse)	10.00
1 Spring Wagon	75.00
1 Gas Engine (8-hp.)	500.00
1 Feed Grinder	50.00
1 Water Tank (500 gallons)	25.00
1 Mower with Pea Guards and Buncher	60.00
1 Hay Rake	35.00
1 Manure Spreader	145.00
6 Harness (double work)	240.00
	<u>\$2264.00</u>

Amount Carried Forward \$2264.00

1 Harness (light double)	35.00
1 Fanning Mill	50.00
1 Disk (double action)	75.00
1 Saddle	40.00
4 Horse Blankets	10.00
16 Halters	16.00
Total Value	<u>\$2490.00</u>

Minor Equipment

12 Bits, \$6; 1 Brace, \$1.50; 1 Pinch Bar, .75; 1 Axe, \$1.50; 1 Steel Square, \$1.50; 1 Bevel Square, .40; 1 Try Square, .50; 4 Wood Chisels, \$2.40; 1 Compass, .40; 1 Drawing Knife, \$1.25; 2 Claw Hammers, \$1.50; 1 Hand Axe, \$1; 2 Screw Drivers, \$1; 2 Log Chains, \$5; 2 Hand Saws, \$3; 2 Plows, \$2; 1 Steel Tape Line, \$2.50; 1 Rasp, .60; 1 Scythe, \$2; 3 Files, .75; 5 Oil Cans, \$1; 2 Pipe Wrenches, \$5; 2 Monkey Wrenches, \$2; 1 Grindstone, \$5; 1 Riveting Hammer, .65; 1 Sledge Hammer, \$1.25; 2 Pliers, \$1; 1 Nipper, .75; 1 Hack Saw, \$1.25; 1 Saw Set, \$1; 2 Wire Stretchers (woven and barbed), \$8.25; 2 Trowels, \$1; 1 Sand Sieve, \$1; 1 Pick Axe, \$1; 3 Shovels (assorted), \$3; 1 Counter Scale, \$1; 1 Platform Scale, \$15; 3 Lanterns, \$3.75; 10 Forks (assorted), \$7; 4 Grain Measures, \$3; 2 Garden Rakes, \$1; 3 Garden Hoes, \$1.50; 1 Wheelbarrow, \$4; 3 Brushes, \$1.50; 3 Curry Combs, \$1.50; 1 Riveting Machine, \$1.25; 1 Wagon Jack, \$3.	
Total Value	<u>\$112.20</u>

Blacksmith Outfit

1 Anvil	12.00
1 Vice	15.00
1 Forge	15.00
6 Tongs	1.50
1 Drilling Machine	10.00
12 Iron Bits	6.00
Minor Articles	25.00
Total Value	<u>84.50</u>

Total Value of Machinery and Tools	\$2686.70
Total Inventory Value of Real Estate, Live Stock, and Machinery	30,261.70

#### Expenses

Regular Hired Labor--12 Months	400.00
Extra Hired Labor--82 Days @ \$2.50	205.00
Board for Hired Labor--64 Weeks @ \$3	192.00
Threshing (1404.9 bu. Wheat @ 7¢)	98.34
Bags (1404.9 bu. Wheat @ 5¢)	70.25
Breeding Fees	94.00
Threshing (492 bu. Seed Peas @ 9¢)	44.28
Feed--3.8 tons Bran for Sheep @ \$25	95.00
Feed--3000 lbs. Cut Bone for Chickens @ 2 <sup>1</sup> / <sub>2</sub> ¢	75.00
Incidental Expense	500.00
Depreciation on Machinery (figured at 10%)	249.00
Depreciation on Horses (figured at 10%)	240.00
Depreciation on Fences and Buildings (figured at 5%)	292.75
Depreciation on Minor Equipment and Blacksmith Outfit (figured at 15%)	29.50
<u>Total Expense</u>	<u>\$2585.12</u>

#### Receipts

Crop Products	
1405 Bushels of Wheat @ 80¢	\$1123.92
432 Bushels of Peas @ \$2.10	907.20
5184 Pounds of Alfalfa @ 30¢ (not figured)	
Alfalfa as Hay @ \$8 per Acre	<u>408.00</u>
	<u>2439.32</u>

Live Stock Products

210 Pigs--175 Pounds Each @ 7¢	\$2572.50
100 Lambs--100 Pounds Each @ 8¢	800.00
5 Horses @ \$150	900.00
2 Cattle @ \$50	100.00
300 Chickens @ 50¢	150.00
800 Pounds Wool (100 Ewes Shearing 8 Pounds) @ 10¢	80.00
3600 Dozen Eggs (300 Chickens at 12 Dozen Eggs Each) @ 25¢	<u>900.00</u>
Total Receipts (inclusive of Alfalfa Seed)	\$9088.82
Total Receipts (exclusive of Alfalfa Seed)*	\$7941.62

\*Since the practicability of alfalfa seed production under these conditions has not been fully established, its value as forage only will be considered here.

# Financial Summary

Total Capital Invested	\$30,261.70
Total Receipts	7,941.62
Total Expense	2,585.12
Farm Income	5,356.50
Interest on Capital @ 6%	1,815.70
Farmer's Labor Income	3,540.80

## Comparative Financial Statement of Farm No. 5 A

### Under Old and New Management Plan

	<u>Old Plan</u>	<u>New Plan</u>
Capital Invested		
Real Estate	\$21,465.00	\$22,315.00
Live Stock	3,000.00	5,260.00
Machinery and Tools	2,019.50	2,686.70
Total	<u>\$26,484.50</u>	<u>\$30,261.70</u>
Receipts		
Live Stock Products	\$ 500.00	\$5,502.50
Crop Products	<u>3,600.00</u>	<u>2,439.12</u>
	<u>\$4,100.00</u>	<u>\$7,941.62</u>
Expense		
Labor	\$ 743.00	\$ 797.00
Other Expense	<u>1,545.70</u>	<u>1,788.12</u>
	<u>\$2,288.70</u>	<u>\$2,585.12</u>
Farm Income	\$1,811.10	5,356.50
Interest on Capital @ 6%	1,589.07	1,815.70
Farmer's Labor Income	222.03	3,540.80



Bibliography of Literature Read  
in Connection with Thesis

Books

<u>Author</u>	<u>Title</u>
Warren, G. F.	Farm Management
Boss, Andrew	Farm Management
Card, F. W.	Farm Management
Farmer, Virginia	Ancient Farm Management
Roberts, I. P.	The Farmstead
Compiled (U. S. Department of Agriculture Reports and Bulletins)	Farmers' Cyclopedia
Hopkins, C. G.	Soil Fertility and Per- manent Agriculture
Henry, W. A.	Feeds and Feeding
Van Slyke, L. L.	Fertilizers and Crops
Shaw, Thomas	Weeds and How to Eradicate Them
Pammel, L. H.	Weeds of the Farm and Garden
Bailey, L. H.	Cyclopedia of American Agri- culture
Widtsoe, J. A.	Dry Farming
Davidson and Chase	Farm Machinery and Farm Motors

Bulletins

Scudder, H. D.	No. 119--Eastern Oregon Ex- perimental and Demonstra- tion Tillage and Cropping Practices--Oregon Station
Scudder, H. D.	No. 124--Corn in Oregon-- Oregon Station
Beckwith, T. D.	No. 118--Ammonification and Nitrification Studies of Certain Types of Oregon Soils-- Oregon Station
McClure, H. B.	No. 362--Conditions Affecting The Market Value of Hay-- U. S. Dept. Agriculture

<u>Author</u>	<u>Title</u>
Hammond, J. W.	No. 270--Experiments in Winter Lamb Production-- Ohio Station
Ellis, L. W.	No. 227--Farm Equipment-- Ohio Station
Sampson, G. R.	Live Stock Management (Swine)-- Oregon Station
Burritt, M. C.	No. 32--An Example of Success- ful Farm Management--New York Station
Potter, E. L., and Nelson, O. M.	No. 38--Sheep Raising in Ore- gon--Oregon Station
Forley, J. W.	No. 436--A System of Tenant Farming and Its Results-- U. S. Dept. Agriculture
Taylor, H. C.	No. 198--Methods of Renting Farm Land in Wisconsin-- Wisconsin Station
Potter, E. L., and Kennedy, C. N.	No. 178--Horse Management-- Oregon Station
Wheeler, G. C.	No. 192--Hog Feeding--Kansas Station
Fitts, E. B.	No. 10--Raising the Dairy Calf--Oregon Station
Warren, G. F.	No. 295--An Agricultural Survey--New York Station
Whitson, A. R.	No. 202--How to Improve Over Heavy Clay Soils--Wisconsin Station
Ellis, L. W.	No. 44C--Minor Articles of Farm Equipment--U. S. Dept. Agriculture
Billings, A. B.	No. 472--Systems of Farming in New Jersey--U. S. Dept. Agriculture
Macory, H. H.	No. 3--A Normal Day's Work for Various Farm Operations-- U. S. Dept. Agriculture

<u>Author</u>	<u>Title</u>
Spillman	No. 102--Planning a Cropping System--U. S. Dept. Agriculture
Beattie	No. 347--The Repair of Farm Equipment--U. S. Dept. Agriculture
Parker, E. C.	No. 117--The Cost of Producing Minnesota Farm Products--Minnesota Station
Arnold, J. H.	No. 432--How a City Family Managed a Farm--U. S. Dept. Agriculture
Parker, E. C.	No. 73--The Cost of Producing Minnesota Farm Products--U. S. Dept. Agriculture
Dryden, James	No. 157--Feeding for Eggs--Oregon Station
Atkinson, Fred	No. 100--Winter Wheat, Montana Station
Spillman, W. J.	No. 259--What is Farm Management--U. S. Dept. Agriculture
Whitson, A. R.	No. 204--Ways of Improving Our Clay Soils--Wisconsin Station
Ellis, L. W.	No. 212--A Study of Farm Equipment in Ohio
Forley, J. W.	No. 437--A System of Tenant Farming and Its Results--U. S. Dept. Agriculture
Graves, R. R.	No. 101--Feeding the Dairy Cow--Oregon Station
Bradley, C. E.	No. 112--The Soils of Oregon--Oregon Station
Ellis, L. W.	No. 98--Minor Items of Farm Equipment--Ohio Station
Hays, W. M.	No. 236--Farm Management--U. S. Dept. Agriculture
Johnson, O. R.	No. 121--Land Tenure--Missouri Station
Yerkes, A. P.	No. 174--Farm Experience with the Tractor--U. S. Dept. Agriculture
Thompson, E. H.	No. 661--A Method of Analysing the Farm Business--U. S. Dept. Agriculture
Stephens, D. E.	1913-14 Report of Moro Station--Oregon Station