UNITED STATES DEPARTMENT OF AGRICULTURE

COST OF PRODUCING WINTER WHEAT AND INCOMES FROM WHEAT FARMING IN SHERMAN COUNTY, OREG.[1]

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INTRODUCTION

In a region like Sherman County, Oreg., where farmers are largely dependent on the production of wheat as a source of income, factors which influence the price received or the cost of producing the crop have a direct bearing on the profits from such a system of farming. Taking 1913 as a base year, the farm price of wheat and the cost of the factors of production in this region are seen to have been subject to very decided changes.

Index numbers of the farm price of wheat, the wages of farm labor, prices paid for farm machinery, and the value of farm land show an upward trend from 1913 to 1920. These trends are shown in Table 1 and Figure 1 and indicate that during the period the farm

price of wheat increased more rapidly than the other factors.   When the break in the general price level of farm products came in 1920 the price of wheat declined much more rapidly and fell to a much lower level than did the factors of the cost of production, which resulted in heavy losses to wheat farmers generally.   This situation continued until 1924 when the trend in the price of wheat was again upward.   For that year the index figure for wheat stood at 171, as compared with a figure of 146 for farm wages and 182 for farm machinery (Table 1).

INDEX NUMBERS OF FARM PRICE OF WHEAT AND COSTS OF IMPORTANT FACTORS IN WHEAT PRODUCTION

1913 - 1924
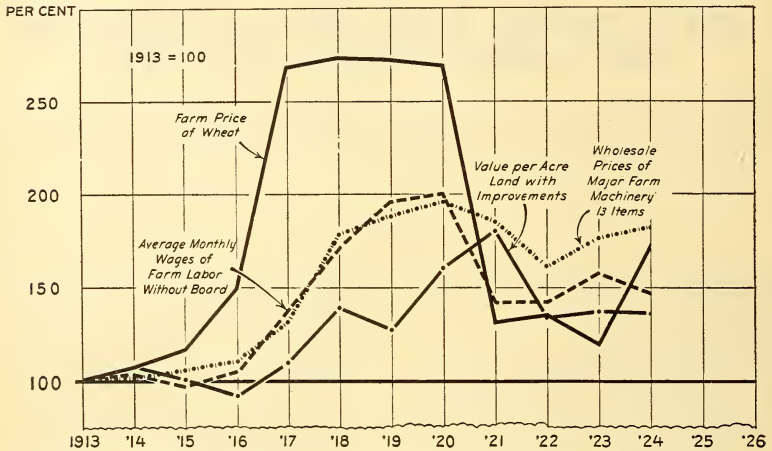
Fig. 1.—The price of wheat increased much more rapidly than production costs at the beginning of the World War and declined much more rapidly after the war

TABLE 1.—*Index numbers of the farm price of wheat and costs of important factors of production, 1913–1924* [1]

Year	Average farm price of wheat per bushel [2]	Monthly wages of farm labor without board	Wholesale prices of 13 representative farm implements [3]	Value per acre of all land with improvements
1913	100	100	100	100
1914	107	103	101	107
1915	116	98	105	100
1916	149	104	110	93
1917	268	137	131	109
1918	273	171	178	139
1919	272	196	188	127
1920	269	200	196	160
1921	131	142	185	180
1922	135	142	161	133
1923	119	157	176	137
1924	171	146	182	136

[1] All for the State of Oregon except for farm implements.   The implement prices are from International Harvester Co. of America and are the prices to dealers over the United States.
[2] Average of prices for year beginning July 1.
[3] Effective as of April 15, for years 1913–1921.   For the year 1922 effective as of September, 1921, and held through 1922; for 1923 effective as of May 8 that year; and for 1924 effective as of November 15, 1923, and remained in effect throughout 1924.

This study was begun early in the summer of 1921. Detailed information was obtained relative to the earnings on these farms as well as the cost of the factors of production. These have been reported in terms of physical requirements wherever possible. An attempt has been made to analyze the quantity requirements of labor and materials in the operation of these farms and to measure the effect of differences in methods and practices on costs and returns.[2]

EXTENT OF STUDY AND METHOD OF PROCURING DATA

The data on which this bulletin is based were obtained by personal interviews with actual farm operators in a study of the cost of winter wheat production and farm organization for 1920, 1921, and 1922. The study is based on 450 farm records, of which 145 are for the calendar year 1920, 153 for 1921, and 152 for 1922. The number of farms included in the tables is dependent on the data to be shown. Certain farms have been omitted from some of the tables because of incomplete data or other irregularities, rendering them incomparable with other farms included in the study.

AREA STUDIED

Sherman County, Oreg., is located in an upland area of the southwestern portion of the Columbia River basin. The average annual precipitation at Moro, in Sherman County, is about 11.5 inches. Practically all of the rainfall occurs during the period from September to June, inclusive. The topography is characterized by nearly level to very rolling slopes and is broken by canyons. The more rugged portions of the area are devoted principally to grazing purposes. The agricultural history of the region shows a gradual transition from a grazing country to one of wheat production by haphazard methods, followed by the present system of good summer fallow practice. Dry-farming methods are well established (fig. 2).

TENURE

Owner and share-rent systems are the only tenure systems used on the farms studied. Of the total number of farms represented, for all years, the number of farmers who owned the entire acreage farmed was about 27 per cent; the number who owned a part and rented additional land was about 31 per cent; and the number who rented all of their land, about 42 per cent. In all tabulations those farms of which a part of the acreage was owned and additional land rented have been combined with the owner group.

The two-thirds share system is the common method of rental. The landlord receives one-third of the crops produced and, with very few exceptions, he maintains the buildings and fences and pays the insurance and land tax. The tenant-operator usually receives free use of

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[2] The details relative to the cost of using horses, tractors, and combines, and the relative efficiency in the use of horse and tractor motive power on these farms, are reported in Department Bulletin No. 1447, entitled "Cost of Using Horses, Tractors, and Combines on Wheat Farms in Sherman County, Oreg."

the native pasture and all proceeds from the sale of livestock and livestock products and two-thirds of the crops produced. He furnishes all livestock and equipment, pays all cash operating expenses and delivers the landlord's share of the wheat to the local elevator or warehouse.

LIVESTOCK

The distribution of the different kinds of livestock, and their equivalent in animal units [3] per farm is shown in Table 2 and Figure 3. On most farms sufficient colts were raised to maintain the supply of
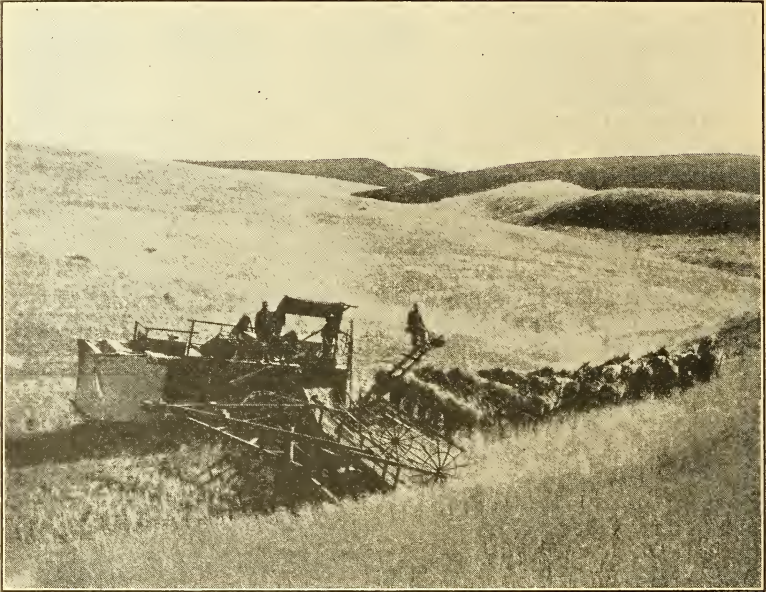
FIG. 2.—General view of the region studied showing a portion of the land in summer fallow and the remainder in grain crops. The common practice is to leave the land in fallow one year and follow with a crop of grain the succeeding year

work stock. The number of colts per farm averaged about 27 per cent of the number of horses kept. A majority of the farms kept enough milk cows, hogs, and poultry to supply the family needs and a little more. The small surplus was sold on the local market. During the period of the survey there was a slight increase in the number of farms reporting cows, hogs, and poultry. The advisability of keeping more of these classes of livestock is considered later.

[3] An animal unit is a mature horse or cow, or as many other animals as consume the equivalent quantity of feed. Two colts, 2 head of young cattle, 5 hogs, 7 sheep, or 100 poultry constitute an animal unit.

TABLE 2.—*Distribution of livestock; averages for all farms studied, 1920–1922*

Class of livestock	1920 (145 farms)			1921 (153 farms)			1922 (152 farms)		
	Farms reporting each class	Average per farm	Average animal units per farm	Farms reporting each class	Average per farm	Average animal units per farm	Farms reporting each class	Average per farm	Average animal units per farm
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Horses_____	[1] 144	15.8	15.8	153	16.7	16.7	152	17.4	17.4
Colts_____	109	4.6	2.3	121	4.6	2.3	113	4.2	2.1
Cattle_____	141	6.6	5.7	150	7.3	6.1	150	7.6	6.2
Hogs_____	92	3.5	.6	99	3.9	.6	102	4.7	.8
Sheep_____	35	4.8	.7	30	2.7	.4	24	1.8	.2
Poultry____	140	64.4	.6	149	67.8	.7	151	73.3	.7

[1] One farm reported no work stock.

FIG. 3.—With the exception of horses and colts, only a limited amount of livestock was kept on these farms

FARM AREA AND CAPITALIZATION

The distribution of the farm area and farm capital is shown in Table 3 and Figures 4 and 5. Winter wheat production after summer-fallow was by far the chief enterprise. Of the average area per farm in 1922 on 152 farms, approximately 36 per cent was in winter wheat, 39 per cent in summer-fallow, 4 per cent in other crops, 19 per cent

in pasture, and 2 per cent in waste land. The crops, other than wheat, produced on these farms were oats and barley which were utilized mainly as feed for livestock.

DISTRIBUTION OF FARM AREA
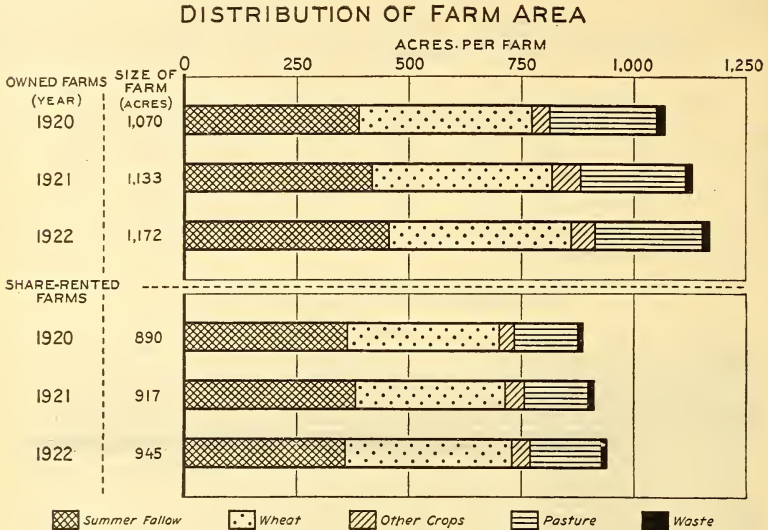
FIG. 4.—The area per farm was somewhat greater on owned than on rented farms. The acres in summer fallow were slightly less than those in crops, since on some farms a part of the crop area was on nonsummer fallow land

DISTRIBUTION OF FARM CAPITALIZATION
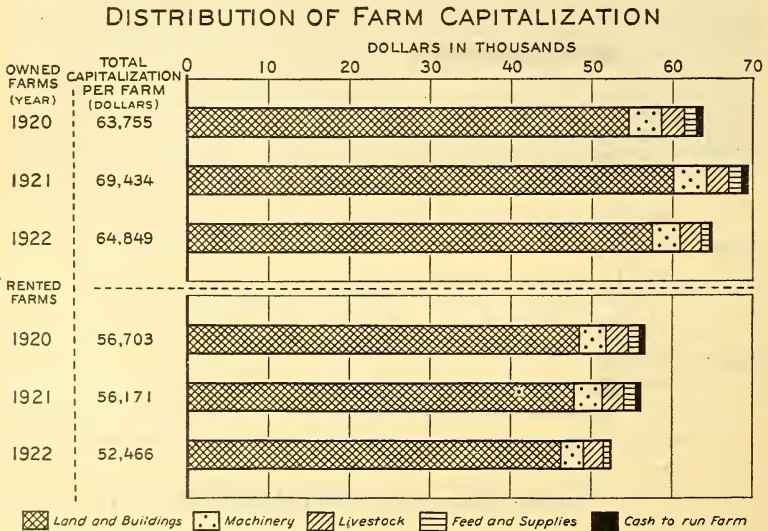
FIG. 5.—The total farm capitalization was somewhat greater on owned than on rented farms. The differences were mainly in the items of land and buildings, machinery, and cash to run farm

On rented farms the landlord furnishes the land and buildings and the tenant furnishes the livestock, machinery, feed and supplies, and cash to run the farm. The average total capitalization on owned

farms was $75.88 and on rented farms $72.91 per cultivated acre, 1920–1922.[4]   The average value of real estate per cultivated acre on owned farms was $65.92 and on rented farms $62.90.   The average value of machinery on owned farms was $4.45 and on rented farms $4.20 per cultivated acre.

TABLE 3.—*Distribution of farm area and farm capitalization, 1920–1922*

Item	Owned farms			Rented farms		
	1920	1921	1922	1920	1921	1922
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Farms	86	87	87	59	66	65
Acreage per farm in—	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Wheat	379	399	402	338	334	372
Other crops	43	63	54	37	40	39
Summer-fallow	391	420	459	364	382	359
Total cultivated	813	882	915	739	756	770
Pasture	237	234	240	138	146	161
Waste	20	17	17	13	15	14
Total per farm	1,070	1,133	1,172	890	917	945
Farm capitalization: [1]	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Land and buildings	54,528	60,018	57,503	48,526	47,887	46,208
Livestock	2,805	2,755	2,619	2,740	2,717	2,496
Machinery	4,048	4,170	3,388	3,265	3,480	2,782
Feed and supplies	1,473	1,531	918	1,366	1,400	782
Cash to run farm	901	960	421	806	687	198
Total per farm	63,755	69,434	64,849	56,703	56,171	52,466

[1] On rented farms the farm capital, with the exception of land and buildings, was furnished by the tenant.

AVERAGE RECEIPTS, EXPENSES, AND EARNINGS

In Table 4, all farms are grouped according to tenure to show the average receipts, expenses, and earnings per farm.   The rented farms are tabulated to show the business of the landlord and tenant separately, and for the farm as a whole.   Of the total cash receipts for all years on both owned and rented farms, about 90 per cent was from wheat.   Cash receipts from other sources were mainly from livestock sales and outside work with horses and equipment.   The sale of work that had been done on summer-fallow land was a considerable item on some farms.   Receipts of this kind might occur, for example, when a man moved to a new location or when he decided that he would reduce the acreage of wheat grown.

On rented farms the total receipts to tenant and landlord were approximately in the proportion of two-thirds to the tenant and one-third to the landlord.   Receipts to the landlord for items other than wheat represent, in the majority of instances, money paid by the tenant for the landlord's share of the wheat hay produced or cash rent paid by the tenant for the use of pasture land.

[4] Averages shown throughout for both single and groups of years are weighted. Thus, averages per acre were obtained by dividing by the total acres of the farms studied; averages per bushel, by dividing by the total production, etc.   In many cases the weighted and unweighted averages were the same, the difference between the results obtained by the two methods rarely being of much significance.

TABLE 4.—*Average receipts, expenses, and earnings, 1920–1922*

| Item | Owned farms | | | Rented farms [1] | | | | | | | | |
| | | | | Total for farm | | | Tenant's share | | | Landlord's share | | |
	1920	1921	1922	1920	1921	1922	1920	1921	1922	1920	1921	1922
Farms_____number__	86	87	87	59	66	65	------	------	------	------	------	------
Cash receipts per farm:												
Wheat_____dollars__	10,806	10,239	5,961	12,699	9,410	5,925	8,499	6,178	3,783	4,200	3,232	2,142
Other crops_____do____	81	70	54	83	43	44	30	8	20	162	145	109
Live stock products _____dollars__	140	93	132	77	86	106	77	86	106	------	------	------
Livestock sales___do____	472	252	205	284	303	169	284	303	169	------	------	------
Outside labor [2] ____do____	294	305	345	506	327	428	506	327	428	------	------	------
Summer fallow sold [2] _____dollars__	45	118	28	31	11	9	31	11	9	------	------	------
Other_____do____	3	18	2	3	2	4	3	2	4	13	23	15
Total cash receipts _____dollars__	11,841	11,095	6,727	13,683	10,182	6,685	9,430	6,915	4,519	4,375	3,400	2,266
Cash outlay per farm:												
Man labor____dollars__	2,030	1,601	1,192	1,912	1,361	1,108	1,912	1,361	1,108	------	------	------
Contract labor___do____	238	279	273	333	257	173	333	254	173	------	3	------
Normal repairs on machinery, buildings, and fences___dollars__	593	588	448	507	469	386	449	410	328	58	59	58
Fuel and oil_____do____	602	513	393	488	357	254	488	357	254	------	------	------
Seed_____do____	120	192	67	96	83	71	96	83	71	------	------	------
Feed_____do____	277	155	126	398	184	163	507	294	248	------	------	------
Livestock purchases _____dollars__	230	174	164	307	187	129	307	187	129	------	------	------
Sacks and twine_do____	516	376	282	601	370	290	588	368	286	13	2	4
Taxes and insurance _____dollars__	797	820	826	785	708	743	186	160	156	599	548	587
Auto for farm use _____dollars__	219	202	165	180	186	137	180	186	137	------	------	------
Summer fallow bought [2] _____dollars__	122	341	133	637	290	108	637	290	108	------	------	------
Interest on borrowed working capital _____dollars__	127	164	91	118	114	68	118	114	68	------	------	------
Other_____do____	123	121	96	167	105	122	175	128	137	5	------	------
Total cash outlay _____dollars__	5,994	5,526	4,256	6,529	4,671	3,752	5,976	4,192	3,203	675	612	649
Unpaid family labor _____dollars__	236	191	200	72	120	103	72	120	103	------	------	------
Inventory decrease [3] _____dollars__	1,216	972	1,575	462	746	1,541	328	594	1,395	134	152	146
Total expense__do____	7,446	6,689	6,031	7,063	5,537	5,396	6,376	4,906	4,701	809	764	795
Earnings per farm: [4]												
Farm income [5] ___do____	4,395	4,406	696	6,620	4,645	1,289	3,054	2,009	−182	3,566	2,636	1,471
Interest on farm capitalization at 6 per cent_____dollars__	3,825	4,166	3,891	3,402	3,370	3,148	491	497	376	------	------	------
Labor income____do____	570	240	−3195	3,218	1,275	−1859	2,563	1,512	−558	------	------	------
Operator's labor_do____	1,179	1,098	833	1,214	1,067	840	1,214	1,067	840	------	------	------
Return on farm capitalization [6] __per cent [7]	5	4.8	−.2	9.5	6.4	.9	22.5	11.4	−16.3	7.3	5.5	3.2
Family income [7] _____dollars__	4,631	4,597	896	6,692	4,765	1,392	3,126	2,129	−79	------	------	------
Family living from farm [8] _____dollars__	711	588	569	550	496	439	550	496	556	------	------	------
Adult equivalent _____number__	4	4	4	3.5	3.6	3.5	3.5	3.6	3.5	------	------	------

[1] Receipts and expenses to landlord and tenant when combined are in some instances more than the total for the farm. This is due to transactions between landlord and tenant which are not considered as a receipt or an expense for the farm.

[2] Refers to work on summer-fallow land which was sold or bought before the crop was planted.

[3] Difference in inventory values of feed and supplies, livestock, machinery, and buildings, and summer fallow.

[4] Minus sign denotes loss.

[5] Difference between the farm receipts and the farm expenses.

[6] Farm income minus the value of the farmer's labor and management divided by the total farm capitalization.

[7] Sum of the farm income and unpaid family labor.

[8] Value of farm-produced food and a rental value for the farm dwelling.

Cash outlay per farm for most items of expense, especially in 1921, was somewhat less on rented than on owned farms. Hired-man labor was the largest single item of expense on all farms. Others of the more important items of cash outlay were taxes and insurance, repairs, fuel and oil, sacks, and twine. The sum of the cash outlay, unpaid family labor, and inventory decrease constituted the total expense and, for all years, was somewhat higher on owned than on rented farms.

Receipts on owned farms exceeded the expenses by $4,395 in 1920, by $4,406 in 1921, and by $696 in 1922. These are the farm-income figures and represent the combined earnings of the farm capital

FARM EARNINGS ON OWNED AND ON RENTED FARMS
(On basis of total Farm)
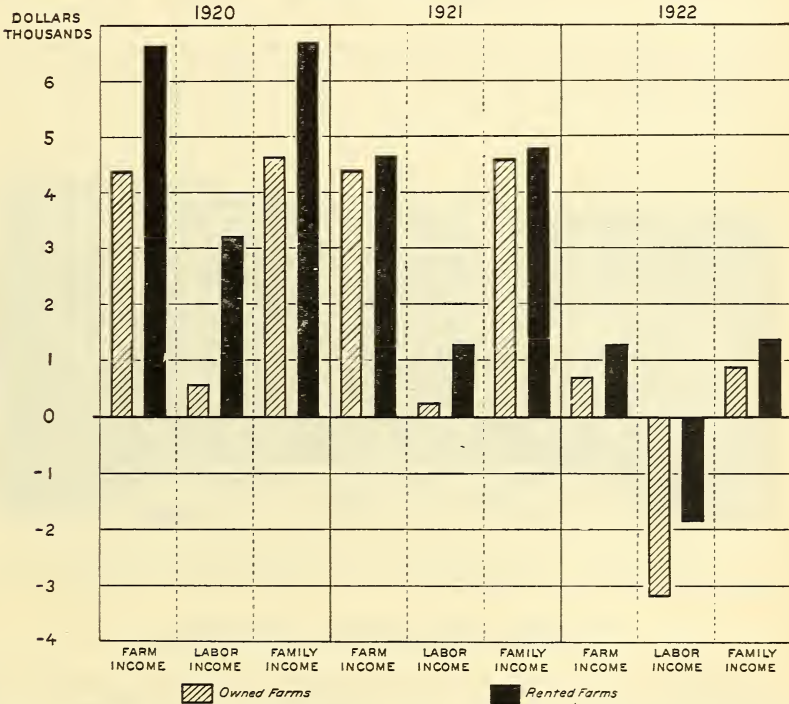
FIG. 6.—There was a decided decline in the farm earnings for both owned and rented farms over the period 1920–1922

and the farmer's labor and management. After deducting 6 per cent interest on the farm capital there is left for owned farms in 1920 a labor income of $570, in 1921 a labor income of $240, and in 1922 a minus labor income of $3,195. These figures represent what was left to the farmer for his labor and management, in addition to a house to live in and products furnished by the farm toward the family living. On rented farms after deducting 6 per cent interest on the farm capitalization there is a labor income which was somewhat larger than for owned farms. The larger labor income on rented farms was due mainly to a higher yield of wheat on these

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farms, which in 1920 sold at 18 cents per bushel more than on owned farms. In addition, the farm capitalization and most items of expense on rented farms were lower than on owned farms.

The percentage return on farm capitalization determined by deducting the value of the farmer's labor from the farm income and dividing by the total farm capital varied on owned farms from an average of 5 per cent in 1920 to an average of minus 2 per cent in 1922. The percentage return on rented farms ran somewhat higher than on owned farms.

The family income, or the amount of money available to the farmer and his family to pay living expenses, interest on farm capital and for savings, was also somewhat higher on rented than on owned farms.

The farm income, labor income, family income, and percentage return on farm capitalization are shown graphically in Figure 6.

Fig. 7.—A good farm garden. On many farms in the region much more attention might profitably be given to the production of home supplies, not only as a means of raising the standard of living but to supplement the farm earnings

FAMILY LIVING FROM THE FARM

In areas of specialized types of farming, in many instances little attention has been given to the production on the farm of home supplies. A majority of the farms in Sherman County are no exception to this tendency. On the other hand, there were a few farmers who had very good gardens (fig. 7). During the period of the study two of the farms contributed no home-produced supplies. In addition there were 6 farms on which no cows were found, 87 farms on which no hogs were kept, and 5 farms which kept no poultry.

The value of the house rent and the quantities and value of the farm-produced food contributed toward the living of the farmer and his family are given in Table 5. In general, the quantities per farm of the items of food furnished by the farm were as large in 1922 as in 1920, or larger but lower prices for the year 1922 resulted in a total average value per farm which was $129 less for that year than in 1920.

TABLE 5.—*Family living from the farm, 1920–1922*

Year	Farms studied	Quantity and value of farm-produced food									
		Fruits and vege-tables	Butter		Milk		Beef		Pork	
	No.	*Dolls.*	*Lbs.*	*Dolls.*	*Gals.*	*Dolls.*	*Lbs.*	*Dolls.*	*Lbs.*	*Dolls.*
1920	145	37	112	67	289	112	27	5	475	70
1921	153	40	119	49	306	76	64	6	536	54
1922	152	36	115	39	316	76	102	8	433	45

Year	Quantity and value of farm-produced food						Value of house rent	Value of all items	Adult units	Value per adult unit
	Poultry		Eggs		Mutton	Total value				
	No.	*Dolls.*	*Doz.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*No.*	*Dolls.*
1920	20	14	202	100	1	406	236	642	3.8	169
1921	22	17	212	63	1	306	240	546	3.8	144
1922	46	25	180	45	1	275	238	513	3.8	135

Of the total average value of all items the value of house rent constituted about 42 per cent, dairy products about 25 per cent, poultry and poultry products about 16 per cent, pork about 10 per cent, and fruit and vegetables about 7 per cent. The total value of the family living contributed by the farm varied from an average of $169 per adult in 1920 to $135 per adult in 1922. The average family consisted of an equivalent of 3.8 adults.

There was a wide variation on individual farms in the value of the family living furnished by the farm. In 1920 on 19 farms the total value per farm of farm-produced supplies was less than $200, on 60 farms it was from $200 to $400, and on 65 farms it was $400 and over. In 1922 this value on 37 farms was less than $200, on 97 farms it was from $200 to $400, and on 18 farms it was $400 and over.

Taken as a whole, however, the value of the family living furnished by the farm was rather significant. For all years it was somewhat higher on owned than on rented farms. In 1920 the total value per farm of the family living furnished by the farm amounted on owned farms to $711 and on rented farms to $550. In 1922 on owned farms it was $569 and on rented farms $439 per farm.

COST AND UTILIZATION OF IMPORTANT FACTORS OF PRODUCTION

MAN LABOR

Human labor was the largest single item of expense on these farms. The amounts and cost of hired man labor, unpaid family labor, and the operator's labor will be found in Table 6, for the years 1920 to 1922 inclusive. The total man labor per farm in 1920 amounted to an average of 26.5 months, in 1921 to 28.1 months, and in 1922 to 26.4 months. In the latter year the range in months of man labor on individual farms was from 12.2 to 91.4 months per farm. Approximately 44 per cent of the total months of man labor was hired, 11 per cent was represented by unpaid family labor, and 45 per cent by

the operator's labor.   The number of months of man labor expressed in terms of number of men shows an equivalent, in 1922, of slightly more than two men per farm.

TABLE 6.—*Amount and cost of man labor per farm, 1920–1922*

Item	1920 (67 farms)[1]		1921 (114 farms)[1]		1922 (152 farms)	
	Labor	Cost	Labor	Cost	Labor	Cost
	Months	*Dollars*	*Months*	*Dollars*	*Months*	*Dollars*
Hired labor	11. 7	1, 623	13. 5	1, 399	11. 6	1, 155
Unpaid family labor	2. 8	213	2. 6	173	2. 8	153
Operator's labor	12. 0	1, 088	12. 0	1, 070	12. 0	836
Total	26. 5	2, 924	28. 1	2, 642	26. 4	2, 144

[1] Certain farms have been omitted for the reason that the data on the months of hired man labor were incomplete.

The cost of hired man labor for all years was somewhat greater than the estimated value of the operator's labor, although the average months of hired man labor was slightly less for all years, except 1921, than the months of labor of the operator.   This is mainly because a large portion of the hired labor was employed during the harvest period at a high wage rate.

The months of man labor used on tractor and nontractor farms of specified sizes (table 7) indicates that there was some saving in man labor on farms where tractors were owned.   This saving in man labor per farm owing to the use of the tractor was as follows: 0.8 months on 640-acre farms, 0.6 months on 960-acre farms, and 0.9 months on 1,280-acre farms.   In selecting these farms for comparison care was taken not to include any which had an undue influence on the months of man labor used, such as farms on which there was an appreciable amount of contract work or where outside work was done.

TABLE 7.—*Amount of unpaid family and hired man labor used on tractor and nontractor farms of specified sizes, 1921*

Number and class of farm	Size of farm	Tillable acreage				Amount of man labor used
		Wheat	Other crops	Summer-fallow	Total	
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Months*
Tractor farms:						
5	640	219	36	294	549	10. 4
3	960	335	32	406	773	12. 5
5	1, 280	396	49	457	902	15. 9
Nontractor farms:						
14	640	275	32	262	569	11. 2
5	960	294	81	383	758	13. 1
6	1, 280	402	65	433	900	16. 8

HORSE WORK [5]

The number of work stock per farm, hours of horse work per farm and per head of work stock, the cost of keeping work stock and the cost of horse work for the years 1920 to 1922, inclusive, on tractor and nontractor farms are given in Tables 8 and 9.

TABLE 8.—*Utilization and average cost of keeping work stock on tractor farms, 1920–1922* [1]

Item	1920 (23 farms)	1921 (27 farms)	1922 (20 farms)	3-year average 1920–1922
Size of farm_____acres__	1,175	1,105	1,296	1,183
Tillable area per farm_____do____	909	882	998	924
Work stock per farm_____number__	13.2	14.6	16.2	14.6
Tillable acres per horse per farm_____do____	69	60	62	63
Acres in wheat per horse per farm_____do____	31	26	29	28
Acres in other crops per horse per farm_____do____	2	3	4	3
Acres in summer fallow per horse per farm_____do____	36	31	29	32
Value of work stock per farm_____dollars__	1,736	1,756	1,596	1,704
Value of work stock per head_____do____	132	120	98	117
Cost of keeping work stock per farm_____do____	1,543	1,361	1,373	1,424
Grain and mixed feed fed per head of work stock_____pounds__	971	871	771	869
Hay and roughage fed per head of work stock_____do____	8,624	8,979	8,108	8,597
Cost of keeping work stock per head_____dollars__	117	93	85	97
Hours worked per farm per year_____number__	8,336	10,692	9,155	9,479
Hours worked per head per year_____do____	632	731	564	649
Cost per hour of horse work_____cents__	19	13	15	15

[1] Certain farms have been omitted from this table for various reasons, such as: More than one tractor per farm, an excessive amount of contract horse work, a large amount of horse work done outside, and other irregularities, which makes them incomparable with the farms included in Table 9.

TABLE 9.—*Utilization and average cost of keeping work stock on nontractor farms, 1920–1922* [1]

Item	1920 (56 farms)	1921 (79 farms)	1922 (72 farms)	3-year average 1920–1922
Size of farm_____acres__	1,004	992	1,022	1,006
Tillable area per farm_____do____	740	756	755	751
Work stock per farm_____number__	17.9	18.4	18.6	18.3
Tillable acres per horse per farm_____do____	41	41	41	41
Acres in wheat per horse per farm_____do____	19	18	18	18
Acres in other crops per horse per farm_____do____	3	3	3	3
Acres in summer fallow per horse per farm_____do____	19	20	20	20
Value of work stock per farm_____dollars__	2,151	2,034	1,863	2,006
Value of work stock per head_____do____	120	111	100	109
Cost of keeping work stock per farm_____do____	1,751	1,521	1,460	1,562
Grain and mixed feed fed per head of work stock_____pounds__	584	664	547	602
Hay and roughage fed per head of work stock_____do____	6,742	7,896	7,060	7,298
Cost of keeping work stock per head_____dollars__	98	83	78	85
Hours worked per farm per year_____number__	14,154	15,627	12,927	14,289
Hours worked per head per year_____do____	791	849	695	780
Cost per hour of horse work_____cents__	12	10	11	11

[1] Certain farms have been omitted from this table for various reasons, such as: An excessive amount of contract horse work, a large amount of horse work done outside, owning self-propelled combine, and other irregularities which makes them incomparable with farms included in Table 8.

For these years the total area per farm averaged 177 acres larger and the tillable area averaged 173 acres larger on tractor than on nontractor farms. Notwithstanding the larger size of tractor farms, an average of 3.7 less horses per farm were kept than on nontractor farms. The tillable area per horse on tractor farms averaged 63 acres

[5] See Department Bulletin No. 1447 for a detailed analysis of the cost of keeping work stock on Sherman County (Oreg.) farms.

as compared with an average of 41 acres on nontractor farms. The hours of annual work on tractor farms averaged 131 less per head than on nontractor farms.

The net cost of keeping work stock averaged $97 per head on tractor farms as against $85 on nontractor farms, although on tractor farms the hours worked per head per year were materially less than on nontractor farms. The greater cost of keeping work stock on tractor farms, together with the lesser hours worked, resulted in a cost per hour of horse work which was 4 cents higher than on non-tractor farms. The cost per hour of horse work for each farm was computed by dividing the total cost of keeping the work stock by the total annual hours of horse work for each farm.

Studies of the cost and utilization of work stock on tractor and on nontractor farms in other regions have, in many cases, shown a smaller number of hours of horse work per head on tractor farms, together with a lower cost of maintenance per head. There appear, however, to be several reasons why the cost of maintenance of work stock on these tractor farms, as well as on those in a number of other regions, should be greater than on nontractor farms, even where the number of hours of horse work per head was smaller on the tractor farms.

In the case of Sherman County farms on which tractors were owned the quantities of grain fed, the hours of human labor spent in the care of work stock, and the charges for depreciation were somewhat greater than on nontractor farms. Likewise, the average value per head of work stock on tractor farms was higher than on nontractor farms, which in turn entailed an interest charge greater than on nontractor farms. On nontractor farms surplus work stock kept for harvest work with the combine was not of as good a grade as the smaller numbers kept on tractor farms. These horses on nontractor farms were fed larger quantities of wheat hay, especially during the harvest season, and lesser quantities of threshed grain and mixed feed than those on tractor farms. On tractor farms larger quantities of grain and chaff and straw were fed to take the place of the reduced hay ration. From these comparisons it would appear that a better grade of work stock was kept on tractor farms which received relatively better care than that kept on nontractor farms. The grain ration fed as grain on both tractor and nontractor farms was relatively low, because much of the grain consumed was fed as grain hay.

A comparison of the number of head of work stock kept on tractor and on nontractor farms of specified sizes and the hours worked per head per year is given in Table 10. Care was taken not to include any farms in these comparisons which influenced unduly the number of head of work stock kept on the farm or the hours worked per head per year. No farms were included on which more than one tractor was owned, on which there was an appreciable amount of contract work, or where outside work was done. On 640-acre tractor farms the number of head of work stock averaged 5.6 less and the hours worked per head per year averaged 18 hours less than on nontractor farms of the same size; on 1,280-acre tractor farms 5.2 less head of work stock were kept and the hours worked per head per year averaged 112 less than on nontractor farms of the same size.

TABLE 10.—*Number of work stock kept and amount of horse work done on tractor and nontractor farms of specified sizes, 1921*

Number and class of farm	Size of farm	Tillable acreage				Work stock per farm	Amount of work per head, per year
		Wheat	Other crops	Summer-fallow	Total		
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Number*	*Hours*
Tractor farms:							
5	640	219	36	294	549	10.0	731
3	960	335	32	406	773	13.0	524
5	1,280	396	49	457	902	18.0	799
Nontractor farms:							
14	640	275	32	262	569	15.6	749
5	960	294	81	383	758	17.4	755
6	1,280	402	65	433	900	23.2	911

In general, as the hours worked per head per year increased, there was some increase in the cost per head of keeping work stock but a greater decrease in the cost per hour of horse work. This relationship is clearly shown in Table 11 which serves to illustrate the importance of keeping only sufficient work stock to perform the farm work and of getting the maximum amount of profitable work out of the work stock. On those farms where horses worked less than 500 hours per horse per year, the cost of horse work amounted to an average of 16 cents per hour, but in the group where the hours worked per horse per year were 950 and over, the cost per hour of horse work was only half as much.

TABLE 11.—*Relation of hours worked per head to cost per year of keeping work stock and cost per hour of horse work on 72 nontractor farms, 1922* [1]

Hours worked per head per year	Farms studied	Average size of farm	Tillable acreage			Average amount of work per head per year	Net cost of keeping one head of work stock	Cost per hour of horse work
			Crops	Summer-fallow	Total			
	Number	*Acres*	*Acres*	*Acres*	*Acres*	*Hours*	*Dollars*	*Cents*
Less than 500	9	954	316	267	583	429	68	16
500 to 650	27	920	354	328	682	588	75	13
650 to 800	19	1,011	375	351	726	731	79	11
800 to 950	10	1,306	513	533	1,046	855	86	10
950 and over	7	1,122	410	514	924	1,098	92	8

[1] The number of farms contained in this table has been made to conform to the number of nontractor farms shown in Table 8.

FARM MACHINERY

The farms included in this study are of a type requiring a relatively large amount of farm machinery. The inventory value per farm of all classes of farm machinery for the three years of the study was as follows: 1920, $3,730; 1921, $3,872; and 1922, $3,129. The value per farm of general farm machinery—that is, all machinery except tractors, combines, and stationary threshing machines—varied from an average of $2,342 per farm in 1920 to $1,666 per farm in 1922. In the latter year the value of general farm machinery on different farms varied from $370 to $7,393 per farm and amounted to an average of $1.99 per tillable acre.

The items constituting the total annual charge for use of general farm machinery as given in Table 12, include fuel, oil and grease,

repairs, depreciation, and interest.   The total annual charge for use of general farm machinery to wheat was made on the basis of the number of horse hours of use on the wheat enterprise.   Depreciation was the largest single item in the annual charge for use of general farm machinery and amounted to 58 per cent of the total.   The other items of cost in the order of their importance were repairs, 20 per cent; interest, 16 per cent; and fuel, oil, and grease, 6 per cent. The annual use-cost of general farm machinery per farm over the the period 1920 to 1922 was from 38 to 43 per cent of its inventory value.   The annual use-cost of tractors, combines, and stationary threshing outfits include fuel, oils and grease, repairs, insurance, depreciation, and interest.   Charges were made according to actual hours of use [6] (Table 13).

TABLE 12.—*Average value and use-cost of general farm machinery, 1920–1922* [1]

Item	1920 (140 farms)	1921 (149 farms)	1922 (147 farms)
Tillable area per farm_____acres__	766	810	837
Average value per farm_____dollars__	2,342	1,975	1,666
Use-cost per farm_____do____	899	820	713
Use-cost per tillable acre_____do____	1.17	1.01	.85
Use-cost per horse-hour of use_____do____	.082	.065	.061

[1] All farm machinery except tractors, combines, and stationary threshing machines. Because of incompleteness of detail machinery cost data certain farms have been omitted from this table.

TABLE 13.—*Average value and use cost of tractors, motor-drawn combines, and stationary threshing machines*

Item	1920			1921			1922		
	42 tractors	72 combines	6 threshers	45 tractors	82 combines	8 threshers	40 tractors	80 combines	7 threshers
Average value per machine _____dollars__	3,469	2,140	2,607	2,771	1,872	2,087	2,348	1,637	1,820
Use cost per machine__do____	2,359	1,017	922	2,080	1,011	874	1,892	941	756
Days of use per year _____number__	63	24.3	19.2	55	23.9	25.7	51.8	23	23
Use cost per 10-hour day _____dollars__	37.44	14.85	48.17	37.82	42.32	33.94	36.55	40.87	32.87

The most economical use of farm machinery is obtained when it is used the maximum amount of time on profitable work.   This fact is illustrated in Table 14, which gives the average value and the charge for use of general farm machinery on farms of specified sizes.   These data indicate that, while the tillable acreage per farm was about 65 per cent greater on the farms of the larger size the machinery use-cost per tillable acre was 32 cents less on the farms in this group, and the cost per horse-hour of use 2 cents less.   Under actual farm conditions a machine used only a few days each year lasts only a little longer than the same machine used a much longer time.   Therefore from the standpoint of good management a farmer should attempt so to organize his business as to obtain, annually, the maximum of profitable use of his farm machinery.

[6] See Department Bulletin No. 1447, for a detailed analysis of tractor and combine costs in Sherman County, Oreg., 1920–1922.

TABLE 14.—*Average value and use cost of general farm machinery on farms of specified sizes, 1922*

Item	Size of farm	
	640 acres	1,280 acres
Farms_____number__	24	16
Average value per farm_____dollars__	1,295	1,840
Use cost per farm_____do____	601	690
Use cost per tillable acre_____do____	1.04	.72
Use cost per horse-hour of use_____do____	.06	.04

The numbers of the principal farm tools represented on farms of specified sizes and the estimated years of useful life of this farm equipment are given in Table 15. The number of the various implements per farm was only slightly greater, and in many instances no greater on the farms of the larger size, and the estimated years of useful life, in most instances, nearly as great on the farms in this group. From the standpoint of economy the farms of the larger size were better able to obtain the maximum of profitable use annually from the farm equipment, thereby reducing their machinery cost per tillable acre and per horse-hour of use.

TABLE 15.—*Kind, number, and years of useful life of principal farm tools on farms of specified sizes, 1922*

Implement	24 farms—640 acres			16 farms—1,280 acres		
	Farms reporting	Machines	Estimated useful life	Farms reporting	Machines	Estimated useful life
	Number	Number	Years	Number	Number	Years
Walking plow_____	13	14	9.0	14	20	8.0
Sulky plow_____	1	1	10.4	1	1	10.2
Gang plow_____	24	47	12.3	16	39	9.4
Spike-tooth harrow_____	24	42	9.4	15	30	9.2
Spring-tooth harrow_____	4	4	11.0	4	4	10.0
Disk harrow_____	23	27	9.6	16	23	9.3
Gas engine_____	16	19	11.8	9	12	12.0
Packer_____	9	11	13.4	6	9	10.8
Weeder_____	20	26	15.2	14	22	9.1
Mowing machine_____	8	9	10.0	1	1	10.0
Hay rake_____	4	4	15.0	2	2	15.0
Grain drill_____	24	47	10.5	16	33	8.4
Header_____	11	11	9.5	10	11	10.0
Reaper_____	8	8	10.4	6	6	10.0
Grain binder_____	2	2	10.0	1	1	8.0
Grain cleaner_____	19	19	10.3	12	13	9.0
Heavy farm wagon_____	24	78	13.9	16	74	9.8
Auto truck_____	7	7	7.9	5	8	5.2
Tractor_____	5	5	6.8	6	6	5.9
Combine_____	19	19	8.1	12	12	7.1
Thresher_____	2	2	5.0	5	5	7.1

RELATION OF SIZE OF FARM TO MAN LABOR, HORSE WORK, AND OTHER FACTORS

It is impossible to obtain a large return from farming where the business is of small volume. On the other hand, while an increase in the size of the business may result in a larger income, there is always the possibility of large losses in unfavorable years. The data

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grouped according to tillable acres per farm shows that man labor, work stock, and machinery are used more effectively on the larger farms.

Growing wheat by the summer-fallow method in this region permits the farmer to operate a relatively large acreage, since by this system a relatively long period of time is provided in which to plow and prepare the land for seeding to wheat. In addition, a favorable climate allows the wheat to stand for a period of two or three weeks after it is ripe without shattering and thereby provides a much longer harvesting season than in the more humid areas.

The question of the best size of farm unit for these wheat farms is dependent to a large extent on the experience and managerial ability of the farmer. It can be said with a fair degree of assurance, however, that these wheat farmers can not hope to make a comfortable living on less than a section of land. It is difficult to lay down a general rule as to the best size of farm, but it is safe to say that the farm should not be so large as to prevent the performance of the various field operations during the normal time for these operations. The influence of size of farm on the cost of the factors of production and on the income from farming in this region is shown in Tables 16 and 17 for tractor and nontractor farms separately.

TABLE 16.—*Relation of size of farm to cost of important factors of production and to returns on 79 nontractor farms, 1921*

Item	Tillable acres per farm			
	550 and under	551 to 800	801 to 1,050	1,051 and over
Farms_____number__	19	33	13	14
Average size of farm_____acres__	594	891	1,146	1,651
Average tillable area per farm_____do____	450	651	927	1,311
Months of hired-man labor per farm_____number__	5.4	10.5	15.4	19.9
Months of unpaid family labor per farm_____do____	2.1	2.3	2.5	3.8
Hired and family labor expense per tillable acre_____dollars__	1.44	1.83	1.81	1.80
Total man-labor expense per tillable acre including operator_do___	3.50	3.44	2.87	2.73
Tillable acres per 12 months of man labor (including the operator's time)_____number__	277	315	372	429
Work stock per farm_____do____	13.7	16.9	19.8	26.4
Tillable acres per head of work stock_____do____	32	38	47	49
Work stock cost per tillable acre_____dollars__	2.22	2.14	1.78	1.83
Cost per hour of horse work_____cents__	9.1	9.8	8.8	8.7
General farm machinery cost:				
Per farm_____dollars__	404	475	683	905
Per tillable acre_____do____	.90	.73	.74	.70
Net cost per acre of winter wheat_____do____	27.15	27.18	26.43	26.33
Yield per acre of winter wheat _____bushels__	24.8	25.2	25.6	25.6
Net cost per bushel of winter wheat_____dollars__	1.10	1.08	1.03	1.03
Farm income_____do____	1,930	3,276	5,252	7,925
Interest on farm capitalization at 6 per cent_____do____	1,699	2,767	3,770	5,433
Labor income_____do____	231	509	1,482	2,492
Operator's labor_____do____	928	1,047	983	1,221
Return on farm capitalization_____per cent__	3.5	4.8	6.8	7.4
Unpaid family labor_____dollars__	120	147	211	299
Returns per farm to capital and unpaid labor_____do____	2,050	3,423	5,463	8,224

TABLE 17.—*Relation of size of farm to cost of important factors of production and to returns on 27 tractor farms, 1921*

Item	Tillable acres per farm			
	550 and under	551 to 800	801 to 1,050	1,051 and over
Farm _____number__	6	8	6	7
Average size of farm _____acres__	560	921	1,238	2,032
Average tillable area per farm _____do____	458	680	890	1,595
Months of hired-man labor per farm _____number__	5.8	11.7	13.8	27.7
Months of unpaid family labor per farm _____do____	.8	-------	2.3	-------
Hired and family labor expense per tillable acre _____dollars__	1.46	1.80	1.83	2.24
Total man-labor expense per tillable acre including operator's time) _____dollars__	3.66	3.39	3.10	3.19
Tillable acres per 12 months of man labor (including the operator's time) _____number__	296	344	380	482
Work stock per farm _____do____	10.3	12.0	16.8	17.9
Tillable acres per head of work stock _____do____	44	57	53	89
Work stock cost per tillable acre _____dollars__	2.44	1.63	1.63	1.20
Cost per hour of horse work _____cents__	14.4	14.5	11.7	12.6
Tractor cost:				
Per farm _____dollars__	784	912	919	2,225
Per tillable acre _____do____	1.71	1.34	1.04	1.39
General farm machinery cost:				
Per farm _____do____	585	692	800	1,358
Per tillable acre _____do____	1.28	1.02	.90	.85
Net cost per acre of winter wheat _____do____	34.34	35.51	32.98	28.68
Yield per acre of winter wheat _____bushels__	22.3	25.5	23.1	28.5
Net cost per bushel of winter wheat _____dollars__	1.54	1.39	1.42	1.01
Farm income _____do____	1,120	2,996	5,471	9,353
Interest on farm capitalization at 6 per cent _____do____	2,473	2,793	4,069	6,744
Labor income [1] _____do____	−1,353	203	1,402	2,609
Operator's labor _____do____	1,010	1,082	1,133	1,500
Return on farm capitalization _____per cent__	.3	4.1	6.4	7.0
Unpaid family labor _____dollars__	52	-------	150	-------
Returns per farm to capital and unpaid labor _____do____	1,172	2,996	5,621	9,353

[1] Minus sign denotes loss.

As the size of farm increased, the tillable acres per 12 months of man labor and per head of work stock increased. This relationship is reflected in the cost of man labor and the work-stock cost per tillable acre. The total cost of man labor on tractor farms for those farms in the smallest tillable-acre group (550 acres and under) averaged $3.66 per acre, and the cost of man labor for those farms in the largest tillable-acre group (1,051 acres and over) averaged $3.19 per acre. Likewise, the work-stock cost in the lowest tillable-acre group was $2.44 as compared with $1.20 per acre in the highest tillable-acre group.

For all size groups there was a slight saving in man labor on tractor farms as measured by tillable acres per 12 months of labor.

The number of work stock per farm was somewhat greater on nontractor farms, with the result that the tillable acres per head were considerably less on these farms. The fact that there was a smaller number of work stock on tractor farms resulted in a work-stock cost per tillable acre which was slightly lower than on nontractor farms of the same average size for all except the group of from 550 and under tillable acres per farm. On the other hand, because the hours worked per head per year were lower and the cost per head of keeping work stock somewhat higher on tractor farms, the cost per hour of horse work on farms of the same average size was higher on tractor than on nontractor farms.

The advantage of a large farm as measured by the cost of farm machinery per tillable acre is well illustrated on these farms (fig. 8). The cost of general farm machinery per tillable acre was decidedly lower on the farms of the larger sizes. The tractor cost per tillable acre decreased with an increase in size of farm. The high tractor cost per tillable acre in the largest tillable acre group was mainly because of an abnormally high expense for cash repairs for some tractors in this group. The influence of the size of farm on the cost of the factors of production is, of course, reflected in the net cost of producing wheat, and here again there appears to be a distinct advantage in favor of the large farm.

On the group of tractor farms having the smallest tillable acreage per farm (550 acres and under), the net cost of producing winter wheat was $34.34 per acre, which decreased to $28.68 per acre for the group having the largest tillable acreage (1,051 acres and over) per farm. A comparison of the same size groups for nontractor

Fig. 8.—Large fields requiring a minimum of turning at corners and at irregular places make these farms well adapted to the use of large-size machinery. Three 16-inch plows with packer attached behind hauled by 16 horses. An outfit of this size will plow and pack about 10 acres per day

farms shows a cost of $27.15 per acre for the small farms as against a cost of $26.33 per acre for the large farms.

A comparison of earnings shows that the farm income, labor income, percentage return to capital, and returns per farm to capital and unpaid labor were considerably greater on the larger farms. Though size of business was not the sole reason for the large earnings on the larger farms, the greater efficiency in the use of man labor, work stock and equipment, and the larger volume of sales on these farms were the factors mainly responsible for the increased earnings on the larger farms. The slightly larger yield of wheat on the farms in the larger tillable-acre groups for tractor farms was responsible for some of the increased returns on these farms, and the abnormally high expense for hired man labor and a high capitalization on one farm in the lowest tillable-acre group for tractor farms (550 and under) was a contributing factor explaining the minus labor income for this group. The price received for wheat averaged about the same for all groups.

AVERAGE COSTS BY TENURE

The principal items entering into the cost of wheat production are man labor, horse work, seed, sacks, taxes, insurance, use of land, and equipment. These and other costs have been summarized to show the average itemized cost per acre of winter wheat to owner and to tenant operators. From the total gross cost a deduction was made for the value of stubble pasture and insurance received for damage to the crop, leaving the net cost of producing wheat. The average acre cost of each item of expense is a weighted average computed by dividing the total cost of each expense item by the total harvested wheat acreage. The net cost per bushel to owner operators for a given year was determined by dividing the total net cost by the total yield for that year.

The acre cost to tenant operators represents only those expense items furnished by them and includes all expenses incident to the wheat crop except interest on land and buildings, taxes on land and buildings, and fence overhead. The average net cost per bushel to these operators is based on their share of the total cost divided by their share of the total production.

Averages of the man-labor and horse-work rates and values for seed wheat and grain sacks, which were used in computing the cost of producing winter wheat are shown in Table 18.

TABLE 18.—*Prices of labor and materials, 1920–1924*

Item	1920	1921	1922	1923	1924
Man-hour rate:	*Dollars*	*Dollars*	*Dollars*	*Dollar*	*Dollars*
Pre-harvest—					
Tractor operator	0.80	0.50	0.35	0.40	0.35
Other labor	.45	.35	.30	.35	.30
Harvest and market—					
Large crews	.75	.50	.50	.55	.45
Small crews	.65	.45	.45	.50	.40
Horse-hour rate	.14	.11	.12	.12	.11
Seed per bushel, including seed treatment	2.16	2.20	1.03	.86	1.30
Grain sacks, including sewing twine	.22	.10	.11	.13	.105

The man-labor rates represent the prevailing wages paid for farm labor at the period at which the work was done, including board when furnished. The man-labor rates for harvesting and marketing work were weighted according to the number of men employed and the wages paid. On each farm the total cost of man labor was determined, including the value of the labor of the farmer and his family, as well as the cost of hired labor and the value of board when furnished. The direct man-labor cost to wheat for each farm was arrived at by multiplying the hours of man labor spent on wheat by the man-labor rates which prevailed for the year under consideration. This cost of direct man labor to wheat was subtracted from the total farm-labor expense for the year and that portion of the remainder chargeable to wheat was carried as an overhead labor expense against the wheat crop.

The 1920, 1921, and 1922 horse-hour rates were computed, for each farm, by dividing the total cost of keeping work stock by the total horse hours worked during the year. The horse-hour rates for 1923 and 1924 were adjusted to conform to changes in prices for horse feed and on higher or lower horse values for those years.

The value of seed wheat per bushel is an average of the prices paid by those farmers who bought high-grade recleaned seed and the farm sale value at planting time for those farmers who used their farm supply for sowing. The figures given include the value of any materials used for seed treatment.

The prices for grain sacks are averages of the estimates of individual farmers visited and include the value of sack-sewing twine.

TABLE 19.—*Summary of the average net cost per acre and per bushel of winter wheat to owner operators, owned farms, 1920–1922* [1]

Item	1920 (69 farms)		1921 (77 farms)		1922 (72 farms)	
	Amount	Cost	Amount	Cost	Amount	Cost
		Dollars		*Dollars*		*Dollars*
Winter wheat per farm_____acres__	357	----------	373	----------	391	----------
Average yield per acre_____bushels__	20. 9	----------	27. 8	----------	17. 1	----------
Operating expense per acre:						
Man labor and horse work—						
Summer fallow and seeding—						
Man labor_____hours__	3. 35	1. 61	3. 14	1. 55	3. 04	1. 12
Horse work_____do____	18. 72	2. 67	16. 71	2. 12	16. 63	1. 69
Contract work_____	----------	. 04	----------	. 12	----------	. 04
Harvesting and marketing—						
Man labor_____hours__	2. 88	2. 07	3. 12	1. 51	2. 04	. 99
Horse work_____do____	7. 32	1. 02	9. 12	. 88	6. 41	. 67
Contract work_____	----------	. 54	----------	. 63	----------	. 65
Summer fallow purchased_____	----------	. 33	----------	. 66	----------	. 31
Material costs—						
Seed, including seed treatment _____bushels__	1. 14	2. 46	1. 13	2. 45	1. 17	1. 21
Sacks, including sewing twine _____number__	7. 2	1. 56	9. 8	. 99	6. 3	. 72
Other costs—						
Special crop insurance_____	----------	. 32	----------	. 23	----------	. 14
Taxes and insurance, two years___	----------	1. 68	----------	1. 58	----------	1. 65
Use of tractor_____hours__	. 46	1. 57	. 52	1. 56	. 47	1. 55
Use of combine_____do____	. 46	1. 37	. 43	1. 37	. 36	1. 14
Use of other farm machinery _____hours [2]__	26. 04	2. 05	25. 83	1. 63	23. 04	1. 22
Overhead—						
Man labor_____	----------	3. 85	----------	3. 28	----------	2. 02
Building and fence_____	----------	. 60	----------	. 65	----------	. 57
Other_____	----------	. 53	----------	. 98	----------	. 69
Total_____	----------	24. 27	----------	22. 19	----------	16. 38
Less value of stubble pasture and insurance for damaged wheat_____	----------	. 35	----------	. 38	----------	. 42
Net operating expense per acre_____	----------	23. 92	----------	21. 81	----------	15. 96
Interest on:						
Land, two years _____	----------	7. 98	----------	7. 84	----------	7. 42
Combine and tractor_____	----------	. 33	----------	. 29	----------	. 25
Other farm machinery and work stock_	----------	. 69	----------	. 61	----------	. 49
Net cost per acre_____	----------	32. 92	----------	30. 55	----------	24. 12
Net cost per bushel_____	----------	1. 58	----------	1. 10	----------	1. 41
Net operating expense per bushel_____	----------	1. 15	----------	. 78	----------	. 93

[1] Certain farms were omitted from Tables 19 and 20 because of incompleteness of cost data. In these tables a farm on which all or a majority of the wheat crop was on rented land was included in the share rent group. For this reason the number of farms in the owned and share rented groups are not the same as those shown in the same groups in Table 3.
[2] Reported in terms of horse hours of use.

Cost items expressed as money units are subject to considerable change, especially during periods of wide price fluctuations. The same items when expressed in terms of quantity requirements, such as hours, bushels, and the like, are more stable and lend themselves

better to analytical study. These quantity cost factors in the case of winter wheat in this region are shown in Figure 9.

The data have been itemized so that the amounts and cost of any one item can be readily compared one year with another. The acre cost of most items of expense for both owners and renters (Tables 19 and 20) declined somewhat over the period 1920 to 1922. On rented farms in 1921 the high acre cost for use of tractor was mainly due to a greater number of hours of use on winter wheat, whereas the higher cost for use of combine in 1921 as compared with 1920 and 1922 was mainly due to a greater number of hours of use on winter wheat at a higher cost per hour of operating.

TABLE 20.—*Summary of the average net cost per acre and per bushel of winter wheat to tenant operators, share-rented farms 1920–1922*

Item	1920 (71 farms)		1921 (72 farms)		1922 (75 farms)	
	Amount	Cost	Amount	Cost	Amount	Cost
		Dollars		*Dollars*		*Dollars*
Winter wheat per farm_____acres__	327	_____	329	_____	368	_____
Average yield per acre_____bushels__	20. 6	_____	29. 5	_____	16. 9	_____
Operator's share of yield per acre____do____	13. 7	_____	19. 7	_____	11. 3	_____
Operating expenses per acre:						
Man labor and horse work—						
Summer-fallow and seeding—						
Man labor_____hours__	3. 01	1. 41	3. 23	1. 55	3. 26	1. 18
Horse work_____do____	19. 23	2. 32	18. 74	2. 09	19. 76	1. 68
Contract work_____	_____	. 08	_____	. 13	_____	. 02
Harvesting and marketing—						
Man labor_ _____hours__	2. 49	1. 76	3. 19	1. 54	2. 39	1. 15
Horse work_____do____	7. 71	. 88	10. 40	. 93	7. 38	. 73
Contract work_____	_____	. 97	_____	. 49	_____	. 50
Summer-fallow purchased_____	_____	1. 47	_____	. 79	_____	. 26
Material costs—						
Seed, including seed treatment						
_____bushels__	1. 06	2. 29	1. 13	2. 48	1. 19	1. 23
Sacks, including sewing twine						
_____number__	7. 5	1. 66	11. 6	1. 08	6. 7	. 74
Other costs—						
Special crop insurance_____	_____	. 28	_____	. 16	_____	. 12
Taxes and insurance, two years___	_____	. 22	_____	. 15	_____	. 17
Use of tractor_____hours__	. 25	. 94	. 36	1. 18	. 33	1. 15
Use of combine_____do____	. 40	1. 15	. 44	1. 44	. 35	1. 11
Use of other farm machinery						
_____hours [1]__	26. 94	1. 77	29. 17	1. 58	27. 17	1. 30
Overhead—						
Man labor_____	_____	3. 17	_____	3. 05	_____	1. 86
Building and fence_____	_____		_____		_____	
Other_____	_____	. 51	_____	. 95	_____	. 62
Total_____ _____	_____	20. 88	_____	19. 59	_____	13. 82
Less value of stubble pasture and insurance for damaged wheat_____	_____	. 65	_____	. 40	_____	. 42
Net operating expense per acre_____	_____	20. 23	_____	19. 19	_____	13. 40
Interest on—						
Land, two years_____	_____		_____		_____	
Combine and tractor_____	_____	. 29	_____	. 30	_____	. 23
Other farm machinery and work stock_	_____	. 74	_____	. 67	_____	. 54
Net cost per acre_____	_____	21. 26	_____	20. 16	_____	14. 17
Net cost per bushel_____	_____	1. 55	_____	1. 03	_____	1. 26
Net operating expense per bushel_____	_____	1. 47	_____	. 98	_____	1. 19

[1] Reported in terms of horse hours of use.

An analysis of what has been termed "operating expense" (that is, all costs except the charge for interest on land, machinery, and work stock), grouped together under the following headings, shows for owner operators a division about as follows: Man labor and horse work, 32 per cent; summer-fallow purchased, 2 per cent; materials, 15 per cent; and all other costs, 51 per cent. The division of the operating expense to tenant operators was about as follows: Man labor and horse work, 36 per cent; summer-fallow purchased, 5 per cent; materials, 17 per cent; and all other costs, 42 per cent.

The total operating expense per acre for all years was relatively lower to tenants than to owners. Much of this difference was due to the lower overhead, tax, and insurance expense to tenants on rented farms. On the other hand, because the cost to the tenant was based on his share of the expense divided by his share of the yield, the operating expense per bushel was relatively higher to tenants
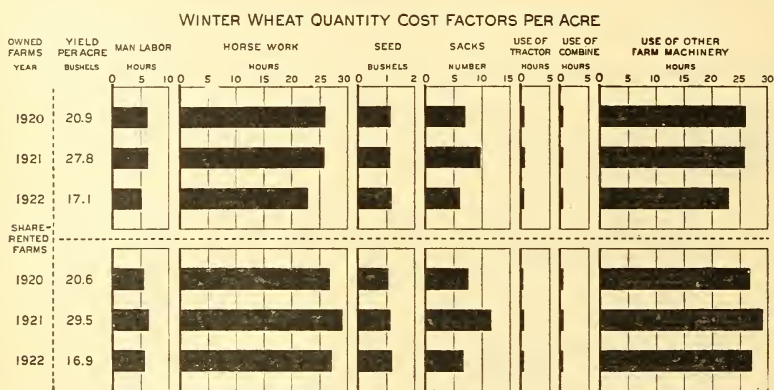

Fig. 9.—Differences in yields and in the practices of growing and handling the crop caused some variations in the quantity requirements of wheat production on these farms. The greater use of the tractor on owned farms was mainly responsible for the smaller number of hours of horse work as compared with rented farms. The items shown as quantity cost factors represent for owned farms from 63 to 67 per cent and for share-rented farms from 68 to 74 per cent of the total operating expense of producing an acre of winter wheat.

than to owners. The average net cost per bushel to both owner and tenant operators was materially lower in 1921 than in 1920 and 1922, which was mainly due to the exceptionally good yield in 1921.

CASH AND NONCASH COSTS OF PRODUCTION

In a study of costs it should be kept in mind that many of the cost items are noncash. A division of the cost of winter-wheat production into cash and noncash items (Table 21) may explain why some men are able to continue in the business of wheat growing for a time when producing at a cost higher than the market price. In many instances much of the labor is performed by the farmer and his family, and when his land, machinery, and work stock are clear of indebtedness a large part of the expense that correctly enters into the cost of production is not an actual cash outlay (fig. 10).

PERCENTAGE DISTRIBUTION OF CASH AND NONCASH COSTS TO OWNERS PER ACRE OF WINTER WHEAT
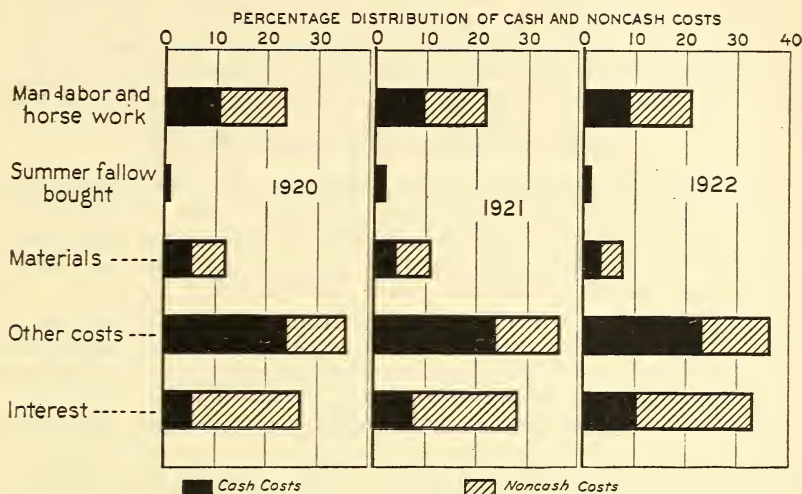
1920-1922

FIG. 10.—For all years approximately 47 per cent of the total gross acre cost of producing winter wheat to owner operators was represented by money actually paid out, while the other 53 per cent was not an actual cash outlay

TABLE 21.—*Summary of the gross cash and noncash cost per acre of winter wheat to owners, 1920–1922*

Item	1920 (69 farms)				1921 (77 farms)				1922 (72 farms)			
	Cash costs		Noncash costs		Cash costs		Noncash costs		Cash costs		Noncash costs	
	Per acre	Per cent of total	Per acre	Per cent of total	Per acre	Per cent of total	Per acre	Per cent of total	Per acre	Per cent of total	Per acre	Per cent of total
	Dolls.		*Dolls.*		*Dolls.*		*Dolls.*		*Dolls.*		*Dolls.*	
Man labor	2.31	6.9	1.37	4.1	1.68	5.4	1.38	4.4	1.15	4.7	0.96	3.9
Contract work	.58	1.8			.75	2.4			.69	2.8		
Horse work:												
Feed	.59	1.8	2.91	8.8	.47	1.5	2.29	7.4	.24	1.0	1.76	7.2
Other	.11	.3	.08	.2	.11	.4	.13	.4	.11	.4	.26	1.1
Summer fallow bought	.33	1.0			.66	2.2			.31	1.3		
Materials:												
Seed	.16	.5	2.26	6.8	.29	.9	2.13	6.9	.11	.4	1.07	4.4
Seed treatment	.04	.1			.03	.1			.02	.1		
Sacks, including sewing twine	1.56	4.7			.99	3.2			.72	2.9		
Other:												
Special crop insurance	.32	1.0			.23	.8			.14	.6		
Taxes and insurance	1.68	5.0			1.58	5.1			1.65	6.7		
Use of tractor	.93	2.8	.64	1.9	.95	3.1	.61	2.0	.95	3.9	.60	2.4
Use of combine	.73	2.2	.64	1.9	.74	2.4	.63	2.0	.53	2.2	.61	2.5
Use of other farm machinery	1.20	3.6	.85	2.5	.87	2.8	.76	2.5	.44	1.8	.78	3.2
Overhead:												
Labor	2.43	7.3	1.42	4.3	1.79	5.8	1.49	4.8	1.10	4.5	.92	3.7
Building and fence	.24	.7	.36	1.1	.21	.7	.44	1.4	.20	.8	.37	1.5
Other	.53	1.6			.98	3.1			.69	2.8		
Interest on land, machinery, and work stock	2.15	6.5	6.85	20.6	2.35	7.6	6.39	20.7	2.55	10.4	5.61	22.8
Total	15.89	47.8	17.38	52.2	14.68	47.5	16.25	52.5	11.60	47.3	12.94	52.7

The percentage distribution of the more important noncash costs was about as follows: 4 per cent for unpaid man labor performed by the operator and family; 8 per cent for horse feed grown on the farm; 6 per cent for home-grown seed; 21 per cent for interest on debt-free land, machinery, and work stock; and 4 per cent for overhead labor. Approximately 9 per cent of the total cost to these operators was for depreciation on work stock, machinery, buildings, and fences.

COST OF PRODUCTION, 1923 AND 1924

In Table 22 an estimate is given relative to the 1923 and 1924 cost per acre and per bushel of producing winter wheat. In computing these costs the 1923 and 1924 man and horse hour rates, and value of seed wheat were applied to the three-year average requirements for these items, as shown for the years 1920 to 1922, inclusive. The average hours of man and horse work were adjusted to care for the increased or decreased yield of wheat hauled to market in 1923 and 1924. The 1923 and 1924 requirements of sacks and sewing twine were charged at the prices paid during those years.

The 1923 and 1924 hour cost of operating tractors and combines was applied to the average tractor and combine hour requirements over the period 1920 to 1922, inclusive.[7] The 1923 and 1924 charge for other farm machinery was made in proportion to the increase or decrease in the value of general farm machinery in 1923 and 1924, as compared with 1922

TABLE 22.—*Computed average net cost per acre and per bushel of winter wheat, Sherman County, Oreg., 1923 and 1924*

Item	1923		1924	
	Amount per acre	Cost per acre	Amount per acre	Cost per acre
		Dollars		*Dollars*
Average yield per acre_____bushels__	30	----------	12	----------
Man labor and horse work:				
Summer-fallow and seeding—				
Man labor_____hours__	3.2	1.13	3.2	.98
Horse work_____do____	17.5	2.10	17.5	1.92
Contract work_____	----------	.03	----------	.03
Harvesting and marketing—				
Man labor_____hours__	3.0	1.56	2.2	1.27
Horse work_____do____	8.8	1.06	6.2	.68
Contract work_____	----------	.60	----------	.52
Summer-fallow purchased_____	----------	.30	----------	.30
Material costs:				
Seed, including seed treatment_____bushels__	1.2	1.03	1.2	1.56
Sacks, including sewing twine_____number__	11	1.43	4	.42
Other costs:				
Special crop insurance_____	----------	.13	----------	.13
Taxes and insurance, two years_____	----------	1.60	----------	1.58
Use of tractor_____hours__	.5	1.64	.5	1.71
Use of combine_____do____	.4	1.55	.4	1.57
Use of other farm machinery_____do.[a]__	26.3	1.55	23.7	1.45
Overhead_____	----------	3.84	----------	3.41
Total_____		19.55		17.53
Less value of stubble pasture and insurance for damaged wheat__	----------	.42	----------	.42
Net operating expense per acre_____	----------	19.13	----------	17.11
Interest on—				
Land, two years_____	----------	7.16	----------	7.02
Combine and tractor_____	----------	.25	----------	.25
Other farm machinery and work stock_____	----------	.49	----------	.49
Net cost per acre_____	----------	27.03	----------	24.87
Net cost per bushel_____	----------	.90	----------	2.07

[a] Reported in terms of horse hours of use.

[7] From Department Bulletin No. 1447, "Cost of Using Horses Tractors, and Combines on Wheat Farms in Sherman County, Oreg."

The 1923 and 1924 charge for contract work, summer-fallow purchased, special crop insurance, land taxes and insurance was made in proportion to the percentage increase or decrease in the cost of these items in 1923 and 1924, as compared with 1922.

The overhead man-labor charge was increased or decreased in proportion to the increase or decrease in the cost of man labor in 1923 and 1924 as compared with 1922. The other overhead charges, interest on all items except land, and the deductions for value of stubble pasture and insurance for damaged wheat, were allowed to remain the same as in 1922. Interest on land in 1923 and 1924 was calculated in proportion to the increase or decrease in the value of the land in these years as compared with 1922.

VARIATION IN COST PER BUSHEL

It is a matter of common observation that varying amounts of labor and materials per acre are used in a community and that yields vary greatly. These differences cause a wide range of costs (Tables 23 and 24). Costs vary not only from farm to farm during the same crop season but also show a considerable range on the same farm from year to year.

Variation in cost to owner operators in 1920 was from $0.91 to $4.16 per bushel. Average net cost was $1.58 per bushel. Approximately 40 per cent of these operators grew about 48 per cent of the harvested acreage and produced 57 per cent of the total yield on such farms at or below the average cost per bushel for this group. Variation in cost to tenant operators was from $0.92 to $3.28 per bushel. Average net cost was $1.55, or 3 cents less than for the owner group. Forty-one per cent of the tenants producing 54 per cent of the total tenants' yield on such farms had costs at or below the average for this group.

TABLE 23.—*Variation in net cost per bushel of winter wheat to owner operators, 1920–1922*

Variation in net cost per bushel	Farms in group	Acreage in wheat		Production	
		Total	Cumulative percentage	Total	Cumulative percentage
1920	*Number*	*Acres*	*Per cent*	*Bushels*	*Per cent*
$0.91 to $1.10	5	1,557	6.3	44,177	8.6
$1.11 to $1.30	10	4,256	23.6	113,339	30.6
$1.31 to $1.50	8	3,897	39.4	96,896	49.5
$1.51 to $1.70	15	5,130	60.2	94,232	67.8
$1.71 to $1.90	11	3,511	74.4	68,835	81.2
$1.91 to $2.10	8	2,656	85.2	38,682	88.7
$2.11 to $2.30	6	2,092	93.7	35,204	95.6
Over $2.30	6	1,550	100.0	22,745	100.0
1921					
$0.71 to $0.90	13	4,464	15.5	134,448	16.8
$0.91 to $1.10	30	14,135	64.8	427,578	70.4
$1.11 to $1.30	16	5,388	83.5	129,337	86.5
$1.31 to $1.50	4	1,583	89.1	41,756	91.8
$1.51 to $1.70	6	1,633	94.7	37,258	96.4
$1.71 to $1.90	5	878	97.8	16,860	98.5
Over $1.90	3	630	100.0	11,651	100.0
1922					
$0.71 to $0.90	1	215	.8	6,653	1.4
$0.91 to $1.10	5	1,551	6.3	32,878	8.2
$1.11 to $1.30	18	7,826	34.0	144,438	38.2
$1.31 to $1.50	19	7,971	62.3	145,950	68.5
$1.51 to $1.70	15	5,495	81.8	92,514	87.8
$1.71 to $1.90	8	3,460	94.1	37,841	95.6
Over $1.90	6	1,654	100.0	21,110	100.0

TABLE 24.—*Variation in net cost per bushel of winter wheat to tenant operators, 1920–1922*

Variation in net cost per bushel	Fa:.ms in group	Production [1]	
		Total	Cumula-tive per-centage
1920	*Number*	*Bushels*	*Per cent*
$0.91 to $1.10	4	38, 292	12. 0
$1.11 to $1.30	9	48, 328	27. 1
$1.31 to $1.50	14	80, 484	52. 4
$1.51 to $1.70	16	66, 399	73. 2
$1.71 to $1.90	8	21, 994	80. 1
$1.91 to $2.10	8	25, 904	88. 2
$2.11 to $2.30	3	12, 121	92. 0
Over $2.30	9	25, 572	100. 0
1921			
$0.70 and under	1	7, 139	1. 5
$0.71 to $0.90	19	153, 360	34. 5
$0.91 to $1.10	23	157, 141	68. 3
$1.11 to $1.30	16	97, 538	89. 2
$1.31 to $1.50	9	32, 942	96. 3
$1.51 to $1.70	2	8, 804	98. 2
$1.71 to $1.90	2	8, 366	100. 0
1922			
$0.71 to $0.90	5	26, 402	8. 5
$0.91 to $1.10	16	94, 772	38. 9
$1.11 to $1.30	16	64, 713	59. 7
$1.31 to $1.50	19	68, 396	81. 7
$1.51 to $1.70	7	28, 706	90. 9
$1.71 to $1.90	6	14, 312	95. 5
Over $1.90	6	13, 890	100. 0

[1] Only the tenant operator's share of the production is shown in the above table.

Variation in cost to owner operators in 1921 was from $0.71 to $2.47 per bushel. Average net cost was $1.10 per bushel. Approximately 56 per cent of these operators grew 65 per cent of the harvested acreage and produced 70 per cent of the total yield on such farms at or below the average cost per bushel for this group. The variation in cost to tenant operators was from $0.62 to $1.90 per bushel. Average net cost was $1.03 or 7 cents less than for owner operators. Fifty-four per cent of the tenants produced 60 per cent of the tenants' yield on such farms at or below the average cost per bushel for this group.

Variation in cost to owner operators in 1922 was from $0.71 to $5.46 per bushel. Average net cost was $1.41 per bushel. Forty-four per cent of these operators grew 49 per cent of the harvested acreage and produced 54 per cent of the total yield on such farms at or below the average cost per bushel for this group. The variation in cost to tenant operators was from $0.71 to $2.42 per bushel. Average net cost was $1.26 or 15 cents less than for owner operators. Forty-seven per cent of the tenants produced 54 per cent of the tenants' yield on such farms at or below the average cost per bushel for this group.

All tenant and owner operated farms have been grouped together in Figure 11 to show the net cost per bushel to the men who grew the wheat regardless of tenure.

The wide variation in the cost per bushel of producing winter wheat suggests that there must have been a similar variation in the profits therefrom. It is essential, especially during periods of low

prices, that wheat growers produce their crop at a low cost per bushel. To do this, careful attention must be given to the expense incurred per acre and to the importance of obtaining good yields.

VARIATION IN NET COST PER BUSHEL OF WINTER WHEAT
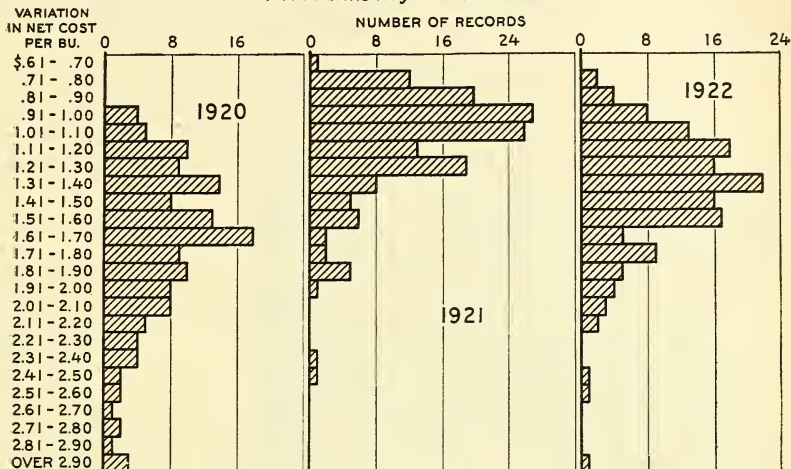### 1920 – 1922
(All Farms Regardless of Tenure)

FIG. 11.—In 1920 the average net cost was $1.57 per bushel. Forty-three per cent of these growers produced at or below the average cost per bushel for this group. In 1921 the average net cost was $1.07 per bushel. Fifty-four per cent of these growers produced at or below the average cost per bushel for this group. In 1922, 50 per cent of these growers produced at or below the average cost, or $1.35 per bushel

YIELD AN IMPORTANT FACTOR IN DECREASING COSTS AND IN INCREASING PROFITS

Yield per acre is the factor exerting the greatest influence on the cost per unit of product, and is a factor of great importance in determining the profits from wheat farming. The available information on the yields of wheat for Sherman County is given in Table 25. For the years of this study the average yields of wheat for the farms surveyed followed closely, the average county yields.

TABLE 25.—*Annual winter wheat yields*

Year	County average	Average yields on farms visited	
		Owned farms	Rented farms
	Bushels	*Bushels*	*Bushels*
1890	[1] 6		
1900	[1] 12		
1910	[1] 13		
1919	[2] 19		
1920	[2] 22	20. 9	20. 6
1921	[2] 27	27. 8	29. 5
1922	[2] 18	17. 1	16. 9
1923	[2] 30		
1924	[2] 12		

[1] All wheat, from census reports.
[2] Winter wheat, from reports of Bureau of Crop and Livestock Estimates, United States Department of Agriculture.

The influence of yield per acre on the cost per acre and per bushel and on the profits from wheat farming is shown in Table 26. With few exceptions an increase in yield resulted in some increase in cost per acre, but in a proportionately greater decrease in cost per bushel. With an increase in yield from an average of 13.3 bushels to an average of 32.8 bushels per acre, the cost per acre increased from an average of $25.79 to an average of $33.69 per acre or 30.6 per cent, and the corresponding cost per bushel decreased from $1.94 to $1.03 or 47 per cent.

In the production of any given crop a point will be reached beyond which an increase in the product will result in an increasing cost per unit of product. In the case of wheat on these farms the cost groups do not indicate that the methods of production have resulted in an increasing cost per bushel.

TABLE 26.—*Relation between yield, the cost of producing winter wheat and the profits from wheat farming on 77 owned farms, 1921*

Variation in yield per acre (bushels)	Farms in group	Average cost		Labor income	Return on farm capitalization
		Per acre	Per bushel		
	Number	*Dollars*	*Dollars*	*Dollars*	*Per cent*
Under 15	5	25.79	1.94	−2,065	−4.1
15 to 20	9	25.68	1.41	−1,078	.3
20 to 25	15	24.77	1.12	84	4.7
25 to 30	23	30.96	1.12	400	4.8
30 to 35	17	33.69	1.03	115	4.7
35 and over	8	36.95	1.01	1,644	6.3

In 1921 the average yield on owned farms was 27.8 bushels per acre. Fifty-seven per cent of these men had yields equal to or below the average of all owned farms. As in the case of cost per bushel, the yield of wheat was emphatically a deciding factor in determining the profits from these farms (fig. 12). For those farms falling in the lowest yield group, or under 15 bushels per acre, the labor income was minus $2,065 per farm and the percentage return to capital minus 4.1; for the group with the largest yield, or 35 bushels and over per acre, the labor income averaged $1,644 per farm, and the percentage return to capital was 6.3.

The following summarizes the experiments conducted at the agricultural experiment station at Moro, Oreg., with respect to the effect of different methods in preparing the soil for wheat, and of the handling of the crop, on the yield of wheat obtained.[8]

Fall disking of stubble and spring disking before early spring plowing reduced wheat yields.

Spring disking before late spring plowing killed weeds, saved moisture, and increased yields.

Highest yields and best quality of wheat were produced on early spring-plowed summer-fallow. Careful experiments at Moro for nine years have proved that the average yield of winter wheat after early spring plowing was 6.3 bushels per acre more than after late spring plowing and 2.3 bushels per acre more than after medium-early spring plowing.

[8] STEPHENS, D. E., and HYSLOP, G. R.   Wheat Growing After Fallow in Eastern Oregon.   Bull. No. 190, Oreg. Agr. Exp. Sta.

The total increase in yield for early over late plowing in nine years was 56.7 bushels per acre, or the equivalent of two and one-half years of crop on late plowing.

The yield of winter wheat after early spring plowing exceeded the yield obtained after fall plowing.

Late spring plowing for fallow produced low yields and soft wheat.

The nine-year average yield of 10-inch over 5-inch plowing at Moro was only 0.9 bushel of wheat per acre.

Moldboard plowing in the fall gave slightly higher yields of winter wheat than disk plowing in the fall.

The use of the subsurface packer at Moro did not increase wheat yields. The surface packer gave only slightly increased yields.

Early sowing of winter wheat at the rate of 5 pecks of treated seed per acre gave the highest yields.

FIG. 12.—A good stand of winter wheat. In a region like Sherman County where over 88 per cent of the receipts are from wheat the profits from farming depend to a large extent on the yield of wheat obtained

Harrowing winter wheat in the spring generally reduced yields. The nine-year average yield of winter wheat at Moro was reduced 1 bushel per acre by spring harrowing. In three of these years an increased yield was obtained from the harrowed grain and in the other six years a decreased yield.

SUMMARY OF LABOR PRACTICES IN WHEAT PRODUCTION

The prevailing farm practice in Sherman County is to leave the land in fallow one year and follow with a crop of grain the succeeding year. In the case of winter wheat the land is broken as early in the spring as practicable, and kept in a state of clean cultivation until seeding time in the fall. The tillage operations on summer fallow and in the preparation of a suitable seed bed were fairly uniform. The chief implements used were the plow, disk harrow, weeder, and spike-tooth harrow. Table 27 shows by operations for all farms the relative use of horse and tractor motive power in 1920 and the relative hours per acre required by each class of power.

The use of the tractor was most general for plowing, disking, and harvesting with the combine. Thirty per cent of the total acreage was tractor plowed, 18 per cent tractor disked, 13 per cent tractor drilled. Harvesting with the combine was the most common prac-

tice. Ninety-four per cent of the total acreage was harvested in this manner, and 6 per cent was harvested with headers. Tractors were used on 35 per cent of the acreage that was cut with the combine. Twenty-seven per cent of the total production was marketed with motor trucks.

TABLE 27.—*Summary of labor practices in wheat production on 145 farms in 1920*

Operation	Man labor and horse work				Man labor and tractor work			
	Times over	Per cent of total acreage covered[1]	Hours per acre		Times over	Per cent of total acreage covered[1]	Hours per acre	
			Man	Horse			Man	Tractor
	Number		Number	Number	Number		Number	Number
Remove trash		2	0.2	0.1				
Burn stubble		7	.1					
Plowing	1.0	70	1.4	12.5	1.0	30	0.9	0.7
Disking	1.0	47	.6	4.8	1.0	18	.3	.2
Harrowing (spike)	2.8	89	.7	4.4	1.7	11	.2	.2
Harrowing (spring)	1.8	3	.4	3.4	1.5	9	.4	.2
Weeding	1.2	66	.5	3.1	1.0	6	.2	.2
Weeding (man only)		42	.4					
Haul seed		33	.1	.2				
Clean and treat seed		99	.1					
Drilling	1.0	87	.5	2.3	1.0	13	.3	.2
Tillage after seeding	1.1	22	.3	1.8			.2	.2
Weeding after seeding		6	.5					
Haul fuel		20	.1	.3		7	.1	.1
Cutting (combine)		59	1.3	6.0		35	2.2	.4
Cutting (header)		6	2.4	6.9				
Threshing		6	3.9					
Picking up and piling sacks		37	.4	1.0				
Marketing		73	.8	3.6		[2]27	.8	.6

[1] Marketing percentages are based on bushels.   [2] Hauled with motor truck.

SUGGESTED PLANS FOR THE ORGANIZATION AND MANAGEMENT OF WHEAT FARMS IN SHERMAN COUNTY, OREG.

In the dry-land area of eastern Oregon both natural and economic factors limit the agriculture to a much larger extent than in more humid regions where there are greater chances for diversification. Because of these natural and economic conditions, wheat growing is now and doubtless will continue to be the dominant factor in the agriculture of the area. A good grade of wheat is produced on these farms, and of all cash crops it appears to offer the best opportunities for success.

For this area, then, it is not so much a matter of introducing new enterprises as a problem of improving the present farm organization. Perhaps the greatest improvements may be made in the reduction of production costs through a more efficient management of the labor program, the employment of the right size and proper type of machinery, and the proper choice of motive power. The problem also involves the production of the feed crops for the livestock and the production on the farm of a larger proportion of the family food supplies.

Each farm presents its own problem, and each farmer must decide for himself what course he shall pursue in an effort to realize the greatest returns from his available resources. For this reason the details for the general plan of organization of these farms are not applicable to all farms in the region. It is believed, however, that a majority of the farmers in Sherman County will be able to use to good advantage the data presented and the method outlined in analyzing their farm-management problems.

Basic data such as that presented in this and in Department Bulletin No. 1447, "Cost of Using Horses, Tractors, and Combines in Sherman County, Oreg." were used in planning the organization of these farms. Such data must of necessity be used in connection with normal yields and probable future prices.

STANDARD ORGANIZATION FOR A 640-ACRE FARM

The farm resources, such as work stock, equipment, and man labor, as indicated, are in such proportions as provide for their efficient utilization, and the organization calls for the minimum of hired labor and other cash expense.

The proposed division of the farm area provides for a maximum acreage of the wheat crop after making provision for the farm production of most of the feeds for the livestock. Table 28 shows the division of the farm area, prospective yields, and proposed disposition of the crops grown. The livestock to be kept, together with the feed requirements, are shown in Table 29. Fourteen head of work stock are sufficient to perform the farm work. A majority of this work stock should be good mares, and they should be sold while they are still young enough to command a good price on the market.

To carry out this plan 3 colts should be foaled each year, which, after taking into consideration deaths, injuries, and colts which are not good enough to keep, should result in a yearly average of about 2 yearling colts, two 2-year-old colts, and allow for the sale of 2 work stock each year. At the age of 3 years the colts may be broken and allowed to do some light work that year. The following year they should be ready to take their regular places in the farm work with the older horses. All of the feed consumed by work stock should be produced on the farm and would consist, for a mature horse, of 3,000 pounds of wheat hay, 4,200 pounds of wheat chaff, 600 pounds of barley, together with native and stubble pasture and a limited amount of wheat pasture.

The ration for a 2-year-old colt would consist of about two-thirds of the wheat hay and chaff and for a yearling colt about one-half of the wheat hay and chaff that would be required for a mature work animal.

The ration for the cows would consist of 2,000 pounds of wheat hay, 6,000 pounds of chaff, and 1,000 pounds of rolled wheat, and for young cattle about 500 pounds of wheat hay and 3,000 pounds of chaff. Both cows and young cattle would receive native pasture, stubble pasture, and wheat pasture.

The hog ration would consist of about 1,000 pounds of rolled barley together with a small amount of grain pasture. This quantity of feed should be sufficient to produce a 250-pound hog, live weight.

Seven thousand pounds of feed is sufficient for 100 head of mature laying hens and for the pullets and cockerels produced during the year. The poultry should be allowed to forage a considerable portion of this feed which, together with the wheat screenings, would amount to about 2,000 pounds. This feed, supplemented by the barley and wheat as shown in Table 29, would necessitate the purchase of only 1,280 pounds of chicken feed.

STANDARD REQUIREMENTS FOR FIELD WORK

The suggested plan calls for the preparation of 275 acres of summer-fallow land, including plowing, harrowing three times, and

weeding once; drilling 266 acres of this land to winter wheat in the fall, 9 acres to barley in the spring; plowing, harrowing three times, and drilling in the fall 10 acres of wheat for pasture purposes on nonsummer-fallow land. In addition there would be grain harvesting and marketing, hay harvest, and picking up and storing chaff.

TABLE 28.—*Division of farm area, production and disposition of crops; standards for a 640-acre farm*

Item	Farm area	Normal yield per acre	Production	Disposition		
				Feed	Seed	Sold
	Acres			*Bushels*	*Bushels*	*Bushels*
Winter wheat, grain	238	20 bushels	4,760 bushels	110	345	4,305
Winter wheat, chaff			47 tons	All.		
Winter wheat, hay	28	1 ton	28 tons	All.		
Winter wheat, pasture	10			All.		
Barley	9	28 bushels	252 bushels	240	12	
Summer-fallow	275					
Native pasture	70					
Waste	10					

TABLE 29.—*Livestock and feed requirements; standards for a 640-acre farm*

Livestock	Feed requirements				
	Wheat hay	Chaff	Barley	Wheat	Chicken feed
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
14 head of work stock	42,000	58,800	9,600		
2 two-year-old colts	4,000	5,600			
2 yearlings colts	3,000	4,200			
3 milk cows	6,000	18,000		3,000	
2 young cattle	1,000	6,000			
3 hogs			3,000		
100 chickens [1]			120	3,600	1,280
Total	56,000	101,000	11,520	6,600	1,280

[1] In addition to quantities shown about 2,000 pounds of feed would be foraged.

The farm operator should be able to do the summer fallow and seeding work and haul the wheat to market. This would necessitate the hiring of very little extra man labor except during the period for harvesting and marketing wheat, hay harvest, and picking up and storing chaff. In a normal season all of this work would be completed not later than August 25. Standards with respect to size of crew, size and type of implements used, and amount of work done are shown in Table 30.

Under normal weather conditions the ground should be sufficiently dry to allow the plowing to start about March 15. The importance of early plowing on these farms can not be overemphasized. Experiments conducted at the Agricultural Experiment Station, at Moro, to determine the effect on the yield of wheat obtained after early and after late spring plowing, have shown a very decided advantage in favor of early plowing.

Plowing should be completed not later than May 1 and usually the cultivation of the summer-fallow should start, especially if the acreage is large, before all of the plowing has been completed and should be continued often enough to keep the ground free from weeds. The season for harvesting is during the month of July, and wheat seeding should be done from September 15 to October 30 when moisture conditions are most favorable for seed germination.

TABLE 30.—*Standard requirements for field work on a 640-acre farm*

Kind and amount of work	Size of crew and size and type of implement used	Work accomplished per 10-hour day	Total		Usual season for doing field work
			Man labor	Horse work	
			Hours	*Hours*	
Plowing 285 acres_____	1 man and 12 horses, 16-inch 3-bottom gang plow.	9 acres_____	317	3,804	Mar. 15 to May 1.
Spike-tooth harrowing 855 acres.	1 man and 6 horses, 24-foot harrow.	50 acres_____	171	1,026	Usually should be started before all plowing is completed and continued often enough to keep weeds down.
Weeding 275 acres_____	1 man and 6 horses, 12-foot rod weeder.	20 acres_____	138	828	
Drilling 285 acres_____	1 man and 6 horses, 10-foot hoe drill.	20 acres_____	142	852	Sept. 15 to Oct. 30 when moisture conditions are favorable to seed germination.
Hay harvest and storing 28 tons.	_____	_____	172	304	June 20 to July 1.
Harvesting and threshing 247 acres.	3 men and 12 horses, 12-foot combine.	22 acres_____	336	1,344	July 4 to Aug. 1.
Picking up and piling 2,228 grain sacks.	1 man and 4 horses.	500 sacks_____	45	180	
Hauling wheat to market, 4,305 bushels 5 miles.	1 man and 6 horses, 2 wagons.	260 bushels_____	166	996	
Hauling grain to granary, 597 bushels.	1 man and 4 horses.	_____	10	40	
Picking up and storing chaff, 47 tons.	2 men and 4 horses.	Six-1,500-pound loads.	208	416	
Miscellaneous work (haul, clean, and treat seed, hand hoe, and haul fuel).	_____	_____	112	24	
Total_____	_____	_____	1,817	9,814	

No provision is made for time required for disking land before plowing or any tillage work on the crop after seeding. Experiments conducted at the agricultural experiment station at Moro have shown that disking before plowing and tillage work on the crop after seeding is of doubtful value in increasing crop yields in this area. The equipment requirements, however, include a disk harrow which may be needed at times for pulverizing clods on the fallow ground, or to kill weeds when there is an excessive growth which can not be controlled through the use of the spike-tooth harrow and rod weeder. A disk harrow may also be needed occasionally in the spring to work up ground for reseeding where winter wheat has frozen out.

A single set of equipment, aside from wagons, wagon beds, and harness, would suffice for the effective operation of a farm of this size and would be about as shown in Table 31.

TABLE 31.—*Machinery and equipment; standards for a 640-acre farm*

Number	Item	Number	Item
2	Heavy wagons.	1	12-foot combine.
2	Wagon beds for hauling sacked grain.	1	Grain cleaner.
1	Hay and straw rack.	1	5-foot reaper.
1	14-inch walking plow.	7 sets	Double work harness.
1	3-bottom 16-inch gang plow.	1	Saddle.
1	24-foot spike-tooth harrow.	1	Cream separator.
1	8-foot double-disk harrow.	1	Miscellaneous equipment (including small tools, hitches, etc.)
1	12-foot weeder.		
1	10-foot hoe drill.		

ESTIMATED CASH RECEIPTS AND CASH EXPENSES

Receipts from the sale of wheat at $1.25 per bushel amount to $5,381, and from the sale of livestock and livestock products to $579. The plan calls for the sale of all wheat not needed for feed and seed, 2 horses each year and all excess poultry, butter, and eggs, 2 veal calves and a small quantity of dressed beef.

The cash expenses provide for the hire of 64 days of man labor. The expense for man labor, feed, fuel, oil, and grain sacks was arrived at by multiplying the requirements by the rates that were paid during 1925 for these items. The other expense items are averages of a group of farms of the 640-acre size. After subtracting the cash expenses from the cash receipts there is left a net cash return of $4,020, and in addition a considerable quantity of farm-produced supplies contributed toward the family living. (See Table 32.)

TABLE 32.—*Estimated cash receipts and cash expenses on a 640-acre farm*

Cash receipts		Cash expenses	
Wheat, 4,305 bushels at $1.25	$5,381	Labor, 64 days	$304
Horses, 2 at $75	150	Repairs:	
Butter, 384 pounds at $0.35	134	General farm machinery	90
Eggs, 663 dozen at $0.35	232	Combine	150
Cockerels, 25 at $0.50	12	Building	40
Old hens, 25 at $0.65	16	Fences	25
Dressed beef, 160 pounds at $0.08	13	Chicken feed, 1,280 pounds	26
Veal calves, 2 at $11	22	Salt	6
		Rolling barley and wheat	14
		Horseshoeing	10
		Breeding fees for 3 colts	60
		Young pigs, 3	15
		Grain sacks including sewing twine, 2,228	267
		Automobile for farm use	300
		Telephone	10
		Fuel and oil:	
		General farm	15
		Combine	45
		Insurance:	
		Building	18
		Combine	70
		Crop	25
		Taxes	450
		Total	1,940
		Difference between receipts and expenses	4,020
	5,960		5,960

EFFECT OF CHANGES IN WHEAT YIELDS AND PRICES UPON NET CASH RETURNS

With a yield of wheat of 15 bushels per acre, and the same quantities kept out for seed and feed, and prices received for wheat and quantities and prices of other products the same as shown in Table 32, the results would be as follows:

Decrease in cash receipts	$1,487
Decrease in cash expenses	63
Decrease in net cash returns owing to lower yield of wheat	1,424

With a 25-bushel yield of wheat the net cash returns would be increased by $1,424.

On the basis of a 20-bushel yield of wheat sold at $1 per bushel, and other receipts and expenses the same as shown in Table 32, the total net cash returns would be decreased by $1,076. With a 20-bushel yield of wheat sold at $1.40 per bushel, and other receipts and expenses the same as shown in Table 32, the total net cash returns would be increased by $646.

FAMILY LIVING FROM THE FARM

The quantities of farm-produced dairy, poultry, pork, and beef products (Table 33) are sufficient to care for the needs of 2 adults, 2 children under 16 years of age, and 64 days of hired labor which it is assumed would board in the farmer's family. In addition, these farms should contribute a considerable quantity of garden products toward the family living.

TABLE 33.—*Farm-produced food for home consumption on a 640-acre farm* [1]

Item		Quantity	Value
Dairy products:			
Butter	pounds	124	$43
Whole milk	gallons	213	36
Poultry and poultry products:			
Cockerels	number	25	15
Old hens	do	25	12
Eggs	dozens	170	60
Dressed pork	pounds	560	95
Dressed beef	do	200	16
Garden produce			75
Total			352

[1] Family consisting of 2 adults and 2 children under 16 years of age, and provides for 64 days of hired man labor.

EFFECT ON THE FARM ORGANIZATION OF INCREASING THE SIZE OF BUSINESS

A 1,280-acre farm, operated with horses, has been taken to illustrate the effect on the farm organization of increasing the size of business. The organization of this farm would be similar to that of the 640-acre farm operated with horses. The division of the farm area would be as follows: Winter wheat, 412 acres; wheat hay, 51 acres; wheat pasture, 15 acres; barley, 17 acres; summer-fallow, 480 acres; waste, 15 acres; and native pasture, 290 acres. [9]

Provision has been made for the farm production of the feeds required for the livestock with the exception of a small quantity of chicken feed as well as all of the dairy and meat products required for the family and hired labor. The number of work stock would be increased from 14 to 28, and the 2-year-old and yearling colts from 2 to 3 each. This would allow for the sale of 3 young horses each year. The number of hogs kept would be increased by one to take care of the increased requirements of pork products for home consumption, and the other livestock would remain the same as on the smaller farm.

Practically a double set of most of the tillage implements would be required and a 16-foot combine and a 6-foot binder would take the place of the 12-foot combine and 5-foot reaper which were suitable for the smaller farm.

Standard requirements for the field work and the season at which this work should be done are shown in Table 34.

As in the case of the smaller farm the requirements for field work provide for the fullest utilization of the work stock and equipment, and require the minimum of hired labor. The program calls for an extra man to help with the summer-fallow and seeding work and also extra labor during the harvest period. One man would start hauling wheat to market with a 6-horse outfit about one week after wheat

[9] The percentage shown as nontillable acreage is considerably larger than for the 640-acre farm. Some large farms favorably situated may have a larger acreage of cultivated land than shown in this example.

cutting begins. As soon as the cutting is completed another 6-horse outfit would be added. With these crews all of the wheat could be hauled to market by August 4, and with an extra man to help pick up chaff this work would be completed by August 17.

Some farmers reduce the number of work stock and the expense for hired-man labor by exchanging work with their neighbors during the period for harvesting and marketing wheat. Also during recent years the horse work has been reduced on some farms by the use of the motor truck to haul the grain to market. On most farms, however, it is doubtful if the use of motor trucks will allow any appreciable reduction in the number of work stock.

TABLE 34.—*Standard requirements for field work on a 1,280-acre farm* [1]

Kind and amount of work	Size of crew and size and type of implement used	Work accomplished per 10-hour day	Total		Usual season for doing field work
			Man labor	Horse work	
			Hours	*Hours*	
Plowing 495 acres	2 men, 24 horses, two 16-inch 3-bottom gang plows.	18 acres	550	6,600	Mar. 15 to May 1.
Spike-tooth harrowing 1,485 acres.	2 men, 12 horses, two 24-foot harrows.	100 acres	297	1,782	Usually should be started before all plowing is completed and continued often enough to keep weeds down.
Weeding 480 acres	2 men, 12 horses, two 12-foot rod weeders.	40 acres	240	1,440	
Drilling 495 acres	2 men, 12 horses, two 10-foot hoe drills.	40 acres	248	1,488	Sept. 15 to Oct. 30, when moisture conditions are favorable to germination of seed.
Hay harvest and storing 51 tons.			300	450	June 20 to July 1.
Harvesting and threshing 429 acres.	4 men, 21 horses, 16-foot combine.	30 acres	572	3,003	July 4 to Aug. 1.
Picking up and piling 3,874 grain sacks.	1 man, 4 horses	500 sacks	77	308	
Hauling wheat to market, 7,532 bushels, 5 miles.	1 man, 6 horses, 2 wagons.[2]	260 bushels	290	1,740	
Hauling grain to granary, 1,184 bushels.	1 man, 4 horses		20	80	
Picking up and storing chaff, 78 tons.	2 men, 4 horses	Six 1,500-lb. loads	346	692	
Miscellaneous work (haul clean, and treat seed, hand hoe, and haul fuel).			184	46	
Total			3,124	17,629	

[1] The proper use of eveners and hitches would allow the spike-tooth harrowing, weeding, and drilling to be done by 1 man driving a 12-horse team. The use of teams of this size for these operations would release 1 man for other work about the farm, or, if not needed all of the time it would allow some reduction in the hire of man labor during these periods. No doubt the use of large teams has a place on the 640-acre farm. However, if used on the smaller farm an additional harrow, weeder and drill would need to be purchased. See Mont. State Col. Ext. Serv. Bul. No. 70 for suggestions with reference to hitches and eveners and the use of big teams on large dry-land farms in the Northwest.
[2] On completion of the wheat cutting another 1-man and 6-horse crew would be added.

Using the estimates of cash receipts and cash expenses as shown in Table 35, the larger farm should result in an increase in cash receipts of $4,097 over the smaller farm and in an increase in cash expenses of $1,614, resulting in an increased net cash return of $2,483. See Table 36 for quantities and values of farm-produced food for home consumption.

It is impossible to receive a large return where the business is of small volume. On the other hand, while an increase in the size of

the business may result in a larger income there is always the possi-
bility of larger losses in unfavorable years. Success or failure de-
pends to a large extent on the experience and managerial ability of the
farmer. If he is capable and ambitious, and if he possesses sufficient
capital, his chances for success are decidedly better in most cases on
the larger farm.

TABLE 35.—*Estimated cash receipts and cash expenses on a 1,280-acre farm*

Cash receipts		Cash expenses	
Wheat, 7,532 bushels at $1.25	$9,415	Month labor, 6 months at $75	$450
Horses, 3 at $75	225	Other labor, 115 days	590
Butter, 340 pounds at $0.35	119	Repairs:	
Eggs, 629 dozen at $0.35	220	General farm machinery	125
Cockerels, 25 at $0.50	12	Combine	250
Old hens, 25 at $0.65	16	Building	40
Dressed pork, 115 pounds at $0.17	20	Fence	25
Dressed beef, 105 pounds at $0.08	8	Chicken feed, 1,280 pounds	26
Veal calves, 2 at $11	22	Salt	9
		Rolling barley and wheat	29
		Horseshoeing	20
		Breeding fees for 4 colts	80
		Young pigs, 4	20
		Grain sacks, including sewing twine, 3,874	465
		Automobile for farm use	350
		Telephone	10
		Fuel and oil:	
		General farm	20
		Combine	120
		Insurance:	
		Building	20
		Combine	90
		Crop	40
		Taxes	775
		Total	3,554
		Difference between receipts and expenses	6,503
	10,057		10,057

TABLE 36.—*Farm produced food for home consumption on a 1,280-acre farm* [1]

Item		Quantity	Value
Dairy products:			
Butter	pounds	150	$52
Whole milk	gallons	255	43
Poultry and poultry products:			
Cockerels	number	25	12
Old hens	do	25	16
Eggs	dozens	204	71
Dressed pork	pounds	635	108
Dressed beef	do	255	18
Garden produce			75
Total			395

[1] Family consisting of 2 adults and 2 children under 16 years of age, and provides for 295 days of hired
man labor.

EFFECT OF INTRODUCTION OF A TRACTOR ON THE ORGANIZATION OF A 1,280-ACRE FARM

It is believed that as a general rule a 640-acre farm in this region
is not of sufficient size to warrant the purchase of a tractor, and
therefore no figures are given on the effect of the introduction of a
tractor on the organization of farms of this size. If a 28-drawbar
horsepower tractor was purchased, the following changes could
be effected in the organization of the 1,280-acre farm: After the
purchase of the tractor the 16-inch 3-bottom gang plow could be sold
and a 16-inch 6-bottom tractor gang plow purchased. It is assumed
that in normal years all of the plowing, all of the home harvesting
and threshing work, and about 200 acres of custom harvesting and

threshing could be done with tractor motive power. This would allow a reduction in the number of work stock of from 28 to 14 and in the 2-year-old and yearling colts of from 3 to 2 each.

This change would make it possible to reduce the acreage of wheat hay cut for feed by 21 acres, and of barley by 6 acres. This acreage planted to wheat would produce an additional 540 bushels of wheat for sale. The reduction in the number of horses kept would result in the sale of one less head of work stock each year. The reduced requirements of chaff for horses and colts would result in a saving in man labor and horse work of the amount required to pick up about 32 tons.

Records obtained in this area show that on tractor farms after the purchase of a tractor there is some saving in total months of man labor for the year. The amount of man labor saved, however, is slight, and it is assumed that the extra man labor on account of the 200 acres of custom harvesting and threshing would about off-set any saving in man labor that might have been possible had no outside work been done after the tractor was purchased.

The total annual tractor repairs and cost of fuel and oils, as well as the additional cost for combine fuel and oils because of the outside work, are shown in Table 37. After taking into consideration the increases and decreases in current cash receipts and in current cash expenses after the purchase of the tractor there is a total increase in net cash returns of $167. The increase in net cash returns is slight, and if set aside each year the amount saved will not be great enough to buy a new tractor when the old one is worn out, but all of the benefits from the ownership and use of tractors on these farms can not be accurately measured in dollars. The opinions of tractor owners relative to the use of tractors are discussed in Department Bulletin No. 1447, "Cost of Using Horses, Tractors, and Combines on Wheat Farms in Sherman County, Oreg." Of the points to consider in the purchase of a tractor probably the one of greatest importance is the mechanical skill of the tractor operator. Unless the tractor owner is mechanically inclined and operates the tractor himself or is able to hire a thoroughly competent tractor man he is almost certain to find his tractor an unprofitable investment.

TABLE 37.—*Changes in current cash crop and livestock receipts and in current cash expenses on a 1,280-acre farm after the purchase of a tractor*

Increase in wheat receipts, 540 bushels, at $1.25	$675
Decrease in sale of horses, 1	75
Net increase in crop and livestock receipts	600
Custom work harvesting and threshing wheat, 200 acres, at $3	600
Net increase in total cash receipts	1,200
Increase in current cash expenses:	
For 52 days of tractor drawbar work—	
Gasoline, 2,392 gallons, at $0.20	478
Cylinder oil, 104 gallons, at $0.88	92
Other oil, 151 gallons, at $0.14	21
Hard grease, 120 pounds, at $0.10	12
Repairs	375
For 7 days of custom combine harvesting—	
Gasoline, 210 gallons, at $0.20	42
Cylinder oil, 10 gallons, at $0.88	9
Other oil, 11 gallons, at $0.14	2
Hard grease, 15 pounds, at $0.10	2
Total	1,033
Net change	167