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Costing Data

Farm Costs and Practices

In the Production of Walworth County Crops and Livestock

P. E. McNall and L. S. Ellis

nt Station University of Wisconsin,
tment of Markets, Bureau of Agricul-
d States Department of Agriculture,
co-operating.

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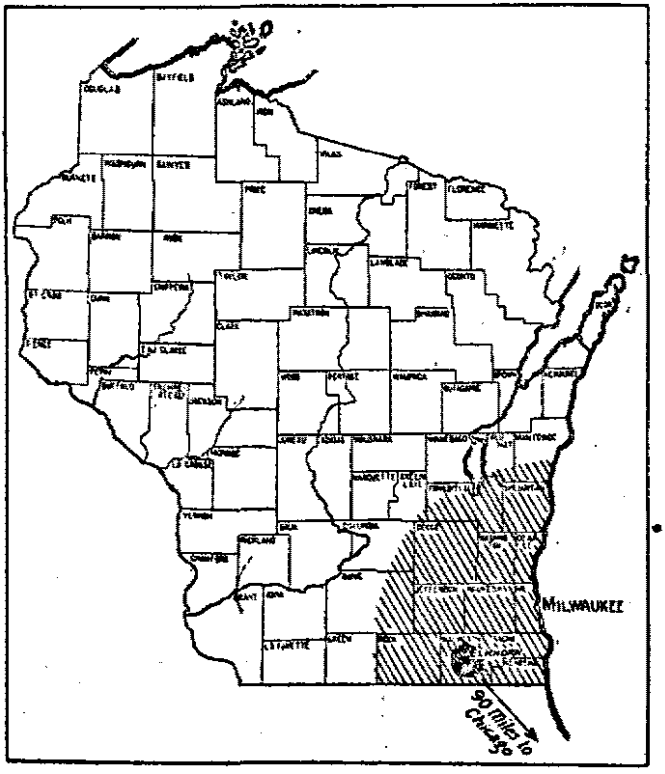
THE FARMS STUDIED are located within a radius of seven miles of Elkhorn, Wisconsin, the county seat of Walworth county. The population of Elkhorn was 1,991 in 1920. The area within which the farms are located is indicated on Map 1.

Elkhorn is about 95 miles from Chicago and not more than 40 miles from Milwaukee. City markets for fluid milk are thus within reach of the area,



Map 1—Area in Which This Material Applies.

Table I.—Temperature
(Williams Bay Station, Wisconsin)

Years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean Temp.	
													Summer	Winter
Average 21 years	19.0	20.4	33.6	46.6	55.9	65.5	70.7	68.2	62.1	50.3	37.5	24.1	68.1	21.2
1922	19.6	23.1	35.4	45.8	63.2	68.6	70.6	72.0	66.0	54.0	40.0	23.1	70.4	22.3
1923	23.8	15.9	26.0	43.6	56.1	70.4	73.2	68.4	62.4	49.0	39.4	34.2	70.7	20.9
1924	11.9	23.2	30.0	45.6	51.4	63.8	68.2	68.6	57.1	57.2	36.6	16.2	66.9	23.1

Table II.—Precipitation in Inches
(Williams Bay Station, Wisconsin)

Years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Average 21 years	1.61	1.28	2.03	2.58	3.58	3.11	3.32	3.92	3.70	2.55	1.66	1.54	30.78
1922	1.33	1.42	2.88	1.67	2.22	.36	2.48	1.91	2.64	1.21	2.91	1.17	22.20
1923	0.73	0.57	3.98	1.46	1.12	3.63	2.92	5.31	4.95	3.26	1.30	2.55	31.98
1924	1.22	1.91	3.79	2.20	2.53	8.72	4.21	9.08	1.83	.10	1.41	1.66	38.66

Table IV.—Crop Acreage Distribution on Walworth County Farms

Crop	Farms studied				County[1] acres average per farm	Per cent of crop acreage	
	No. reporting	Maximum acreage	Minimum acreage	Average acreage		Farms studied	All farms of county
Corn	66	68.3	10.5	29.1	29.0	34.8	38.1
Oats	57	56.2	4.0	17.6	17.8	21.0	23.4
Barley	41	31.4	1.8	8.4	8.2	10.0	10.8
Alfalfa	33	33.3	1.6	4.7	2.5	5.6	3.3
Other hay	61	76.7	2.1	19.7	16.2	23.6	21.3
Canning peas	21	10.5	1.1	1.7	.4	2.1	.5
Other crops	xx	xx	xx	2.4	2.0	2.9	2.6
Total	xx	xx	xx	83.6	76.1	100.0	100.0

[1]1923 crop estimates taken from Wisconsin State Department of Agriculture Bulletin No. 65.

and at times Chicago receives ice cream mix as well as fluid milk from Elkhorn. The usual outlet for dairy products, however, is in the form of condensed and evaporated products and butter.

The farming types and market possibilities of this area are typical of the whole of the southeast corner of the state (Map 1). Milwaukee, Kenosha, and Racine counties grow more truck crops than does Walworth county. The production of other crops and of livestock products is similar to the other counties of this group.

Climate

Walworth county has a growing season of about 160 days, a mean summer temperature of 68 degrees, and a mean winter temperature of 21 degrees (Table 1, Chart 1). The average annual precipitation is 30.8 inches (Table II and Chart 2). Seventeen and six-tenths inches, or 57.3 per cent of this falls in the five growing months of May to September, inclusive. The variation in rainfall for the months of May, June, July and August during the three years of the study accounts for the variation in crop yields in these years.

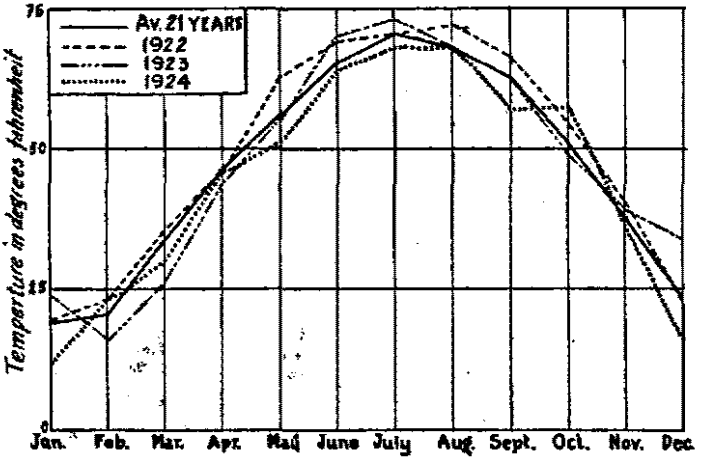


Chart 1.—Temperature of Southeast Wisconsin—Williams Bay Station, Wisconsin.

Soil and Topography

The topography of the area is generally rolling to broken. The general character of the surface is caused by glaciers. The kettle moraine which was formed by the action of two great ice sheets is characterized by numerous holes or pits varying in depth from five to twenty feet and in width from twenty to several hundred feet. These spots are not drained, and result in waste land in otherwise good fields.

The soils of the county may be divided into three groups:

1. Those developed under forest cover are light in color and have fair to good natural drainage. There is a tendency for these soils to be acid in reaction, and they require lime for the growing of such crops as alfalfa.
2. Those developed under prairie conditions are darker in color and usually have poorer natural drainage than do the soils formed under forest cover. These soils may be slightly acid in reaction, although not to such an extent as the first named class.
3. Marsh and swamp soils are brown to black in color. They have a very high content of organic matter and are usually of a black mucky to brown peaty character. Although these soils are not in an acid condition there is very little, if any, free carbonate.

Agriculture of Walworth County

Walworth is primarily a dairy county. From two-thirds to four-fifths of her income is from the dairy herd. Hogs and poultry contribute not more than ten per cent of the total farm income.

Table III indicates the sources of cash income for the farms studied. The average income from the dairy herd of the farms studied is about $500 larger than the income from the dairy herd of the average Walworth county farm. This is accounted for by the fact that the farms studied averaged 2.6 more cows per farm and the production per cow was 1,100 pounds greater than the county average.

Table III.—Total Farm Income—Cash Sales[1] from Different Sources
(Sixty-six farms studied,[2] Walworth County)

Source of income	Income per farm	
	Dollars	Per cent of cash sales
Dairy products	$2144	63.89
Cattle sales	377	11.21
Hogs	276	8.22
Poultry and eggs	168	5.02
Canning peas	61	1.82
Corn[3]	99	2.95
Hay	25	.74
Small grains	40	1.20
Other sources	167	4.95
Total	3357	100.00

[1]Does not include inventorial changes or produce supplied directly by the farm to the family. These items are farm value of: milk, $57; eggs and poultry, $55; hogs, $21; beef or veal, $4; garden cost, $32; wood value, $39; house and yard cost, $230; auto use, $87; the total is $525.

[2]Three years, 1921-22, 1922-23, 1923-24, included in this study.

[3]Corn sales are relatively high because the one important seed corn grower of the county is included with the farmers of the group studied.

Crops Grown

The more important crops are those used by the dairy herd. The farms of the study averaged 83.6 crop acres per farm (Table IV). Twenty-nine

Table V.—Distribution of Farm Acreage Sixty-six Farms by Years
(Walworth County, Wisconsin)

Year	Average number of acres per farm															
	Total crop acres	Corn		Oats	Barley	Peas	Hay			Garden and orchard	Other crop	Farm-stead	Pasture		Waste	Total farm area
		Silage	Grain				Alfalfa	Mixed	Other				Rota-tion	Perma-nent		
1922	85.02	13.21	12.45	17.28	9.12	2.35	.90	22.47	5.30	.87	1.07	1.44	4.92	46.39	4.31	142.08
1923	86.15	15.78	17.80	18.21	8.24	2.21	6.97	11.53	2.57	1.10	1.74	1.51	5.55	32.78	2.11	128.10
1924	78.95	19.83	8.69	17.30	7.78	.45	6.81	15.95	.38	1.10	.66	1.48	5.52	33.71	6.48	126.14
Av. of 3 years	83.57	16.07	13.00	17.60	8.43	1.73	4.71	16.85	2.90	1.02	1.17	1.48	5.31	38.01	4.23	132.00
% of total	63.02	12.12	9.67	13.27	6.35	1.30	3.55	12.71	2.19	.77	.88	1.11	4.01	28.67	3.19	100%

Table VI.—Livestock Per Farm
(Walworth County)

Kind of livestock	Farms studied					County average per farm[3]
	Farms reporting	No. per farm			Percent of all animal units[1]	
		Maximum	Minimum	Average		
Cows	66	44.8	5.4	18.0	45.4	18.1
Heifers	63	17.2	.1	5.6	14.1	Included with cows
Calves	64	15.8	.4	5.4	13.6	3.2
Bulls	62	2.0	.1	.9	2.3	Included with cows
Horses	66	11.0	2.1	4.9	12.3	4.2
Hogs	18[2]	36.0	2.0	16.7	8.3	14.7
Poultry	66	410.0	50.0	158.0	4.0	76.0
Sheep	0	xx	xx	xx	.0	3.0
Total	xx	xx	xx	xx	100.0	

[1]An animal unit consists of one mature cow, horse, mule, 5 hogs, 7 sheep, 100 head of poultry, or twice the number of respective young stock.
[2]County figures are for January 1, 1924.
[3]Hog figures are for the third year only. They are taken as of January 1, 1924.

acres of this total are devoted to corn, 17.6 acres to oats, 8.4 acres to barley, 4.7 acres to alfalfa hay, and 19.7 acres to other tame hays. The county average of alfalfa is but 2.5 acres.

Cash crops are of minor importance in the county as a whole, although the farmers who grow cash crops have from five to ten acres per farm. Canning peas are important in certain limited areas. The farmers who grow canning peas have from six to ten acres per farm. The average acreage for the county, however, is but .4 acre per farm. Likewise, wheat and potatoes occupy but .3 and .6 acres, respectively, per farm for the county, while individual farms producing these crops usually have from four to twelve acres.

Table V indicates the distribution of the farm area on the farms studied for each of the three years of the study. A comparison of the three years shows a reduction in barley, canning peas, mixed and timothy hay acreages and increases in alfalfa and corn. The amount of waste land per farm was high in 1924 because of the unusually wet spring and early summer which made the planting of some fields impossible.

Livestock of the County

The outstanding type of livestock on the farm is the dairy cow (Table VI). Three-fourths of the total animal units of the farm are the dairy herd. Most of these animals are grade Holsteins. A few herds of Guernseys and Jerseys are found, as are also a few herds of Shorthorns. Practically no strictly beef herds are found. The writers know of but one herd of Herefords in the four townships which are included in the study.

The farms studied were somewhat more heavily stocked than the average farm of the county. There are many small farms near the larger lakes which serve as homes for the occupants and from which little, if any, produce is sold. These farms tend to bring down the average operating farm of the county.

The dairy herd was divided into four groups in this study. The "cow" herd included all cows, whether milking or dry. The "heifer" group included all young stock between the age of one year and the age upon freshening. The "calf" group was composed of all cattle less than one year of age; while the "bulls" included only those over one year of age.

The average production of milk in the county for 1923 was 5,400 pounds per cow. The farms included in the study averaged 6,500 pounds milk per cow.

Horses constitute the principal source of power on the farms. The average horse labor per farm was 67 days' work per year. Seventeen of the 66 farms had tractors. The farms used the tractors an average of 40 days per year. The belt work done was mostly for corn shredding, silo filling, and threshing.

Practically no colts were raised, and the horses were of the common farm type, averaging from 1,300 to 1,600 pounds in weight.

Much of the light hauling work and most of the travel on roads was done by automobiles. This does away with all horses used exclusively for road work. All but seven of the farmers of the group had automobiles.

Hogs and poultry supplied a little more than one-tenth of the farm income. Every farm has a few poultry, while nine-tenths of the farms have hogs. Despite an average of over 150 head of poultry per farm many of the farm tables were not supplied with eggs from the poultry flocks during the winter months. Sheep are not kept on the ordinary Walworth county farm.

Size of Farms

The average size of the farms studied was 132.6 acres, of which 83.6 acres were devoted to crops, 38 acres to permanent pasture, 5.3 acres to rotation pasture, and 5.7 acres to farmstead and unused. The average size of farm for the county was 134.8 acres, or 2.2 acres larger than the average of the farms studied. The county averaged but 74.1 acres of crops as compared with 83.6 acres for the farms studied. The smaller county crops acreage per farm is in line with the smaller number of livestock per farm. The permanent pasture land consists of two types. The one is marsh land, which is too wet to cultivate and which either cannot be drained or is not at the present time. The second type of land is the stony, rolling or rough land fairly well wooded.

Cost of Producing Farm Crops in Walworth County, Wisconsin

The costs of production and unit requirement figures given in this bulletin are based on the results secured from records kept on 24 farms in 1922, 22 farms in 1923, and 20 farms in 1924, all in Walworth county, Wisconsin. Averages are given for each of the three years and the cost on each farm for 1923. The costs and unit requirements for each farm are given for 1923 because the crop season of that year was more nearly normal than either of the other two years. This is clearly shown by Chart 2. This chart

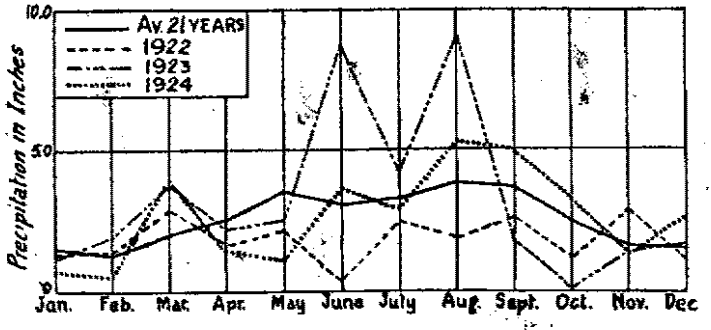


Chart 2.—Precipitation of Southeast Wisconsin—Williams Bay Station, Wisconsin.

gives the inches of precipitation by months for each of the three years and the average for twenty-one years taken at the Williams Bay Station which is located at the Yerkes Observatory in the south central part of the county.

There were nearly nine inches less rainfall in 1922 than on the average for the twenty-one years, while the rainfall was unusually heavy during the summer of 1924. The rainfall was somewhat greater in August and September, 1923, than the average of the twenty-one years for those two months, but the precipitation during the remainder of the year was more nearly normal than during either of the other two years.

Value and Use of Cost Figures

Cost figures are of value to the farmer in the following ways. First, cost accounts reveal the facts. Knowing the facts, one is then in a position to deal intelligently with the problem of reducing costs, of working out a more efficient combination of enterprises, or of determining the proper size of the already existing combination of enterprises. Cost accounts, when viewed in this light, are of greatest value to the individual. Cost accounts are of value to the farmer to the extent that they give him a measure of his efficiency and aid him in locating the points of high cost and thus help him to make his farm a more efficient business unit. This end can be more readily attained if, along with his own records, an individual farmer may have the records of several other farmers in his community with which to compare the results secured from his own farm. Those not actually keeping records will derive the benefit of cost route work through effective extension work or by contact with neighbors who have made changes on a basis of facts shown by the records.

Secondly, cost records are of value in setting up standard requirements for various farm operations—standards of accomplishment for the individual to strive toward or by which to check his own efficiency. An individual doing the same thing in very much the same way from day to day or season to season comes finally to think that he is doing a particular job in the most efficient manner. If one has some standards of accomplishment by which to gauge the efficiency of his methods, he is more apt to maintain or increase his efficiency than if he were going along without any standards of efficiency or accomplishment as a guide.

In the third place, cost records are of value in showing the relative profitableness of various crops and various classes of livestock. The production costs of a farm product have no direct effect upon the sale price. The value of cost records lies in what may be gained from them concerning the management of the farm plant.

Methods of Arriving at Costs

Interest Charge

Interest on the total investment was charged at the rate of 5 per cent. Depreciation on buildings, livestock and machinery was determined for each farm on the basis of the present valuation and the prospective life of

the unit in years. Depreciation on livestock was accounted for by revaluations at each inventory time. It quite frequently happened that the net transactions of the different classes of livestock showed an increase. Depreciation in any case is hidden with sales, purchases and growth of young cows. In most instances such charges as interest and depreciation are not actually paid in cash by the farmer, but represent decreases in capital. These charges are necessary, however, in order to evaluate each factor used in production and to place the farm enterprises on a comparable basis. It is only by giving proper weight to each item of cost that the various methods employed on the differnt farms may be studied and conclusions drawn relative to the merits of those methods.

Man Labor

Man labor was charged at the rate of 22 cents per hour in 1922 and 1923, and 26 cents per hour in 1924. These figures were obtained by adding $20 per month for room and board to the actual cash wages paid hired men, and dividing the total by the number of hours actually worked by the hired men during the year. All labor, whether family or hired, was charged at this rate.

Horse Work

A separate horse work rate was figured for each one of the farms. The cost per hour was obtained by dividing the total cost of keeping all the horses on the farm by the total number of hours of horse work on that particular farm. The average cost of horse work per hour for the three years was 14.7 cents, but the variations from farm to farm were large. The horse work rate for 1923 ranged from 9.5 cents to 40 cents per hour.

Machinery Costs

Machinery costs include the following items: man labor, horse work, cash repairs, fuel, lubricants, building charge, interest, taxes, insurance and depreciation. The total machinery charge was distributed to the various crops on a basis of the acreage of the various crops making use of any particular machine or class of machines. The exception to this rule is the tractor where the hours worked was used as the basis of cost distribution. The distribution of hay machinery charges to different kinds of hay, such as timothy, clover or alfalfa, was made on the basis of the number of tons produced.

Manure Charge

Manure was credited to the various livestock enterprises at $1 per load and charged to the several crops at the same rate plus the cost of hauling. The total value of manure distributed each year is charged to the current crop production on the basis of the relative quantity of fertilizer removed by the various crops grown during the year and produced in the rotation receiving the manure.

The following weights were used in distributing manure charges:—6 units to every ton of corn or small grain, 5 units to every ton of sudan grass, timothy, June grass, millet and corn fodder, 2 units to every ton of clover, alfalfa, peas and other legumes, and 1 unit to every ton of silage and root crops.

Costs and Returns of Various Crops

Six main crops were raised on the route farms (Table V): corn, both for silage and grain, oats, barley, canning peas, alfalfa and mixed hay. Oats is the only crop that failed on the average to return anything for the man labor expended in its production. However, oats did show profits on some farms where the yield was fairly high. The per acre cost of oats and barley was about the same, but barley returned about 18 cents more per hour for the man labor spent on the crop than did oats. Corn raised for silage returned about 16 cents per hour of man labor above all other costs, while corn for grain returned approximately 31 cents per hour. Canning peas was the only strictly cash crop grown; it returned 56 cents per hour for the three years. The hay crops gave the greatest returns per hour of man labor. Alfalfa returned $2.57 and mixed hay $1.56 per hour man labor above all other costs.

This method is valid under the assumption that equal quantities of manure are distributed each year under a fairly regular cropping system.

Variations in Costs

There was a wide difference in the cost of producing the various crops and livestock products on different farms the same year. For example, the cost of producing milk in 1923 ranged from $1.49 to $2.96 per hundred pounds; the cost of producing corn silage ranged from $3.03 to $6.38 per ton. Each crop and class of livestock furnishes a similar example of varying costs from farm to farm. It must be remembered that these varying results were secured during the same year under similar soil and climatic conditions. The varying results are due largely to differences in management. Few men excel in all phases of the farm business. Each farmer may profit through a study of the results obtained by some of his neighbors in the more effective use of livestock, capital or labor.

Reasons for Variations in the Cost of Producing Crops

The two factors which partially account for and contribute to low costs per unit of product are yields per acre and effective use of labor.

Yields per Acre

Varying yields per acre may be the result of one or more of several causes.

Variety of Seed. The adaptability of the variety of seed appreciably affects the yield. Climatic, soil and seasonal conditions all influence the

growth of plants. Because of this the Wisconsin Agricultural Experiment Station has found it necessary to breed up and select varieties which are adaptable to Wisconsin conditions for the more important staple crops. In so doing it has developed smaller growing, earlier maturing varieties of corn which can more or less effectively withstand the cold soil so often experienced at seeding time. Such varieties as Golden Glow or Silver King are recommended for southeast Wisconsin conditions.

Likewise with oats such varieties as Wisconsin No. 1 are found to be especially adapted to southeast Wisconsin. This is indicated by increased yields of this variety over the ones ordinarily used.

Rate of Seeding. The rate of seeding affects the yields of both grain and forage. In the case of oats, for example, three bushels of seed per acre have been found to yield more than a smaller amount. A smaller amount is frequently sown when oats are used as a nurse crop for a hay seeding, but a fewer number of bushels of seed per acre ordinarily results in a smaller crop at harvest time.

It is found desirable to use more grain per acre when corn is planted for silage than when planted for grain. Seed of good vitality is necessary in any case if a satisfactory stand is to be had.

Seedbed Preparation. Seedbed preparation is important in that seed must remain in moist soil until germinated and the rooting system is sufficiently developed to obtain moisture and plant food from lower parts of the surface soil. Some crops are what may be called hardy feeders and will thrive in the ordinary Wisconsin soils with a small amount of additional seedbed preparation when planted in their usual place in the rotation. Oats is a crop of this kind. Other grains, as barley, require a more careful seedbed preparation in order to assure a crop.

Labor

Labor is one of the most costly factors required for farm crop production. The effective use of labor is necessary if costs per acre of producing crops are to be reduced.

Type and Size of Equipment. The size of equipment which makes it possible for one man to plow more acres usually results in decreased costs per acre. Power and machinery requirements per acre are usually not reduced by the use of large units, as it takes so much power to turn a 14-inch furrow whether a single furrow is turned at a time or several are turned at once. If one man can drive the unit for turning three furrows rather than for one furrow the labor cost of that operation is greatly reduced.

The same principle applies to each of the crop operations whether it be plowing, harrowing, planting or harvesting. The maximum size of equipment is limited primarily by the ability of the farmer to handle a certain number of horses as a unit or to watch a series of operations being carried on at the same time.

Selection of Operations. The omission or repetition of operations accounts for much of the differences in costs from farm to farm. The selection of operations can be effective only when previous crop, soil and time

of performing the operations are taken into consideration. Late seedbed preparation in some cases, as for oats, necessitates compacting before planting. For other crops it is necessary to loosen up a fairly compact seedbed by disking before the crop is planted. Plowing at the same season for different crops may necessitate more work for certain of them than if the plowing were done at different seasons.

The Size of Fields. A small field limits the amount that a machine can accomplish in a day because of the time wasted in turning at the ends of the fields. It also limits the size of machines, since a disproportionately larger amount of time is wasted in turning at the ends of the fields with large than with small units.

Distance from Farmstead. The distance from the farmstead affects all field operations because of the time required to go to and from the fields. This is an especially important factor in the handling of hay and other roughage crops where a large tonnage per acre is obtained. The time required for hauling silage corn one-half mile is a much more important factor than is the time required for hauling the grain alone from the same field to the farmstead.

Production of Corn Up to Harvest

Usual Practices in Corn Production

Corn occupied 26.2 per cent of the total crop area in 1923. Forty-seven per cent of the corn was put into silos, and 53 per cent was either shredded or fed to the cattle in the bundle. Corn occupied 22.4 per cent of the total crop area for the three years, of which 55.5 per cent was put into silos. One farmer on the route did not have a silo, and one other farmer made no use of his silo. Sixty-three per cent of the corn raised for grain was shredded. The remainder was stacked and either fed in the bundle to the stock or husked out by hand.

All corn land is plowed, practically all of it being plowed in the spring. Corn generally follows the small grains or hays in the rotation, but some corn is grown on the same land two or more consecutive years. In 1923 six of the twenty-four route members did some fall plowing for corn in addition to the spring plowing.

Most corn land is disked two or more times after plowing. Three men did no disking at all, while one man disked his corn land six times. All corn land is harrowed before planting. Nearly 70 per cent of it is harrowed two or more times,—five times being the largest number. All but three fields were harrowed after planting, one-third of the fields being harrowed twice after planting. Practically all corn land is either rolled, planked, or cultipacked before sowing. The cultipacker is rapidly coming into use in this area. About one-third of the men packed the land in some way after planting.

One-fourth of the farmers checked in some of their corn. One man who makes a practice of raising seed corn always checks the corn that is to be

used for seed. In most cases the corn is checked for the purpose of controlling weeds. Three-fourths of the farmers drill in their corn.

Seventy per cent of the corn is cultivated three or more times, about 11 per cent being cultivated as many as five times. Very little corn is cultivated less than twice. Seven of the men used two-row, three-horse cultivators. The others used the single-row, two-horse type of cultivators.

Labor Requirements up to Harvest Time

Tables VII and VIII show the amount of labor required on each of the farms and the average for 1923 of the farms not using tractors in the production of corn up to harvest time. The range in both man labor and horse work for corn production was unusually large. The man labor ranged from slightly over five hours to nearly sixteen hours per acre, while the horse work per acre ranged from about eight and one-half hours to nearly forty-five hours. It must be remembered that these varying results were all secured during the same season under the same soil and climatic conditions. The soil type does not vary greatly from farm to farm, the greater proportion of it being Miami silt loam, Clyde silt loam, Carrington loam and Waukesha silt loam in the area covered by the route. The variation in the labor required, then, must be largely due to differences in cultural practices and management of the labor used.

Reasons for Variation in Labor Requirements

Size of Equipment and Kind of Power Used. Tractors were used on farms 7, 10, 11 and 14, and it will be noted that both the man labor and horse work hours, which also include tractor hours, are comparatively low. An 8-foot disk drawn by six horses was used on farm 20, which accounts for the very low number of man hours required per acre on that farm. Single-row planters were used on farms 18, 13 and 16. It took over an hour to plant an acre on these farms, while less than an hour was required, with one exception, for planting an acre on all the other farms where two-row planters were used. Two-row, three-horse cultivators were used on farms 20, 21, 17, 9, 12, 1 and 8. It will be noted that the labor required for cultivating on these farms is relatively low. With a two-row cultivator and three horses, an acre of corn can be cultivated in about three-fourths of an hour less time than with a single-row cultivator and two horses. On the average, this makes it possible to cultivate nearly six acres more per day with the two-row cultivator than with the single-row machine. During the busy season, when cultivating conflicts with haying and pea harvest, an economy of this sort is well worth while.

Selection of Operations. The total number of hours required per acre on the various farms was materially influenced by the number of times a given operation was performed. The corn land on farm 8, the one having the highest labor requirement per acre, was disked two and one-fourth times, harrowed twice, rolled three times, one-fourth of it was replanted, and the corn was cultivated four times, besides all being hoed. In contrast to this, the corn land on farm 7, the farm having the lowest labor require-

Table VII.—Man Labor Requirements Per Acre By Operations[8] for Corn, Up to Harvest
(Walworth County, Wisconsin, 1923)

Farm No.	Total hours per acre	Total acres corn	Yield per acre		Plowing		Disking		Harrowing		Compacting		Planting		Cultivating	
			Tons silage	Bu. grain	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre
7	5.23	22.47	7.91	19.8	1.0	1.33 T	1.00	.58 T	.24	.36			1.00	.76	1.53	1.59
20	5.81	57.18	7.99	22.1	1.0	1.42	2.00	.24	1.37	.37	.78	.65	1.14	.54	3.62	.79[1]
21	7.14	21.81	7.73	38.9	1.0	2.33	.71	.52	4.29	.29	.35	.52	1.00	.82	2.35	.94
17	7.27	31.53	8.33	25.4	1.0	2.86	2.19	.48	2.33	.28	.21	1.11	1.08	.70	3.48	.48
10	7.52	47.70	6.49		1.0	1.74 T	2.36	.55 T	3.01	.33			1.29	.67	2.00	1.35
11	7.66	20.37	5.49	25.5	1.0	2.07 T			3.57	.30	.96	.50	1.00	.79	2.00	1.63
9	7.66	28.28	4.80	11.3	1.0	2.27			3.09	.41			1.00	.77	2.70	1.21
18	8.71	24.35	10.16	15.0	.7	3.10	.32	.45	3.51	.33	.63	.49	1.00	1.04	2.52	1.52
5	9.01	29.42	4.28	12.1	1.0	2.31[2]	1.07	.58	2.44	.44	1.00	.57	1.00	.66	1.86	2.03
14	9.16	54.51	6.05	43.6	1.0	1.50 T	2.00	.68 T	3.00	.41	1.49	.46	1.00	.70	2.95	1.25
15	9.21	22.71	6.83	7.6	1.0	3.92[3]	.51	.51	3.00	.43	.33	.53	1.00	.88	3.00	1.81
12	10.62	40.62	5.99	53.7	1.0	2.60	.76	.93	2.22	.60	1.77	.45	1.00	.79	4.41	1.00
6	11.79	11.45		31.8	1.0	3.80			6.00	.64			1.00	.83	3.00	1.11
4	13.11	27.27		37.6	1.0	4.33	.35	.84	3.51	.47	.16	1.13	1.00	1.25	2.52	2.15
3	13.20	37.93	10.12	32.3	1.0	3.47[4]	1.00	.99[5]	2.45	.40	.79	.79[6]	1.00	.88	4.49	1.39
1	13.54	45.30	7.78	49.8	1.0	1.98	1.66	.53	3.39	.44	1.87	.49	1.00	.75	4.22	8.52[7]
13	14.62	15.90	6.56	39.7	1.0	3.87	2.38	.58[10]	2.00	.55	1.00	.63	1.00	1.42	2.33	2.30
16	15.93	18.86	5.52		1.0	5.78	1.30	.65	5.00	.35	1.30	.57	1.00	1.06	3.14	1.83
8	15.98	27.35	7.60	40.4	1.0	3.58	2.26	.81	3.00	.50	3.00	.82	1.26	.58	4.00	2.35[8]
Av. 1923*	9.74	32.41	6.60	32.8	.98	2.82	1.30	.53	2.81	.42	1.10	.61	1.05	.78	3.09	1.24
Av. 1922*	14.23	25.77	6.26	44.3	1.00	3.77	1.74	.70	3.31	.40	1.10	.74	1.00	.95	3.77	1.47
Av. 1924*	9.73	34.69	4.30	28.8	1.00	2.72	1.78	.44	3.62	.35	.75	.55	1.00	.69	2.71	1.33
Av. 3 years.*	12.02	30.34	5.66	36.7	1.00	3.20	1.56	.58	3.30	.39	1.03	.66	1.00	.81	3.23	1.31

[1] Includes .22 man hours hoeing.
[2] Includes 7.27 man hours hoeing.
[3] Once over only.
[4] Includes 1.17 man hours hoeing.
[5] Includes .08 man hours burning stalks.
[6] Includes 2.06 hours of tractor power.
[7] Includes 1.97 hours of tractor power.
[8] Includes .34 hours of tractor power.
[9] Includes .12 hours of tractor power.
[10] Includes .47 hours of tractor power.
* All averages based on farms not using tractors except for the total acreages and yields which are averages for all farms growing corn.
T All tractor power for that operation.

Table VIII.—Horse Work Requirements Per Acre By Operations[1] for Corn, Up to Harvest

(Walworth County, Wisconsin, 1923)

Farm No.*	Total hours per acre	Total acres	Yield per acre		Plowing		Disking		Harrowing		Compacting		Planting		Cultivating	
			Tons silage	Bu. grain	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre
7	8.55[2]	22.47	7.91	19.8	1.0	1.33 T	1.00	.58 T	.24	1.08			1.00	1.52	1.53	3.17
20	22.11	57.18	7.99	22.1	1.0	7.24	2.00	1.42	1.37	2.07	.78	2.34	1.14	1.08	3.62	1.70
21	23.99	21.81	7.73	38.9	1.0	9.17	.71	2.08	4.29	1.06	.35	2.08	1.00	1.65	2.35	2.70
17	21.66	31.53	8.33	25.4	1.0	9.33	2.19	1.43	2.33	.85	.21	3.34	1.08	1.43	3.48	1.44
10	11.51[4]	47.70	6.49		1.0	1.74 T	2.36	.55 T	3.01	1.31[5]			1.29	1.35	2.00	2.70
11	14.71[6]	20.37	5.49	25.5	1.0	2.07 T			3.57	.87	.96	1.50	1.00	1.58	2.00	3.26
9	21.80	28.28	4.80	11.3	1.0	8.67			3.09	1.10			1.00	1.54	2.70	3.02
18	21.81	24.35	10.16	15.0	.7	9.30	.32	.89	3.51	1.28	63	1.46	1.00	2.10	2.52	2.91
5	20.13[7]	29.42	4.28	12.1	1.0	12.58[8]	1.07	2.07	2.44	1.59	1.00	1.14	1.00	1.33	1.86	4.01
14	16.09[9]	54.51	6.05	43.6	1.0	1.50 T	2.00	.68 T	3.00	1.04	1.49	.92	1.00	1.39	2.95	2.49
15	19.82[10]	22.71	6.83	7.6	1.0	16.67[8]	.51	1.56	3.00	1.28	.33	1.06	1.00	1.76	3.00	3.61
12	32.69	40.62	5.99	53.7	1.0	10.39	.76	2.86	2.22	2.11	1.77	1.35	1.00	1.58	4.41	2.60
6	28.65	11.45		31.8	1.0	11.40			6.00	1.49			1.00	1.66	3.00	2.21
4	22.67	27.27		37.6	1.0	12.99	.35	2.52	3.51	1.41	.16	3.36	1.00	2.50	2.52	4.29
3	32.51[11]	37.93	10.12	32.3	1.0	10.11[11]	1.00	3.60[12]	2.45	1.40	.79	1.39	1.00	1.77	4.49	2.78
1	30.56	45.30	7.78	49.3	1.0	5.84	1.66	2.13	3.39	1.28	1.87	1.33	1.00	1.50	4.22	2.95
13	38.30[13]	15.90	6.56	39.7	1.0	15.28	2.38	4.80[14]	2.00	1.64	1.00	1.89	1.00	2.83	2.33	4.61
16	39.70	18.86	5.52		1.0	16.38	1.30	2.61	5.00	.98	1.30	1.14	1.00	2.12	3.14	3.66
8	44.69	27.35	7.60	40.4	1.0	12.30	2.26	4.70	3.00	2.00	3.00	1.63	1.26	1.17	4.00	2.36
Av. 1923[15]	27.13	32.41	6.60	32.8	.98	9.85	1.30	2.23	2.81	1.35	1.10	1.52	1.05	1.56	3.09	2.73
Av. 1922[15]	35.12	25.77	6.26	44.3	1.00	11.88	1.74	2.40	3.31	1.19	1.10	1.70	1.00	1.82	3.77	2.96
Av. 1924[15]	28.51	34.69	4.30	28.8	1.00	9.88	1.78	1.65	3.82	1.09	.75	1.34	1.00	1.38	2.71	2.93
Av. 3 years.[16]	31.74	30.34	5.66	36.7	1.00	10.65	1.56	2.18	3.30	1.22	1.03	1.60	1.00	1.58	3.23	2.83

[1]Once over only
[2]Includes 1.92 hours of tractor power.
[3]Includes .27 hours of tractor power.
[4]Includes 3.67 hours of tractor power.
[5]Includes 2.07 hours of tractor power.
[6]Includes 2.06 hours for tractor power.
[7]Includes 1.55 hours of tractor power.
[8]Includes 2.87 hours of tractor power.
[9]Includes 1.97 hours of tractor power.
[10]Includes .66 hours of tractor power.
[11]Includes .34 hours of tractor power.
[12]Includes .12 hours of tractor power.
[13]Includes .46 hours of tractor power.
[14]Includes .47 hours of tractor power.
[15]Includes .94 hours of tractor power.
[16]Averages based on farms not using tractor except for acreage and yield which are averages for all farms growing corn.

T All tractor power for that operation.

* Farms arrayed in order of total number of man hours per acre (see table VII).

ment per acre, was disked once, one-fourth of it was harrowed, no compacting was done, and all of the corn was cultivated once and half of it twice. The land was disked two or more times on farms 17, 10, 14, 13 and 8. Farms 7 and 20 were the only ones where the land was harrowed less than twice. The land was harrowed five times on farm 16 and six times on farm 6. Some replanting was done on farms 20, 17, 10 and 8, one-fourth of it being replanted in the case of farms 8 and 10. Farms 7 and 5 were the only ones where all the corn was cultivated less than twice.

Standard Requirements for Producing Corn—Up to Harvest

Table IX gives the standard labor requirements for the production of corn up to harvest time. These standards do not necessarily represent the absolute minimum, but they are based on the accomplishments of some of the more efficient men. These standards are goals that most farmers have not yet reached, but under ordinary conditions of soil and size of field it should be possible for most farmers to easily equal or even better these standards by giving some thought to the efficient use of man labor and horse work.

Table IX.—Standard Requirements for Producing Corn, Up to Harvest
(Walworth County, Wisconsin)

Operation*	Equipment	Hours per acre		Acres in 10 hr. day
		Man labor	Horse work	
Plowing**	2 bottom, 14" gang, tractor	1.40		7.10
Plowing	2 bottom, 14" gang, 4 horses	2.50	10.00	4.00
Plowing	1 bottom, 16" sulky, 3 horses	3.25	9.75	3.10
Plowing	2 bottom, 12" gang, 3 horses	2.75	8.25	3.60
Disking	6 ft. disk, 4 horses	.85	3.40	12.00
Disking	6 ft. disk, 3 horses	1.00	3.00	10.00
Harrowng	15 ft., 3 sec. harrow, 3 horses	.40	1.20	25.00
Floating	10 ft. float, 2 horses	.60	1.20	16.70
Rolling	10 ft. roll, 2 horses	.50	1.00	20.00
Cultipackng	8 ft. cultipacker, 2 horses	.60	1.20	16.70
Planting	2 row planter, check or drill	.75	1.50	13.50
Cultivating	Single row cultivator, 2 horses	1.50	3.00	6.70
Cultivating	Two row cultivator, 3 horses	.80	2.40	12.50

*Once over.
**Corn and grain stubble.

Size of machine and the number of horses used certainly are things to be considered, for they have a very distinct bearing on the man labor required for performing various operations. This is especially evident in the case of the one- and two-row cultivators. Nearly six more acres of corn can be cultivated per day with the two-row cultivator than with the single-row machine. In addition to the greater amount of land covered, the entire time of one man and one horse is saved. This is a saving of real importance, especially since it comes at a time of the year when other farm work is very pressing and competing strongly for labor.

Cost of Producing Corn Silage

The cost of producing corn silage on the route farms in 1923, together with the average cost for each of the three years, is given in Table X. The

Table X.—Cost of Producing Corn Silage
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per ton	Yield per acre in tons	No. of acres	Cost per acre									
				Man labor	Horse work	Interest	Taxes	Equipment	Filling silos	Seed and twine	Manure	Overhead and other	Total
18	$ 3.03	10.16	6.00	$ 6.49	$ 7.43	$ 5.60	$ 1.67	$ 3.28	$ 4.00	$ 1.80	$	$ 1.10	$30.77
17	3.42	8.33	10.50	4.13	4.82	4.35	1.27	3.21	3.07	1.38	4.74	1.55	28.52
20	3.57	7.99	25.00	4.49	5.32	4.49	1.99	2.25	3.40	1.26	4.03	1.29	28.54
3	4.23	10.12	12.00	5.65	6.58[8]	7.10	2.70	2.29	5.10	.81	11.18	1.40	42.81
21	4.24	7.73	10.74	5.02	4.71	6.52	1.48	2.36	3.64	.98	6.40	1.65	32.76
7	4.48	7.91	15.50	4.13	8.88[9]	7.00	2.21	1.75		.90	7.01	3.58	35.46
1	4.49	7.78	13.55	5.61	6.09	6.01	1.70	2.84	.28	.88	4.37	2.70	30.48
13	4.65	6.56	9.30	6.08	8.70[10]	5.16	1.27	2.19	2.07	.95	4.57	.49	31.48
10	4.80	6.49	27.68	4.95	11.04[9]	4.59	1.67	2.37	.97	.72	4.33	.60	31.24
14	4.80	6.05	44.51	4.47	5.47[2]	4.25	1.35	2.35	2.77	1.34	6.91	.47	29.38
11	5.01	5.49	18.37	3.81	6.00[1]	4.57	1.68	2.19		1.12	4.77	3.30	27.53
12	5.24	5.99	18.88	4.95	7.47	6.20	1.64	1.71	3.14	1.16	3.45	1.69	31.41
8	5.33	7.60	11.50	7.10	10.30	7.17	1.39	2.96	.13	.85	9.05	1.63	40.58
15	5.39	6.83	18.00	4.62	4.93[6]	8.10	1.80	1.49	4.16	1.00	8.84	1.90	36.84
9	5.49	4.80	17.68	4.10	5.41	6.78	1.57	1.01	2.04	.84	4.07	.55	26.37
5	5.60	4.28	25.05	4.04	3.34	6.25	1.80	1.13	1.18	1.16	4.00	1.14	24.04
16	6.16	5.52	9.50	5.87	7.85	5.74	1.75	1.36	2.21	.69	6.71	1.85	34.03
2	6.38	5.88	17.50	3.32	10.96[7]	6.12	1.72	5.66	2.57	1.03	2.78	3.38	*37.54
Av. 1923	4.75	6.60	17.29	4.70	6.79[3]	5.67	1.69	2.28	2.19	1.07	5.44	1.55	31.38
Av. 1922	5.34	6.26	13.54	5.58	7.63[10]	5.97	1.46	2.82	2.13	.92	5.60	1.34	33.45
Av. 1924	6.20	4.30	21.76	4.27	6.26[11]	4.82	1.58	1.75	1.23	1.14	4.01	1.48	26.54
Av. 3 years	5.35	5.66	17.03	4.83	6.87[12]	5.46	1.58	2.26	1.83	1.04	4.98	1.46	30.31
Av. % of Cost 3 years				15.9	22.7[13]	18.0	5.2	7.5	6.0	3.5	16.4	4.8	100.0

[1]Includes $2.07 tractor power.
[2]Includes 2.86 tractor power.
[3]Includes 5.85 tractor power.
[4]Includes .96 tractor power.
[5]Includes 1.93 tractor power.
[6]Includes .67 tractor power.
[7]Includes 2.16 tractor power.
[8]Includes $0.73 tractor power.
[9]Includes 1.37 tractor power.
[10]Includes .56 tractor power.
[11]Includes 1.31 tractor power.
[12]Includes 1.09 tractor power.
[13]Includes 3.6% tractor power.

cost per acre ranged from $24.04 to $42.81, the average being $31.38. It cost on an average $4.75 to produce a ton of corn silage on the route farms in 1923, the range in cost being from $3.03 to $6.38. This is a difference of $3.35 per ton between the most efficient and least efficient producer of silage. A ton of silage along with other feeds produces approximately seventeen hundred pounds of milk. A difference of $3.35 in the cost of silage per ton means a difference of 20 cents in the cost of producing 100 pounds of milk. Labor was the largest single item in the cost of producing corn silage; man labor, horse work, and tractor power on the average making up 36.6 per cent of the entire cost.

Reasons for Variation in Cost

Yield. Yield per acre is the most important factor in the determination of the per ton cost of silage. This fact is clearly shown in Table XI showing the per acre and per ton cost of producing silage. All those produc-

*Table XI.—High Yield Reduces Cost—Cost of Producing Corn Silage—Two Groups**
(Walworth County, Wisconsin)

Group	Number farms in group	Total number acres	Average yield per acre tons	Average cost per acre	Average cost per ton
Less than 6 tons per acre	27	519.46	4.16	$27.03	$6.50
Over 6 tons per acre	30	541.31	7.57	34.10	4.50

*Based on records kept on 57 farms during 1922, 1923 and, 1924.

ing silage were divided into two groups—those getting yields of less than six tons per acre and those getting yields of over six tons per acre. It will be seen from the table that the average per ton cost on the low producing farms was $6.50 and $4.50 on the high producing farms. This was true in spite of the fact that the per acre cost was $7 greater in the case of the high-producing group.

Practically the same results are shown by an analysis of the 1923 records

Table XII.—High Yield Reduces Cost—Cost of Producing Corn Silage 1923[1]
(Walworth County, Wisconsin)

Group	Number farms in group	Total number acres	Average yield per acre tons	Average cost per acre	Average cost per ton
Less than 6 tons per acre	6	106.98	5.25	$29.42	$5.60
Over 6 tons per acre	12	204.28	7.31	32.41	4.43

[1]Yields can not be increased indefinitely because of the so-called law of diminishing returns. It is easily possible to increase the average yield of the area fifty per cent or more without costs increasing out of proportion to income.

Table XIII.—Man Labor and Horse Work Requirements Per Acre by Operations[11] for Corn Silage
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per ton	Yield per acre in tons	No. of acres	Hours man labor per acre				Hours horse work per acre			
				Before harvest	Cutting	Silo filling	Total[12]	Before harvest	Cutting	Silo filling	Total[12]
18	$ 3.03	10.16	6.00	8.71	1.35	17.86	27.92	21.81	4.06	29.18	55.05
17	3.42	8.33	10.50	7.27	1.36	10.00	18.63	21.86	4.09	13.35	39.10
20	3.57	7.99	25.00	5.81	1.15	11.98	18.94	22.11	3.97	13.68	39.76
3	4.23	10.12	12.00	13.20	1.00	11.50	25.70	32.51[7]	1.49	13.58	47.58[7]
21	4.24	7.73	10.74	7.14	1.65	13.50	22.29	23.99	4.59	19.93	48.51
7	4.48	7.91	15.50	5.23	.80	14.15	20.18[9]	8.55[4]	2.23	21.37	32.15[4]
1	4.49	7.78	13.55	13.31	1.97	10.38	25.66	30.03	5.02	15.50	50.55
13	4.65	6.56	9.30	14.62	2.01	9.33	25.96	38.30[8]	6.10	10.67	55.07[8]
10	4.80	6.49	27.68	7.52	1.94	12.67	22.13	11.51[5]	5.84	15.03	32.38[5]
14	4.80	6.05	44.51	9.16	1.00	9.61	19.77	16.09[3]	3.91	4.89	24.89[3]
11	5.01	5.49	18.37	7.66	1.90	7.46	17.02	14.71[1]	5.72	11.65	32.08[1]
12	5.24	5.99	18.88	10.62	1.30	7.63	19.55	32.69	3.92	11.00	47.61
8	5.33	7.60	11.50	15.98	2.12	13.48	31.58	44.69	4.24	17.74	66.67
15	5.39	6.83	18.00	9.21	2.56	8.70	20.47	19.82[6]	7.67	14.27[6]	41.76[10]
9	5.49	4.80	17.68	7.66	2.71	8.42	18.79	21.80	5.42	8.10	35.32
5	5.60	4.28	25.05	9.01	2.33	7.35	18.69	20.13[2]	5.82	9.44	35.39[2]
16	6.16	5.52	9.50	15.93	1.63	10.07	27.63	39.70	4.89	12.87	57.46
Av. 1923*	4.75	6.60	17.29	9.74	1.64	10.38	21.76	27.13	4.58	12.50	44.21
Av. 1922*	5.34	6.26	13.54	14.23	1.85	11.70	27.78	35.12	5.05	14.81	54.98
Av. 1924*	6.20	4.30	21.76	9.73	1.62	6.18	17.53	28.74	4.61	8.89	42.24
Av. 3 years.*	5.35	5.66	17.03	12.02	1.77	8.66	22.45	31.74	4.92	11.54	48.20

[1]Includes 2.07 hours of tractor power.
[2]Includes 1.55 hours of tractor power.
[3]Includes 2.87 hours of tractor power.
[4]Includes 1.92 hours of tractor power.
[5]Includes .66 hours of tractor power.
[6]Includes 3.67 hours of tractor power.
[7]Includes .46 hours of tractor power.
[8]Includes .94 hours of tractor power.
[9]Includes .17 hours of tractor power.
[10]Includes .83 hours of tractor power.
[11]Once over only.
[12]Based on number of acres—times over not considered.
*Average hours of labor based on records from farms not using tractors except for acreage and yield which are averages for all farms growing corn for silage.

alone as shown in Table XII. There was $1.17 difference in the cost per ton in favor of the high-producing group in spite of $2.99 greater cost per acre.

Variation in Labor Requirements. The labor required was a second factor affecting the cost of producing silage. Table XIII shows that there was a large variation in the amount of both man labor and horse work required in the production of this crop. The total amount of man labor varied from 17.02 to 31.58 hours per acre, or a difference of 14.27 hours, and the horse work varied from 30.01 to 66.67 hours per acre, or a difference of 36.66 hours. This difference in man labor and horse work at the average figures of 22 cents an hour for man labor and 14.6 cents an hour for horse work would make a difference of $8.49 per acre. The great variation in labor requirement, as pointed out later in the discussion, is due to a number of factors including yield, size and type of machinery used, and the size of the silo filling crew.

Labor Requirements for the Production of Corn Silage

Table XIII gives the man labor and horse work requirements in the production of corn silage on the route farms in 1923. The column marked "before harvest hours" includes all the labor required up to the time that the corn was ready to be cut. The distribution of these hours may be found in Tables VII and VIII. As in the case of labor requirements for other crops, the labor requirements for the production of corn silage varied considerably from farm to farm. The man hours varied from 17.02 to 31.58 hours per acre, while the horse hours varied from 39.10 to 66.67 hours per acre on those farms not using tractors.

Yield. As pointed out previously, increased yields materially increased the per acre labor requirements. Those farms having yields above the average of the entire group used 23.0 man hours and 44.8 horse hours per acre. The group having yields below the average of all the farms used 20.3 man hours and 33.4 horse hours per acre. The group having the lower per acre yield used fewer man hours per acre than did the group having the higher yield. This shows that it required more labor to harvest a large than a small crop.

Size and Type of Machinery. The use of tractors and large size machinery, as pointed out in the discussion of the "labor requirements up to harvest time," materially reduced the labor requirements in the production of corn silage. It required, on the average, about half an hour more to cut an acre of corn with a binder and two horses than with a binder and three horses.

Size of Silo Filling Crew. The high labor requirement for silo filling on farm 18 was due to the fact that there were so many teams in the crew that a great deal of waiting in line to unload at the filler was necessary. The same was true on farm 21. There were 13 teams included in the silo filling crews on these two farms. This was seven more teams than were used on the majority of the farms. In all, there were 16 men in the crew on farm 18, and 18 men in the crew on farm 21. On the average, there were nine men and six teams in the silo filling crews on those farms having man labor requirements of less than 10 hours per acre for silo filling.

Table XIV.—Standard Requirements for Producing Corn Silage
(Walworth County, Wisconsin)

Operation*	Equipment	Hours per acre		Acres in 10 hr. day
		Man labor	Horse work	
Cultivation**	All operations up to harvest	12.10	31.55	
Cutting	Corn binder, 2 horses	2.25	4.50	4.40
Cutting	Corn binder, 3 horses	1.80	5.40	5.50
Silo filling	Crew, hours per acre	10.25	12.50	10.00
Silo filling	Crew, hours per ton	1.50	1.75	
Seed	12 pounds seed per acre			
Twine	3 pounds twine per acre			

*Once over.
**Includes plowing, 2 diskings with 4 horses, 3 harrowings, 2 cultipackings, planting and 3 cultivations with a single row cultivator.

Standard Requirements for Producing Corn Silage

Table XIV gives the standard requirements for the production of corn silage. A little over twelve hours of man labor and thirty-one and a half hours of horse work are given as the standard labor requirements up to harvest time. This will vary some with the amount of fitting necessary in the preparation of a good seedbed, but the figures given represent a goal toward which to work and a standard by which individual efficiency may be measured. Experience of the route farmers shows that about one acre of corn more can be cut per day with a binder and three horses than with a binder and two horses.

The number of hours per acre required in filling silos varied from farm to farm depending on the yield and the size of the crew. The number of hours per ton is a better indication of the efficiency of the silo filling operations than is the hours labor per acre.

The seed used per acre varied from about eight and one-half pounds to twenty-four pounds. One of the most successful corn growers, farm 1, used approximately ten pounds of seed per acre, on the average. Experiments conducted by the Wisconsin Experiment Station indicate that slightly over nine pounds of seed that will germinate gives the best results both for seed corn checked in and silage corn drilled in.

Cost of Producing Corn for Grain

Table XV gives the cost of producing corn for grain on the route farms in 1923. The average cost per acre, $30.36, was about one dollar less than the cost of producing silage. The range in cost per acre was from $21.72 to $42.25,—a range of $20.53. The range in yield was even greater. The yield varied from 7.6 bushels to 53.7 bushels per acre, and the per bushel cost was from 68 cents per bushel to $3.21 per bushel. This table includes the cost of all corn not put into silos. Corn was shredded on nine of the farms. On the other farms, it was either husked by hand or fed in the bundle to the cattle during the winter. The entire corn crops on farms 6 and 4 were fed out from the bundle during the winter—none being put into silos or shredded.

Table XV.—Cost of Producing Corn Grain

(Walworth County, Wisconsin, 1923)

Farm No.	Cost per bushel	Yield per acre bushels	No. of acres	Cost per acre									
				Man labor	Horse work	Interest	Taxes	Equipment	Shredding	Seed and twine	Manure	Overhead and other	Total
1	$ .68	49.3	30.96	$ 6.76	$ 5.68	$ 6.01	$ 1.70	$ 2.85	$ .16	$ .87	$ 6.69	$ 2.74	$ 33.46
8	.70	40.4	15.85	6.09	8.25	7.18	1.39	2.25	----------	.86	1.01	1.14	28.17
12	.72	53.7	21.74	7.71	9.15	6.22	1.65	1.70	2.73	1.16	6.48	2.09	38.89
14	.79	43.6	10.00	5.48	6.28[6]	4.24	1.35	2.38	2.48	1.31	10.46	.54	34.52
21	.81	38.9	11.07	4.92	4.16	6.45	1.48	2.40	2.80	.98	6.78	1.60	31.57
13	.84	39.7	6.60	6.37	8.87[4]	5.34	1.31	2.25	2.42	.96	5.27	.52	33.31
17	.86	25.4	21.03	3.59	3.88	4.36	1.27	1.32	1.77	1.39	3.04	1.18	21.80
20	.98	22.1	32.18	2.76	3.35	4.50	1.99	2.23	1.80	1.27	2.35	.97	21.72
3	1.02	32.3	25.93	5.47	6.58[4]	7.10	2.68	1.46	1.23	.66	6.76	1.01	32.95
4	1.12	37.6	22.37	11.33	11.12	4.82	1.31	.74	----------	1.21	8.61	3.11	42.25
11	1.20	25.5	2.00	5.77	8.64[4]	4.57	1.69	1.08	----------	.75	4.62	3.47	30.59
6	1.25	31.8	11.45	8.90	8.99	7.00	1.70	1.10	----------	1.12	8.80	2.39	40.00
7	1.37	19.8	6.07	2.73	6.13[3]	7.00	2.21	1.74	----------	.90	3.68	2.72	27.11
18	1.45	15.0	19.20	3.13	3.66	4.29	1.44	2.50	----------	1.72	3.08	1.93	21.75
5	1.89	12.1	4.37	4.56	3.57	6.25	1.78	1.13	----------	1.04	3.50	1.09	22.92
9	2.22	11.3	10.60	4.64	5.46	6.78	1.57	1.00	2.25	.84	2.04	.53	25.11
15	3.21	7.6	4.70	5.20	4.91[1]	8.12	1.81	1.49	----------	.95	.83	1.27	24.58
Av. 1923	.92	32.8	15.12	5.72	6.33[7]	5.72	1.70	1.86	1.12	1.09	5.14	1.68	30.36
Av. 1922	.80	44.3	12.37	5.91	7.62[8]	6.26	1.64	2.83	2.09	.86	6.94	1.47	35.62
Av. 1924	.94	28.8	12.98	5.68	5.72[9]	4.95	1.74	1.60	.72	1.27	3.99	1.55	27.22
Av. 3 yrs.	.87	36.7	13.34	5.79	6.73[10]	5.78	1.68	2.20	1.44	1.04	5.63	1.57	31.86
Av. % of cost 3 yrs.	----------	----------	----------	18.2	21.1[11]	18.1	5.3	6.9	4.5	3.3	17.7	4.9	100

[1] Includes $.64 tractor power.
[2] " 1.87 " "
[3] " 2.00 " "
[4] " .86 " "
[5] " .91 " "
[6] " 2.85 " "
[7] Includes $.30 tractor power.
[8] " .66 " "
[9] " .88 " "
[10] " .58 " "
[11] " 1.8% " "

Reasons for Variation in Cost of Producing Corn for Grain

Method of Handling the Crop. The corn on farms 4 and 6 was cut with a binder in the usual manner, but none of it was put in a silo or shredded. The corn on these two farms was all shocked, hauled to the barn and the larger part of it stacked and fed to the cattle during the winter. Part of it was fed directly in the bundle, the remainder being husked out by hand and the grain ground and fed with other concentrates to the dairy herd. The stover was generally fed directly to the stock as the corn was husked.

The labor required in the production of an acre of corn was the highest on these two farms. On farm 4, 42.15 hours of man labor and 55.17 hours of horse work were required in the production of an acre of corn. On farm 6, the requirement was 33.99 hours of man labor and 47.73 hours of horse work per acre. The average of those shredding part of their corn and putting some corn in the silo was about 22 hours of man labor and about 43 hours of horse work per acre. Practically 85 per cent of the difference in the amount of labor required by these two methods of harvesting corn was due to extra labor in handling the crop. Nearly 16 hours more of man labor was required per acre in harvesting corn on these two farms than was required on the other route farms. This gives some idea of the extra labor required in handling the corn crop without the use of a silo or modern corn husking machinery. This does not take into consideration the extra labor and inconvenience in taking the corn from the stack during the winter.

Yield. Yield per acre has a direct effect on the cost per bushel. Farms 18 and 17 had about the same per acre costs and yet the per bushel cost was 86 cents on one farm and $1.45 on the other farm—a difference of 59 cents per bushel. This difference in cost was largely due to a difference of 10 bushels per acre in the yield.

Labor Requirements for Producing Corn for Grain

Table XVI gives the man and horse work requirements per acre in the production of corn that was shredded in 1923. Nine of the twenty-two farmers on the route shredded some corn that season. The total man labor ranged from 14.40 to 29.88 hours per acre and the horse work from 30.70 to 56.94 hours per acre.

Method of Seedbed Preparation. The "before harvest hours" varied greatly from farm to farm, and this variation had a marked effect upon the total number of hours required per acre for shredding corn. This was discussed in the earlier part on "labor requirements up to harvest time."

Time for Shocking. The time for shocking varied from farm to farm, and all of the variation cannot be accounted for on a basis of the yield. Judging from the time required for shocking on most of the farms, the requirements on farms 14, 9, 3, and 12 were entirely too high—much higher than necessary under ordinary conditions.

Shredding. The 11.58 acres on farm 3 were shredded out by thirteen men and nine teams in about three hours. This was unusually fast time, but the haul was short, the corn in good condition, and the crew was

Table XVI.—Man Labor and Horse Work Requirements Per Acre for Shredding Corn By Operations[1]

(Walworth County, Wisconsin, 1923)

Farm No.	Cost per bushel	Yield per acre bushels	Hours man labor per acre						Hours horse work per acre			
			No. of acres	Before harvest	Cutting	Shocking	Shredding	Total[5]	Before harvest	Cutting	Shredding	Total[5]
1	$ .68	41.9	8.50	13.31	1.97	2.60	11.70	29.58	30.03	5.02	15.76	50.81
12	.72	41.2	21.74	10.62	1.30	6.34	11.57	29.83	32.69	3.92	20.33	56.94
14	.79	23.0	6.00	9.16	1.00	6.75	6.90	23.81	16.09	3.91	10.33	30.33[1]
21	.81	33.1	11.07	7.14	1.65	2.12	7.23	18.14	23.99	4.59	7.60	36.18
13	.84	25.2	5.10	14.62	2.01	3.33	9.02	28.98	38.30	6.10	14.12	58.52[2]
17	.86	27.1	18.48	7.27	1.36	1.01	6.90	16.54	21.66	4.09	6.16	31.91
20	.98	25.5	16.00	5.81	1.15	2.07	5.37	14.40	22.11	3.97	4.62	30.70
3	1.02	33.0	11.58	13.20	1.00	7.90	3.71	25.81	32.51	1.49	10.53	44.53[3]
9	2.22	16.0	7.50	7.66	2.71	4.13	9.35	23.85	21.80	5.42	8.00	35.22
Av. 1923[6]	.92	32.8	15.12	9.74	1.48	3.56	7.98	22.76	27.13	4.19	10.98	42.30
Av. 1922[6]	.80	44.3	12.37	14.23	2.01	3.48	9.75	29.47	35.12	5.34	9.63	50.09
Av. 1924[6]	.94	28.8	12.08	9.73	1.43	2.50	5.56	19.31	28.74	4.07	3.90	36.71
Av. 3 yrs.[6]	.87	36.7	13.34	12.02	1.67	3.23	7.95	24.87	31.74	4.58	8.18	44.50

[1]Includes 2.87 tractor hours.
[2] " .46 " "
[3] " .94 " "
[4]Once over only.
[5]Based on number of acres—times over not considered.
[6]Average hours of labor based on records from farms not using tractors except for acreage and yield which are for all farms growing corn for grain.

anxious to move before dinner. The corn was heavier on both farms 1 and 12, and the average length of haul on farm 12 was nearly one-half mile.

Standard Requirements for Producing Shredding Corn

Table XVII gives the standard requirements for the production of corn for grain. These standards apply only where the corn was shredded and not where it was husked by hand. The time required for shocking will

Table XVII.—Standard Requirements for Producing Shredding Corn
(Walworth County, Wisconsin)

Operation*	Equipment	Hours per acre		Acres in 10 hr. day
		Man labor	Horse work	
Cultivation	All operations up to harvest time	12.10	31.55	
Cutting	Corn binder, 2 horses	2.25	4.50	4.40
Cutting	Corn binder, 3 horses	1.80	5.40	5.50
Shocking	Shocking and tying	3.00		3.33
Shredding	Crew	8.00	10.00	10.00
Seed	12 pounds per acre			
Twine	3 pounds per acre			

*Once over.

depend to some extent on the condition of the corn and the ground at the time of shocking, as well as the yield per acre, but under good conditions many of the men shocked an acre in less than three hours.

Usual Dates for Corn Operations

The usual dates for performing the different corn operations are shown in Chart 3. The extreme dates for the performance of these operations are not shown. Fall plowing is done for corn, oats, and barley, and no attempt is made to differentiate between the fall plowing operations for the different crops. The usual dates for performing this operation are shown in Chart 3 only, although more oat and barley land than corn land is plowed in the fall.

Usual Dates for Performing Operations—Corn

Operations	Usual dates	Total days	Days available
Fall plowing	October 1—December 4	66	47
Spring plowing	April 20—June 6	48	40
Disking	May 1—June 15	45	34
Harrowing	May 5—June 18	45	33
Floating	May 8—June 1	25	20
Rolling and cultipacking	May 4—June 9	37	28
Planting	May 11—June 11	30	21
Cultivating	June 1—July 25	55	41
Cutting	September 5—October 20	45	33
Silo filling	September 10—October 8	29	21
Shocking	September 21—October 21	30	23
Shredding	November 1—December 10	40	28
Husking	October 1—November 10	40	29

It will be found that the dates for performing the operations will vary from year to year. This is especially true of such years as 1924 when, because of the wet, backward season, all cropping operations were retarded and many were extended over a much longer period of time than usual. The sequence of operations will remain the same, however. It will be noticed that the number of days available for the performance of the differ-

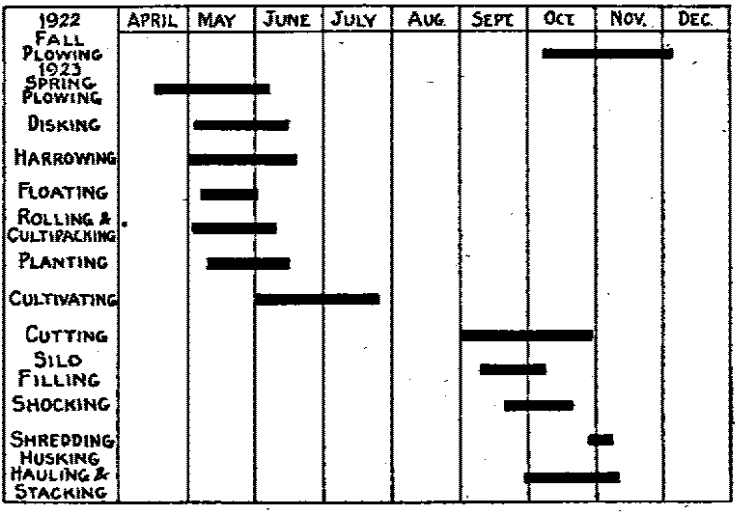


Chart 3.—Days Available for Performing Crop Operations (Corn) Walworth County, Wisconsin.

ent operations varies with the operation. Some operations, as the plowing of hay land for corn, are not interfered with by small rains. Other operations, as harrowing, planting and cultivating corn, are stopped by rains which will not affect plowing.

Plowing for corn begins quite early in the spring and continues over a longer period of time than any other operation except fall plowing and cultivating corn. Cultivating operations are normally spread over a ten day longer period than is spring plowing, but since rains which will stop cultivation will not affect plowing there are practically as many days available for this operation as for the cultivation of corn.

Usual Practices in Oat Production

Oats is the second most important crop of the area when expressed in terms of acreage. Slightly more than 13 per cent of the total farm area, or 21 per cent of the crop area, was in oats for the average of the three years. It is produced principally as feed for horses and dairy cattle, although a small quantity is sold as a cash crop to the local elevators and farmers.

Most land being prepared for oats is plowed in the fall. The small

Table XVIII.—Cost of Producing Oats
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per bushel	Yield per acre bushels	No. of acres	Cost per acre: Man labor	Horse work	Interest	Taxes	Equipment	Threshing	Seed	Twine	Manure	Overhead	Total
20	$ .34	52.2	38.28	$ 2.12	$ 2.30	$ 4.50	$ 1.99	$ 3.13	$ .17	$ .98	$ .44	$ 1.27	$ .85	$ 17.75
17	.42	58.7	12.87	2.95	3.08	4.35	1.27	4.30	2.09	2.00	.36	3.21	1.36	24.97
5	.43	54.4	15.44	2.44	2.44	6.25	1.80	.63	2.28	1.44	.36	4.87	1.12	23.63
11	.46	54.4	18.91	2.57	3.55[3]	4.57	1.68	1.88	2.18	1.46	.36	4.54	2.20	24.99
12	.46	51.8	23.65	2.70	3.64	6.21	1.64	2.07	1.75	1.32	.34	2.83	1.28	23.78
19	.50	30.0	30.96	2.01	2.06	5.56	1.24	2.36	1.37	1.11	.19	2.02	.56	19.38
1	.54	42.4	12.09	4.05	3.83	6.00	1.70	1.09	.15	1.49	.33	2.69	1.33	23.56
21	.54	36.0	16.40	2.01	2.02	6.48	1.48	1.01	1.43	.91	.27	2.87	.99	19.47
8	.60	43.4	42.60	3.55	4.25	6.13	1.37	1.92	1.07	1.39	.32	4.97	1.05	26.02
16	.60	42.0	11.15	3.30	3.73	5.75	1.75	1.09	1.72	1.57	.29	4.62	1.37	25.19
22	.61	40.0	9.15	3.39	4.73	7.25	1.59	1.82	1.56	1.31	.25	1.31	1.33	24.54
14	.61	33.9	35.45	3.01	3.49[1]	4.24	1.35	1.33	1.13	1.69	.34	3.70	.33	20.61
9	.65	33.0	25.53	2.48	3.47	6.78	1.56	.90	1.49	1.47	.28	2.69	.44	21.56
6	.71	30.3	17.20	2.77	2.63	7.00	1.70	.73	1.33	1.55	.21	4.20	1.40	23.52
4	.77	37.6	14.35	4.67	6.64	4.81	1.30	1.43	1.35	2.20	.28	3.93	2.08	28.69
13	.81	23.5	11.81	2.56	3.41	5.33	1.31	1.70	1.19	1.32	.28	1.57	.30	18.92
2	.90	23.6	52.80	1.71	4.54[2]	6.12	1.71	1.78	.94	1.39	.23	1.07	1.72	21.21
Av. 1923	.56	39.9	22.86	2.67	3.57[4]	5.66	1.56	1.83	1.24	1.40	.30	2.94	1.11[5]	22.28
Av. 1922	.60	36.4	18.80	2.43	3.41[6]	6.18	1.54	1.89	1.33	1.09	.28	2.89	.91	21.95
Av. 1924	.68	33.7	19.22	3.28	3.54[8]	4.98	1.64	1.53	1.19	2.33	.33	2.85	1.88	22.98
Av. 3 yrs.	.61	36.8	20.19	2.77	3.51[7]	5.63	1.58	1.76	1.26	1.58	.30	2.89	1.10	22.38
Av. % of cost 3 yrs.				12.4	15.8[9]	25.2	7.1	7.9	5.6	7.1	1.4	12.5	5.0	100

[1] Includes $2.06 tractor power.
[2] " .77 " "
[3] " 2.22 " "
[4] " .40 " "
[5] Includes $.32 tractor power.
[6] " .90 " "
[7] " .53 " "
[8] " 2.4% " "

amount of spring plowing usually represents the completion of fields started in the fall or the plowing of land from which corn was not removed sufficiently early in the fall to permit plowing before the ground froze.

"Disking in" oats is not generally practiced in this section of the state, but in all cases where it was practiced the yields were as high or higher than the average of the group. Practically all oats are sown following corn. In a few cases, however, oats were sown following oats or barley.

Two-thirds of the oat land is disked after plowing, practically all of it being disked twice. It is all harrowed both before and after sowing. One-third of the oat land is cultipacked after sowing, but very little soil compacting is done before sowing.

Over 75 per cent of all oats is drilled in, the remainder being put in with an ordinary seeder. After being cut with a binder it is shocked. In 1923 one farmer stacked his grain and threshed late in the fall. With this exception, however, the grain was threshed directly from the shock.

Variations in Costs of Producing Oats

Table XVIII shows the cost of producing oats[1] on each of the route farms in 1923 together with the average cost on all the farms for each of the three years. The last line of this table contains the cost distribution in percentage of the total cost. The average costs per acre varied very little from year to year. The costs for 1924 were higher than for the other two years.

It will be noted that the cost per bushel varied inversely with the yield. The per bushel cost varied from 34 to 90 cents for that year. This shows that oats handled in the right way can be made to pay.

*Table XIX.—High Yield Reduces Cost—Cost of Producing Oats—Two Groups**
(Walworth County, Wisconsin)

Production group	Number farms in group	Total number acres	Average yield per acre bu.	Average cost per acre	Average cost per bu.
Less than 37 bu. per acre	28	571	28.8	$20.90	$.73
Over 37 bu. per acre	28	563	45.2	23.83	.53

*Based on records kept on 56 farms during 1922, 1923, and 1924.

Reasons for Variation in Cost

Yield. The per acre yield was the outstanding factor affecting the cost per bushel. This fact is shown very clearly in Table XIX. All of the farms producing oats were divided into two groups—those producing less than 37 bushels per acre and those producing over 37 bushels per acre.

[1]No attempt has been made to credit the oat crop with its value as a nurse crop for the hays which are usually seeded with it. Credit for this would reduce the cost of producing oats somewhat.

There was a difference of 16.4 bushels in the production of the two groups and a difference of 20 cents per bushel in the cost in favor of those producing over 37 bushels per acre. The higher producing group had the lower cost per bushel despite the fact that the cost per acre was $2.93 greater than that of the low producing group. The nine farms having yields above the average in 1923 produced oats at a cost of approximately 48 cents per bushel, or about 13 cents less than the route average for that year. The high-producing farms produced an average of nine bushels per acre more than the average of all the route farms.

Seedbed Preparation. Those "disking in" oats on corn stubble have consistently gotten yields from nine to twelve bushels above the average of the entire group. By "disking in" is meant the practice of disking the corn stubble for oats instead of plowing. The common method practiced by those "disking in" oats in Walworth county was to double-disk the corn stubble, sow the grain, and then go over the land with a spike-tooth drag.

Rate of Seeding. The rate of seeding also has an influence upon yield. Nearly two-thirds of those having yields above the average in 1923 and 1924 planted more than 2.6 bushels per acre. Practically 90 per cent of those having yields above the average in 1924 used more than 2.5 bushels of seed per acre. In 1923 those using more than 2.5 bushels of seed per acre received, on an average, 5 bushels more per acre than those seeding 2.5 bushels or less per acre.

This supports the results of experiments carried on by the Wisconsin Experiment Station in which it was found that oats seeded at a rate of three bushels per acre gave better yields than any smaller amount.[2] When used as a nurse crop, a lighter rate of seeding is always desirable.

Variety of Seed. Variety of seed also affects yield. Over a ten-year period, it was found by the Experiment Station that pedigree No. 1, Wisconsin Wonder, and Wisconsin No. 7, State's Pride, each gave an average yield of 52.8 bushels per acre. Pedigree No. 4, Early Gothland, gave an average yield of 51.6 bushels per acre over the same period, and it did not lodge as much as the Kherson. These varieties are recommended for central and southern Wisconsin.

Use of Labor. The effective use of both man labor and horse work was a second important factor influencing the cost of producing oats. A study of Tables XX and XXI, giving the man and horse work required to produce an acre of oats, and Table XXII, giving the cost of producing oats, reveals the fact that some of the men secured better results with a relatively low amount of labor than some of those with a relatively high amount of labor.

Farms 22, 16, 8, 1, and 4, for instance, all used a relatively high amount of both man and horse labor per acre, the average being about 15½ hours of man labor and about 29¼ hours of horse work per acre. Farms 12, 5, 20, and 17 had a relatively low amount of labor per acre, the average being about 10¾ hours of man labor and about 22 hours of horse work per acre.

[2]Conclusion from experiments carried on at the Ashland Station in Northern Wisconsin. This holds with the less thorough seed bed preparations. The effect of heavy seeding rates upon thoroughly prepared seedbeds as contrasted with lighter seedings cannot be determined from these records.

Table XX.—Man Labor Requirements Per Acre By Operations for Oats[3]
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per bushel	Grand[4] total hours labor per acre	Yield per acre bushels	No. of acres	Plowing		Disking		Harrowing		Compacting		Hours per acre					
					Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Seeding	Cutting	Shocking	Threshing	Total[4]	All crop
20	$ .34	9.64	52.2	38.28			2.50	.39	2.00	.15	1.00	.44	.60	.89	1.35	4.92	9.49	.16
17	.42	13.42	58.7	12.87	1.00	3.66	1.00	.54	1.68	.17	1.00	.23	.77	.76	.70	5.99	12.93	.49
5	.43	11.10	54.4	15.44	1.00	2.42	1.00	1.02	2.00	.26			.55	1.02	1.46	3.88	10.86	.23
11	.46	12.37T	54.4	18.91	1.00	2.06T			1.00	.69T	.33	.05	.73	1.05	1.79	4.44	11.80T	.57
12	.46	12.87	51.3	25.65	1.00	2.80	1.25	.48	1.99	.32	.85	.48	.90	.97	1.48	4.23	12.62	.25
19	.50	9.10	39.0	30.96	.72	2.25	.14	.58	2.03	.29			.60	1.03	.66	4.53	9.10	
1	.54	18.44	43.4	12.09	1.00	2.64	1.00	.82	3.00	.23	1.00	.54	.79	1.58	2.27	9.16	17.93	.52
21	.54	9.12	36.0	16.40	1.00	1.83	2.00	.46	2.00	.24			.43	.85	1.10	3.11	9.12	.40
8	.60	15.15	43.4	42.60	1.00	3.05	1.00	.82	2.00	.40	2.06	1.03	.75	1.51	.85	4.58	15.54	.61
16	.60	15.03	42.0	11.15	1.00	3.05	1.00	.81	3.00	.30	.72	.74	.85	1.70	2.15	5.02	15.03	
22	.61	15.42	40.0	9.15	1.00	1.09	2.00	1.37	2.00	.49	1.00	.76	.65	1.31	2.73	4.15	14.44	.98
14	.61	13.66T	33.9	35.45	1.00	.93T	4.32	.26T			.14	.71	.85	1.08	1.41	7.85	13.34T	.33
9	.65	11.27	33.0	25.53	1.00	2.80	.66	.95	2.00	.36			.92	1.37	.85	3.32	10.63	.53
6	.71	12.51	30.3	18.70	1.00	2.91	1.00	.83	2.45	.87			.96	1.10	1.07	3.02	11.92	.59
4	.77	21.21	37.6	14.35	1.00	5.05	.51	.82	3.47	.70	.47	1.48	1.88	5.64	2.48	4.47	19.19	2.02
13	.81	11.65	23.5	11.81	.81	2.45	1.38	.80	2.00	.57	.38	.45	.93	.80	.68	4.44	11.25	.38
2	.90	7.78T	23.6	52.80	1.00	3.56T	.50	.55T	.20	.47			.57	.62	.68	4.43	7.76T	.02
Av. 1923[1]	.56	12.80	39.9	22.86	.92	2.82[2]	1.25	.66	1.93	.36	.53	.69	.63	.96	1.22	5.13	12.37	.43
Av. 1922[1]	.60	12.44	36.4	18.89	.91	2.89	1.65	.53	2.55	.34	.33	.69	.94	1.14	1.28	4.19	12.14	.30
Av. 1924[1]	.68	12.45	33.7	19.22	.85	2.45	1.38	.45	2.33	.30	.73	.39	.80	1.28	1.71	4.97	12.13	.32
Av. 3 yrs.[1]	.61	12.48	36.8	20.19	.86	2.77	1.40	.56	2.34	.34	.44	.64	.82	1.12	1.39	4.66	12.20	.28

[1]Average number of hours per acre based on farms not using tractors except for acreage and yield which are for all farms growing oats.
[2]Tractor plowing required an average of 1.25 hours per acre.
[3]Once over only.
[4]Based on number of acres—times over not considered.
T Tractor used.

Table XXI.—Horse Work Requirements Per Acre By Operations for Oats*
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per bushel	Grand[7] total hours work per acre	Yield per acre bushels	No. of acres	Plowing		Disking		Harrowing		Compacting		Hours per acre				
					Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Seeding	Cutting	Threshing	Total[7]	All crop
20	$ .34	17.82	52.2	38.28			2.50	2.01	2.00	.60	1.00	1.78	1.80	2.66	5.36	17.82	
17	.42	25.01	58.7	12.87	1.00	13.70	1.00	1.62	1.68	.52	1.00	.46	1.54	2.28	4.36	24.82	.19
6	.43	24.40	54.4	15.44	1.00	9.66	1.00	4.01	2.00	1.04			2.20	3.06	3.40	24.40	
11	.46	12.33[3]	54.4	18.91	1.00	2.06T			1.00	1.62[4]	.33	1.90	1.46	3.16	3.16	12.33[3]	
12	.46	25.50	51.3	25.65	1.00	10.90	1.25	1.92	1.99	1.19	.85	1.45	2.70	2.92	2.96	25.50	
19	.50	15.26	39.0	30.96	.72	6.19	.14	2.32	2.03	.64			2.16	2.98	4.14	15.26	
1	.54	31.64	43.4	12.09	1.00	10.56	1.00	3.28	3.00	.92	1.00	1.40	1.58	2.73	8.70	31.27	.37
21	.54	21.28	36.0	16.40	1.00	7.32	2.00	1.84	2.00	.96			1.46	3.40	2.93	20.73	.55
8	.60	27.42	43.4	42.60	1.00	9.82	1.00	4.69	2.00	1.60	2.06	2.06	1.51	1.98	.70	26.95	.47
16	.60	27.05	42.0	11.15	1.00	9.15	1.00	2.65	3.00	.89	.72	1.48	1.70	5.45	4.30	27.05	
22	.61	28.83	40.0	9.15	1.00	3.49	2.00	5.19	2.00	1.47	1.00	2.28	1.95	3.93	3.50	28.50	.33
14	.61	14.81[4]	33.9	35.45	1.00	.93T	4.32	.26T			.14	1.40	2.55	3.24	6.77	14.81[4]	
9	.65	22.36	33.0	25.53	1.00	9.83	.66	1.99	2.00	.97			1.84	4.08	2.74	21.68	.68
6	.71	21.43	30.3	18.70	1.00	7.32	1.00	2.59	2.45	1.14			1.92	3.32	1.86	21.00	.43
4	.77	39.76	37.6	14.35	1.00	14.80	.51	2.46	3.47	2.06	.47	3.40	5.64	4.35	3.83	39.20	.56
13	.81	24.91	23.5	11.81	.81	9.80	1.38	3.02	2.00	1.86	.38	.90	1.86	2.41	4.14	24.61	.30
2	.90	10.32[2]	23.6	52.80	1.00	12.14[1]	.50	.55T	.20	1.46			1.71	2.46	3.53	10.32[2]	
Av.[6] 1923	.56	24.04	39.9	22.86	.92	9.49†	1.25	2.73	1.93	1.13	.53	1.73	1.68	2.99	4.10	23.58	.46
Av.[6] 1922	.60	24.17	36.4	18.89	.91	9.65	1.65	1.86	2.55	.99	.33	1.56	2.20	3.46	3.56	23.94	.23
Av.[6] 1924	.63	21.34	33.7	19.22	.85	8.16	1.38	1.56	2.33	.86	.73	.97	2.02	3.76	4.50	21.08	.26
Av.[6] 3 yrs.	.61	23.39	36.8	20.19	.86	9.28	1.40	2.10	2.34	1.01	.44	1.55	2.06	3.39	3.94	23.19	.20

[1]Includes .71 hours tractor power.
[3] " .89 " " "
[2] " 2.43 " " "
[4] " 2.06 " " "
[5] " .16 " " "

[6]Averages are based on farms not using tractors except for acreage and yield which are for all farms growing oats.
[7]Based on number of acres—times over not considered.
*Once over only.
T All tractor power for this operation.
†Tractor plowing required an average of 1.26 hours per acre, and disking .30 hours per acre.

The average per acre yield of the first group was 42 bushels, while a yield of 52 bushels per acre was secured by the second group.

From an examination of Tables XX and XXI it will be noted that the farmers in both of these groups handled their crop in about the same way with the exception of farm 20, where no plowing was done. It would appear, then, that the one group had been more efficient in the use of labor in producing oats. Nearly 50 per cent of the difference in cost between these two groups was accounted for in the extra labor cost.

A striking example of the saving possible by "disking in" oats is shown in Table XXII. This table shows the cost of producing oats and the labor required by those plowing the land in the usual way and those "disking in" their oats. It will be noted that only about half as much labor was required up to the time of harvest by those "disking in" their oats. In addition to the saving in labor the yield was about 11 bushels greater per acre in the case of those "disking in" their crop.

Tables XX and XXI also give the labor requirements for producing oats, together with the times over by operations on each of the farms in 1923.

*Table XXII.—Labor Required and the Cost of Producing Oats**
(Walworth County, Wisconsin)

Group**	Average per acre yield	Cost	
		Per acre	Per bushel
Plowed	37.9	$22.92	$.61
Disked in	49.1	20.80	.42

Hours labor and work per acre					
Up to harvest		Harvest		Total	
Man labor	Horse work	Man labor	Horse work	Man labor	Horse work
5.40	16.86	6.98	7.05	12.38	23.91
2.43	9.30	7.10	8.10	9.53	17.40

*Based on records kept on 36 farms during 1922, 1923 and 1924.
**Farms using tractors not included.

The figures appearing in the operation columns represent the per acre rate of performing the various operations. The figure in the "total" column represents the actual amount of labor expended per acre in producing oats.

Selection of Operations. This was one of the main causes of variation in total hours per acre on the different farms. The high labor requirements on farms 16, 1, and 4 were due to some extent to the fact that the oat land was disked three or more times. On farms 17, 12, 1, 8, 16 and 22 some compacting was done, while on farms 2, 19, 21, 9, 5, and 6 no compacting was done. It is interesting to note that compacting the soil after plowing resulted in an average of thirteen bushels more per acre than where no soil compacting was done following the plowing.

Size and Type of Equipment and Power. Tractors were used on farms 2, 11, and 14. The low man hours per acre for disking on farm 20 was due to the fact that an 8-foot disk drawn by five horses was used, while

most of the men used 6-foot disks and three horses. In the case of farm 14, the use of a tractor reduced the man hours for plowing and disking. For certain operations such as plowing, disking, and harrowing, the use of large size equipment drawn by several horses will reduce the man labor required.

Size of Fields. The influence of small fields is distinctly shown on farm 4. There were three small fields of oats, and it will be noted that the time required for the various operations is unusually high. Just the opposite effect is seen on farms 2 and 20 where fields of 42 and 38 acres, respectively, resulted in low labor requirements.

Distance From the Farmstead. The effect of a long haul on the labor necessary for threshing is clearly shown on farms 20, 14 and 1, where both the man and horse hours for threshing were high. The average length of haul on these farms was about 121 rods. The longest haul was approximately 151 rods, farm 14. On the other hand, the haul on farms 6, 12, 21, and 9 was very short, in some cases the fields being next to the farmstead. On these farms the horse work for threshing is low as compared with the other farms. The average length of haul on these farms was about 85 rods, the shortest haul being about 61 rods on farm 9. The average length of haul on all of the farms was about 88 rods, or a little less than one-third of a mile.

Table XXIII.—Standard Requirements Per Acre for Oat Production in Southeastern Wisconsin

Operation*	Equipment	Hours per acre		Acres in 10 hr. day
		Man labor	Horse work	
Plowing	2 bottom, 14" gang, 4 horses	2.50	10.00	4.00
Plowing**	2 bottom, 14" gang, tractor	1.70		6.00
Plowing	1 bottom, 16" sulky, 3 horses	3.25	9.75	3.10
Plowing	2 bottom, 12" gang, 3 horses	2.75	8.25	3.60
Disking	6 ft. disk, 4 horses	.85	3.40	12.00
Disking	6 ft. disk, 3 horses	1.00	3.00	10.00
Harrowing	15 ft. harrow, 3 sec., 3 horses	.40	1.20	25.00
Floating	10 ft. float, 2 horses	.60	1.20	16.70
Rolling, etc.	10 ft. roll, 2 horses	.50	1.00	20.00
Cultipacking	8 ft. cultl, 2 horses	.60	1.20	6.70
Seeding	8 ft. seeder, 3 horses (large farm)	.75	2.25	13.40
Seeding	6 ft. seeder, 2 horses (small farm)	.85	1.70	11.80
Cutting	6 ft. binder, 3 horses	1.00	3.00	10.00
Shocking		1.30		8.00
Threshing	Shock threshing, crew	4.50	4.00	20.00
Seed	Nurse crop 2.5 bu. per acre			
	No nurse crop 3 bu. per acre			
Twine	2.5 pounds per acre			

*Once over only.
**Corn and grain stubble.

Labor and Material Requirements for Oats

Table XXIII gives the standard requirements per acre for oat production. These standards have been set after a careful study of the records and accomplishments not only of oats, but of all the other crops of the area. The discussion of the selection of operations and the size and type of equipment and power indicates the source of the standards. The standards

do not represent the least time in which any given operation may be performed. By the use of large size machinery or by using man labor and horse work more effectively in other ways, the time required to perform a given operation may be less than that indicated in the table. The crop season of 1923 approximated a normal more nearly than the two other years. An unusually wet year such as 1924 may result in lower accomplishments than those indicated in the table, but ordinarily the attainment of these standards represents good accomplishment for the usual farmer.

Usual Dates for Oats Operations

The first field work done in the spring is for oats, as they are planted before other crops (Chart 4). There are approximately fifteen days during which each of the operations are usually performed. A week after the

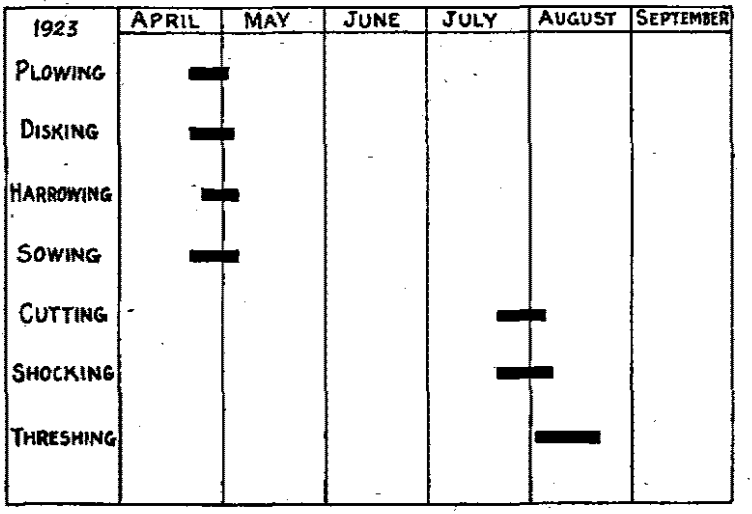


Chart 4.—Days Available for Performing Crop Operations (Oats) Walworth County, Wisconsin, 1923

beginning of the usual plowing period is the first of the usual sowing dates. This means that all the seedbed preparations may in some instances be limited to seven to ten days.

Usual Dates for Performing Operations—Oats

Operation	Usual dates	Total days	Days available
Spring plowing	April 14—May 3	19	15
Disking	April 14—May 6	22	16
Harrowing	April 17—May 8	21	17
Rolling and packing	April 18—May 6	18	15
Sowing	April 20—May 6	16	13
Cutting	July 20—August 10	20	16
Shocking	July 20—August 12	22	18
Threshing	August 1—August 25	25	20

Much of the plowing for oats is done in the fall and for this reason the seedbed is usually more compacted than the limited time between the first spring plowing and the sowing operation would suggest. It should be stated that no one farmer uses the whole period indicated for this particular series of operations, as other spring crops must be prepared for and planted mostly within this period.

Usual Practices in Barley Production

Walworth county was fifth in barley acreage in the state in 1923 and third in total production, but ninth in production per acre. On the route farms this grain crop occupied 6.4 per cent of the entire farm area, or 9.6 per cent of the total crop area.

Nearly 90 per cent of all barley sown in 1923 was put in on old corn land, the plowing being equally divided between fall and spring. Practically no barley is "disked in" on the corn stubble as is being done to some extent in the case of oats. Barley is not such an extensive feeder as oats or wheat and therefore requires a well prepared seedbed and rich soil. For this reason "disking in" barley is not a desirable practice.

Practically all land for barley was disked before planting. Fifty per cent of the fields were disked twice before planting in 1923. All land was harrowed at least once before and after planting. Less than 50 per cent of the land for barley was compacted in any way. All barley was seeded with a drill, about half of the farmers using it as a nurse crop. The grain was cut with a binder, shocked and threshed directly from the field.

Cost of Producing Barley

Table XXIV gives the cost of producing barley on the individual farms for 1923 together with the average for each of the three years, the average of the three years together and the average percentage of cost for the three years. There was a wide variation from farm to farm in the per acre and per bushel cost of producing barley. The cost per acre ranged from $17.10 to $27.52, a difference of $10.42, and the cost per bushel ranged from $.51 to $1.33, a difference of $.82. A study of the table reveals the fact that some men were able to produce barley in 1923 at a much smaller cost per bushel than were others. This indicates the possibility of growing barley at a profit if proper care and management are given.[3]

Reasons for Variations in Cost

Yield. Table XXV shows the extent to which yield influenced the cost of producing barley. The forty farms producing barley were divided into two groups— those producing less than 27 bushels per acre and those producing over 27 bushels per acre. There was a difference of 12.8 bushels in the production of the two groups and a difference of $.30 in the cost per

[3]No attempt has been made to credit the barley crop with its value as a nurse crop for the hays which are usually seeded with it. Credit for this would reduce the cost of producing barley somewhat.

Table XXIV.—Cost of Producing Barley
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per bushel	Yield per acre bushels	No. of acres	Cost per acre: Man labor	Horse work	Interest	Taxes	Equipment	Threshing	Seed	Twine	Manure	Overhead	Total
1	$ .51	42.0	23.86	$ 2.58	$ 2.84	$ 6.01	$ 1.70	$ 1.99	$ .15	$ 1.12	$ .40	$ 3.46	$ 1.21	$ 21.46
9	.69	37.3	6.70	3.39	4.10	6.80	1.57	.90	1.69	1.74	.33	4.55	.53	25.60
21	.69	31.6	25.14	2.41	2.31	6.50	1.48	1.01	1.65	1.39	.27	3.77	1.10	21.89
12	.74	33.9	1.77	3.17	4.44	6.21	1.65	1.93	1.64	1.67	.40	2.81	1.36	25.28
14	.76	33.5	12.05	3.90	5.39[1]	4.24	1.35	1.32	1.51	1.33	.40	5.51	.41	25.45
5	.78	26.9	8.36	2.28	2.15	6.25	1.79	.63	1.17	1.76	.37	3.62	1.00	21.02
16	.80	30.6	3.85	3.11	3.66	5.75	1.75	1.08	1.25	1.27	.30	5.06	1.34	24.57
22	.85	20.0	9.40	3.27	4.04	7.25	1.59	1.82	1.41	.84	.24	2.20	1.35	24.91
7	.96	28.6	14.10	2.14	4.52[2]	7.00	2.21	1.75	1.69	1.39	.38	3.66	2.78	27.52
17	.96	25.3	11.13	3.37	3.78	4.35	1.27	4.37	1.47	1.62	.65	2.08	1.32	24.28
12	1.00	26.0	15.00	2.57	2.51	8.10	1.80	2.03	1.53	1.04	.31	4.79	1.33	26.01
5	1.02	25.8	8.90	2.76	6.11[3]	6.12	1.70	2.04	1.63	1.66	.36	1.75	2.15	26.28
13	1.33	12.8	9.70	2.33	3.07[4]	5.34	1.31	1.70	.50	1.17	.12	1.29	.27	17.10
Av. 1923	.78	30.4	11.54	2.75	3.55[5]	6.21	1.63	1.76	1.25	1.33	.35	3.49	1.27	23.59
Av. 1922	.85	24.4	12.76	2.11	2.98[6]	6.39	1.61	1.75	1.15	1.14	.22	2.71	.74	20.80
Av. 1924	.82	27.4	15.56	2.79	3.28[7]	5.12	1.55	1.43	1.08	1.94	.36	3.72	1.16	22.43
Av. 3 yrs.	.82	27.0	13.06	2.50	3.23[8]	5.96	1.60	1.70	1.11	1.43	.30	3.24	1.01	22.08
Av. % of cost 3 yrs.				11.3	14.7[9]	27.0	7.2	7.7	5.0	6.5	1.4	14.6	4.6	100

[1] Includes $3.98 tractor power.
[2] " 1.84 " "
[3] " 1.03 " "
[4] " .36 " "
[5] Includes $.58 tractor power.
[6] " .23 " "
[7] " .74 " "
[8] " .48 " "
[9] " 2.2% " "

bushel in favor of the high-producing group. The lower cost per bushel was secured by the high-producing group in spite of the fact that the per acre cost was $3.06 more than the per acre cost of the low-producing group. The low-producing group with an average yield of 20 bushels per acre produced barley at an average cost of $1.02 per bushel, while the high producing group with an average per acre yield of nearly 33 bushels produced this grain crop at a cost of $.72 per bushel. Thus, in this case, an

*Table XXV.—High Yield Reduces Cost—Cost of Producing Barley—Two Groups**
(Walworth County, Wisconsin)

Production group	Number farms in group	Total number acres	Average yield per acre bu.	Average cost	
				Per acre	Per bu.
Less than 27 bu. per acre	19	258.80	20.0	$20.43	$1.02
Over 27 bu. per acre	21	266.15	32.8	23.49	.72

*Based on records kept on 40 farms during 1922, 1923, and 1924.

increase of nearly 13 bushels per acre reduced the per bushel cost $.30.

The average yield for the farms producing barley in 1923 was slightly over 30 bushels per acre. The average yield per acre of the six most efficient producers was about 36 bushels. The average yield per acre of the seven least efficient producers that same year was 25 bushels—a difference of 11 bushels per acre. This amount added to the production of the group of seven inefficient producers would have reduced the per bushel cost by more than $.26. The most efficient group o fsix produced their barley at an average cost of $.64 per bushel—$.32 less per bushel than the least efficient group.

Seedbed Preparation. It is well to bear in mind that barley is a shallow feeder, its roots growing near the surface of the soil. Therefore it requires a well-prepared seedbed and a rich soil with fertility near the surface. Barley will not make sufficient returns to pay the cost of production when grown on poor, sandy, worn out soils, poorly drained soils, or on a poorly prepared seedbed.

Farm 1 (Table XXIV) is a good example of the results possible with barley when grown on good soil and the seedbed properly prepared. The yield of 42 bushels per acre on farm 1 was 12 bushels above the average of the entire group and 17 bushels above the average of those with yields below 30 bushels per acre. The comparatively low yields secured on farms 17, 2, 15, and 5 can be attributed almost entirely to the lack of proper seedbed preparation. The very low yield on farm 13 is the only case where low returns could possibly be attributed to poor soil.

Those having yields above the average in 1924 disked and harrowed the land after plowing, while those getting yields of less than the average of the group did not in a single case disk after plowing. The increased yield secured by those disking after plowing was sufficient to make a greater return per hour of man labor in spite of the extra labor required in disking

the land. Those having the higher yield received on the average $.92 per hour for their labor, while those having the lower yield received only $.215 per hour.

"Disking in" barley on corn stubble in this area has proven unsatisfactory. Those "disking in" barley in 1924 received the lowest yields of the group. In general, the records showed that it did not pay to spend a great deal of time in preparing a good seedbed for oats. The opposite is true in the case of barley. Those men who prepared the best seedbed received the largest yield. This fact is shown by Table XXVI, which gives the labor required

*Table XXVI.—Labor Required Per Acre Up to Harvest in Producing Barley**

(Walworth County, Wisconsin)

Group	Total acreage	Yield per acre	Hours labor per acre up to harvest time	
			Man	Horse
Less than 5 man hours per acre up to harvest time	200.33	22.47	3.48	11.00
Over 5 man hours per acre up to harvest time	162.89	31.17	5.73	18.30

*Based on records kept on 27 farms during 1922, 1923, and 1924.

up to harvest. The farms are divided into two groups: those requiring less than five hours of man labor per acre and those requiring over five hours of man labor per acre up to harvest time. There was a difference in the average per acre yield of these two groups of nearly nine bushels in favor of the higher labor group. One of the most striking differences in the operations performed by these two groups was the fact that practically all of those in the high-producing group compacted the land at least once, while those in the low-producing group did practically no compacting.

Labor Requirements for Barley Production

Tables XXVII and XXVIII give the total hours of man labor and horse work required to produce an acre of barley as well as the time required to perform the various operations on each of the farms. There is a great difference in the time required to accomplish the various operations on different farms. The range in man labor per acre was from ten to fifteen hours. The horse work range was from twenty to thirty-one hours per acre on those farms not using tractors.

Selection of Operations. The extremely low amount of man labor and horse work per acre required on farm 5 was due to the fact that no soil compacting or disking was done. Disking twice together with an unusually high labor requirement for threshing on farm 17 explains the high total labor requirement per acre. The slow rate of plowing along with a larger number of men around at threshing time than could be used helped to increase the total labor per acre on farm 12 in spite of the fact that no disking was done.

Table XXVII.—Man Labor Requirements Per Acre By Operations[1] for Barley
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per bushel	Grand[2] total hours labor per acre	Yield per acre bushels	No. of acres	Plowing		Disking		Harrowing		Compacting		Hours per acre					
					Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Seeding	Cutting	Shocking	Threshing	Total[2]	All crop
1	$ .51	11.73	42.0	23.86	1.0	2.12	1.42	.57	2.0	.30	.72	1.01	1.31	.77	2.00	3.52	11.46	.27
9	.69	15.40	37.3	6.70	1.0	2.99	1.00	1.12	3.0	.53			1.05	1.27	1.80	5.59	15.40	
21	.69	10.92	31.6	25.14	1.0	2.70	1.32	.48	2.0	.22	1.0	.64	.60	.56	.92	4.05	10.54	.38
12	.74	14.67	33.9	1.77	1.0	3.11			2.0	.58	1.0	.58	1.12	1.69	1.13	5.65	14.67	
14	.76	18.10	33.5	12.05	1.0	2.57	1.00	.84	2.0	.29	1.0	.41	.83	1.12	2.45	8.84	17.60	.60
5	.78	10.35	26.9	8.36	1.0	2.19			2.23	.29			.54	1.32	1.80	3.82	10.35	
16	.80	14.15	30.6	3.85	1.0	3.09			4.0	.49			1.31	1.82	.78	5.19	14.15	
22	.85	14.89	29.0	9.40	1.0	3.41	1.21	.79	2.0	.43	.33	.32	.96	1.60	1.92	5.03	14.04	.85
7	.96	9.72	25.6	14.10	1.0	1.28	1.0	.57	.57	.38			.64	1.21	1.07	4.76	9.72	
17	.96	15.29	25.3	11.13	1.0	4.03	2.0	.47	1.49	.39	1.0	.27	.72	.85	.76	7.00	15.18	.11
15	1.00	11.67	26.0	15.00	1.0	3.66			3.0	.27	.47	.43	.73	.73	.73	4.12	11.00	.67
2	1.02	12.56	25.8	6.90			2.26	.52	1.0	.31			.56	.70	1.77	7.46	12.00	.56
13	1.33	10.55	12.8	9.70			2.0	.98	2.0	.49	1.0	.72	1.08	1.39	1.24	2.32	9.69	.86
Av. 1923[3]	.78	12.44	30.4	11.54	1.0	2.91	1.02	.58	2.24	.33	.84	.52	.74	.99	1.42	4.86	12.11	.33
Av. 1922[3]	.85	10.30	24.4	12.76	.78	2.10	1.55	.56	1.79	.39	.37	.59	.82	1.03	1.34	3.32	10.05	.25
Av. 1924[3]	.82	10.54	27.4	15.56	.93	1.92	1.68	.46	2.17	.25	.23	.38	.70	.98	1.60	2.97	10.35	.19
Av. 3 yrs.[3]	.82	11.11	27.0	13.06	.90	2.31	1.44	.54	2.01	.33	.45	.53	.76	1.00	1.44	3.96	10.87	.24

[1]Once over only.
[2]Based on the number of acres—times over not considered.
[3]Average based on farms not using tractors except for the acreage and yield which are for all farms growing barley.

Table XXVIII.—Horse Work Requirements Per Acre By Operations[1] for Barley
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per bushel	Grand[2] total hours work per acre	Yield per acre	No. of acres	Plowing		Disking		Harrowing		Compacting		Hours per acre				
					Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Seeding	Cutting	Threshing	Total[2]	All crop
1	$ .51	23.52	42.0	23.86	1.0	8.35	1.42	2.27	2.00	1.13	.72	2.44	3.19	2.33	2.97	23.00	.52
9	.69	26.42	37.3	6.70	1.0	10.60	1.00	2.24	3.00	1.07			2.10	3.81	4.48	26.42	
21	.69	24.27	31.6	25.14	1.0	10.80	1.32	1.92	2.00	.82	1.00	1.28	1.80	2.24	3.82	24.15	.12
12	.74	31.08	33.9	1.77	1.0	12.38			2.00	2.26	1.00	1.70	3.37	5.08	3.96	31.08	
14	.76	12.99[3]	33.5	12.05	1.0	2.57T	1.00	.84T	2.00	.29T	1.00	.82	2.49	3.36	5.97	12.99[3]	
5	.78	21.51	26.9	8.36	1.0	8.76			2.23	1.50			2.16	3.96	3.34	21.51	
16	.80	26.49	30.6	3.85	1.0	9.31			4.00	1.24			2.61	5.46	4.15	26.49	
22	.85	30.02	29.0	9.40	1.0	13.20	1.21	2.37	2.00	1.29	.33	.96	2.88	4.10	5.40	29.70	.32
7	.96	12.55[3]	28.6	14.10	1.0	1.28T	1.00	.57T	.57	1.14			1.92	3.61	4.64	12.55[3]	
17	.96	30.72	25.3	11.13	1.0	16.16	2.00	1.41	1.49	1.17	1.00	.54	1.44	2.55	5.21	30.50	.22
15	1.00	24.17	26.0	15.00	1.0	10.99			3.00	.80	.47	.86	1.87	2.19	6.00	23.90	.27
2	1.02	13.85[4]	25.8	8.90			2.26	.52T	1.00	1.24			1.68	2.80	6.28	13.18[4]	.67
13	1.33	20.16[3]	12.8	9.70			2.00	5.58[3]	2.00	1.96	1.00	1.44	2.16	4.18	2.16	19.44[2]	.72
Av.[5] 1923	.78	25.42	30.4	11.54	1.0	10.85	1.02	1.99	2.24	1.06	.84	1.17	1.91	3.05	4.33	25.18	.24
Av.[6] 1922	.85	19.57	24.4	12.76	.78	7.38	1.55	2.03	1.79	1.16	.37	1.26	1.92	3.16	2.82	19.38	.19
Av.[6] 1924	.82	18.93	27.4	15.56	.93	6.04	1.08	1.59	2.17	.82	.23	.98	2.03	2.97	3.94	18.80	.13
Av.[6] 3 yrs.	.82	21.04	27.0	13.06	.90	8.07	1.44	1.89	2.01	1.06	.45	1.17	1.97	3.08	3.60	20.89	.15

[1]Once over only.
[2]Includes .37 hours tractor power.
[3] " 1.84 " " "
[4] " 1.18 " " "
[5] " .39 " " "
[5]Averages based on farms not using tractors except for acreage and yield which are for all farms growing barley.
[6]Based on the number of acres—times over not considered.
T All tractor power for this operation.

Size and Type of Equipment and Power. The small number of total man hours per acre in the case of farms 7, 2, and 13 was the result of the use of tractors. A tractor was also used on farm 14, but the total number of man hours per acre was extremely high due largely to the very high labor requirements in threshing. The high rate for cutting on farm 16 was due to the use of a five-foot binder for harvesting the grain, while six-foot binders were used on the other farms.

Standard Requirements Per Acre for Barley Production

Table XXIX gives the standard requirements per acre for barley production. With the exception of the amount of seed used, the standards for barley are the same as those set up for oats. These two crops are handled in essentially the same way. According to the standard, about 13 hours of man labor and about 26 hours of horse work are required to produce an acre of barley. This standard should give ample opportunity for proper fitting of the land, as well as harvesting and threshing.

Table XXIX.—Standard Requirements Per Acre for Barley Production in Southeastern Wisconsin

Operation*	Equipment	Hours per acre		Acres in 10 hr. day
		Man labor	Horse work	
Plowing**	2 bottom, 14" gang, tractor	1.70		6.00
Plowing	2 bottom, 14" gang, 4 horses	2.50	10.00	4.00
Plowing	1 bottom, 16" sulky, 3 horses	3.25	9.75	3.10
Plowing	2 bottom, 12" gang, 3 horses	2.75	8.25	3.60
Disking	6 ft. disk, 4 horses	.85	3.40	12.00
Disking	6 ft. disk, 3 horses	1.00	3.00	10.00
Harrowing	15 ft. harrow, 3 sec., 3 horses	.40	1.20	25.00
Floating	10 ft. float, 2 horses	.60	1.20	16.70
Rolling, etc.	10 ft. roll, 2 horses	.50	1.00	20.00
Cultipacking	8 ft. culti, 2 horses	.60	1.20	16.70
Seeding	8 ft. seeder, 3 horses (large farm)	.75	2.25	13.40
Seeding	6 ft. seeder, 2 horses (small farm)	.85	1.70	11.80
Cutting	6 ft. binder, 3 horses	1.00	3.00	10.00
Shocking		1.30		8.00
Threshing	Shock threshing, crew	4.50	4.00	20.00
Seed	Nurse crop 1.5 bu. per acre			
	No nurse crop 2 bu. per acre			
Twine	2.5 pounds per acre			

*Once over.
**Corn and grain stubble.

Usual Dates for Barley Operations

The time for starting the various seedbed preparation operations for barley is usually a few days later than for oats (Chart 5). It is planted slightly later, hence does not seriously compete with oats at planting time.

Barley requires a shorter growing period than does oats, however, so that it is harvested at an earlier period. It is thus pretty well out of the way when the oat harvest begins.

The number of days available for seedbed preparation is greater than for oats. This is due to the later sowing date. Barley requires a more careful

Usual Dates for Performing Operations—Barley

Operation	Usual dates	Total days	Days available
Spring plowing	April 15—May 5	20	17
Disking	April 18—May 6	18	15
Harrowing	April 19—May 8	19	15
Rolling and cultipacking	April 21—May 6	15	12
Sowing	April 22—May 6	14	10
Cutting	July 13—August 4	22	17
Shocking	July 13—August 5	23	18
Threshing	August 1—August 25	25	20

seedbed preparation than oats for the best yields. The present practice of the area is to prepare both seedbeds alike. Where much time is used in mellowing and fining the soil, barley yield should be greater than oat yields. If, on the other hand, very little work is done on the seedbeds and plowing the ground is eliminated, oats usually outyields barley.

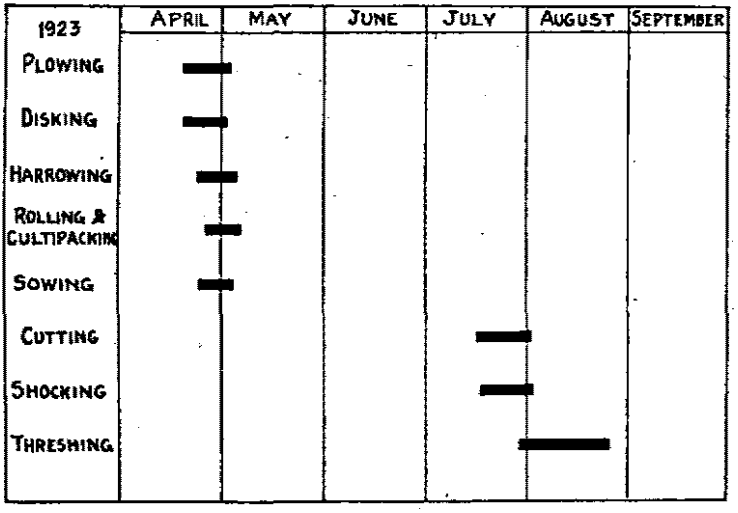


Chart 5.—Days Available for Performing Crop Operations (Barley) Walworth County, Wisconsin.

Usual Practices in Alfalfa Production

Alfalfa is rapidly increasing in importance as a hay crop in Walworth county. The first year 21 per cent of the route members raised some alfalfa. Fifty-five per cent raised some alfalfa the second year, and the number increased to 70 per cent the third year the route was conducted. The acreage for the entire county increased 69 per cent in 1923, the total acreage increasing from a little less than 4,000 acres in 1922 to over 6,500 acres in 1923. In the latter year, 14 of the 22 route members raised a total of 153.37 acres of alfalfa, or an average of nearly 11 acres per farm.

Table XXX.—Cost of Producing Alfalfa
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per ton*	Yield per acre tons	No. of acres	Cost per acre							
				Man labor	Horse work	Interest	Taxes	Equipment	Manure	Overhead and other	Total*
20	$ 4.50	3.28	33.27	$ 1.56	$ 1.54	$ 4.50	$ 1.98	$ 1.21	$ 3.33	$ .66	$ 14.73
22	6.15	4.60	3.45	6.12	5.42	7.25	1.59	1.24	4.93	1.56	28.11
1	7.15	2.20	4.55	2.20	1.46	6.00	1.70	.64	2.83	.89	15.72
6	7.95	3.00	1.65	2.80	2.66	7.00	1.70	.48	8.02	1.44	24.10
13	8.20	2.15	3.25	4.37	2.68	5.34	1.30	.69	3.02	.27	17.67
15	8.76	3.10	3.85	3.44	2.41	8.09	1.80	2.04	8.04	1.40	27.22
4	8.82	2.20	6.75	3.13	3.64	4.80	1.30	.58	4.91	1.43	19.79
12	8.89	1.80	0.51	2.50	1.55	6.20	1.64	.80	2.09	1.32	16.10
18	9.39	2.11	9.50	1.99	1.62	5.00	1.68	3.51	3.96	.87	18.54
3	10.13	2.18	5.96	4.17	2.50	6.93	2.59	.46	4.80	.66	22.11
8	10.27	2.05	31.55	3.14	3.24	7.07	1.37	.53	4.89	.85	21.09
7	11.42	1.30	10.21	1.18	2.67	5.20	1.64	.32	2.30	1.49	14.80
Av. 1923	7.61	2.46	10.70	2.58	2.41	5.91	1.69	1.08	4.14	.98	18.75
Av. 1922	12.36	1.60	9.68	2.22	2.16	7.30	1.49	1.38	4.09	1.09	19.73
Av. 1921	6.44	3.10	11.80	3.42	2.72	5.05	1.68	1.21	4.99	1.19	20.26
Av. 3 yrs.	7.85	2.48	10.76	2.77	2.45	5.95	1.64	1.18	4.40	1.07	19.46
Av. % of Cost 3 yrs.	[%]			14.2	12.6	30.6	8.4	6.1	22.6	5.5	100

*Does not include seed cost.

In 1923, approximately 50 per cent of the alfalfa sown was seeded alone with oats, barley or peas as the nurse crops. Slightly over 50 per cent of the fields seeded that year were seeded in a mixture with timothy and clover or timothy alone. Canning peas are an excellent nurse crop, since they are removed from the land early in the season, thus giving the young alfalfa plants a much better opportunity for development than when either oats or barley is used as a nurse crop. Seeding is done at the same time that either the peas or grains are planted by means of a grass seeder attachment on the drill. In this way, very little or no extra labor is required in seeding either alfalfa or the other hays.

One small field was cut for seed in 1923, the rest being cut for hay. Three of the men cut at least part of their alfalfa three times. Two cuttings were taken on the other farms. About one-half of those growing alfalfa used side delivery rakes and hay loaders. In 1923, two of the men cocked their alfalfa before hauling, but most of those who did not use a hay loader drew directly from the windrow.

In a season such as 1923, which was quite dry, all hay is drawn directly to the barn. In the wet season of 1924, the hay crop was so heavy that it was necessary to stack a great deal of hay. This was an exceptional year, however.

Cost of Producing Alfalfa

Table XXX gives the cost of producing alfalfa on the route farms for 1923. The per acre cost ranged from $19.78 to $28.11, while the per ton cost ranged from $4.50 to $11.42. The average return on alfalfa for the three years was very good, being $2.57 per hour of man labor. This was the highest return made by any crop in the Elkhorn area.

Reasons for Variation in Cost

Variation in yield and labor cost were the two outstanding factors influencing costs. The unusually high interest rate in the case of farm 15 increased the cost per acre on that farm by about $2. However, yield was the important factor in determining the cost per ton. Farm 22 with the highest cost per acre, had the second lowest cost per ton due to a high yield, 4.6 tons per acre. This was the highest yield on the route.

Variations in Labor Requirements

The man labor and horse work requirements for the production of alfalfa on the route farms are given in Table XXXI. Yield and the method of handling were the two most important factors causing the great variation in the labor required.

The extremely high labor requirement in the case of farm 22 was due to the large yield as well as to the fact that no hay loader was used. Much time was also spent in cocking the hay. The large labor requirement on this farm, however, is justified to some extent because of the very high yield per acre. However, the labor required to handle the crop could have been materially reduced by the use of a hay loader. The hay on farm 13

Table XXX.—Cost of Producing Alfalfa
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per ton*	Yield per acre tons	No. of acres	Cost per acre							
				Man labor	Horse work	Interest	Taxes	Equipment	Manure	Overhead and other	Total*
20	$ 4.50	3.28	33.27	$ 1.66	$ 1.54	$ 4.50	$ 1.98	$ 1.21	$ 3.33	$ .66	$ 14.78
22	6.15	4.60	3.45	6.12	5.42	7.25	1.59	1.24	4.93	1.56	28.11
1	7.15	2.20	4.55	2.20	1.46	6.00	1.70	.64	2.83	.89	15.72
6	7.95	3.00	1.65	2.80	2.68	7.00	1.70	.48	8.02	1.44	24.10
13	8.20	2.15	3.25	4.37	2.68	5.34	1.30	.69	3.02	.27	17.67
15	8.76	3.10	3.85	3.44	2.41	8.09	1.80	2.04	8.04	1.40	27.22
4	8.82	2.20	6.75	3.13	3.64	4.80	1.30	.58	4.91	1.43	19.79
12	8.89	1.80	9.51	2.50	1.55	6.20	1.64	.80	2.09	1.32	16.10
18	9.29	2.11	9.50	1.90	1.62	5.00	1.68	3.51	3.96	.87	18.54
3	10.13	2.18	5.96	4.17	2.50	6.93	2.59	.46	4.80	.66	22.11
8	10.27	2.05	31.55	3.14	3.24	7.07	1.37	.53	4.89	.85	21.09
7	11.42	1.30	10.21	1.18	2.67	5.20	1.64	.32	2.30	1.49	14.80
Av. 1923	7.61	2.46	10.70	2.58	2.41	5.91	1.69	1.06	4.14	.96	18.75
Av. 1922	12.36	1.60	9.68	2.22	2.16	7.30	1.49	1.38	4.09	1.09	19.73
Av. 1924	6.44	3.10	11.80	3.42	2.72	5.05	1.68	1.21	4.99	1.19	20.26
Av. 3 yrs.	7.85	2.48	10.76	2.77	2.45	5.95	1.64	1.18	4.40	1.07	19.46
Av. % of Cost 3 yrs.	[illegible]			14.2	12.6	30.6	8.4	6.1	22.6	5.5	100

*Does not include seed cost.

was put up with the aid of a small boy and a woman, which slowed up all of the operations.

Considering the yield and the fact that three cuttings were taken, the labor requirement on farm 20 is quite low. This low labor requirement is the result of efficient use of labor. A hay loader and hay slings reduced the hauling labor to a minimum. The handling of alfalfa on this farm indicates the saving in time that can be expected if the most modern hay-

Table XXXII.—Standard Requirements Per Acre for Alfalfa Production
(Walworth County, Wisconsin)

Operation	Equipment	Hours per acre		Acres in 10 hr. day
		Man labor	Horse work	
Cutting	5 ft. mower, 2 horses	1.00	2.00	10
Raking	10 ft. rake, 2 horses	.50	1.00	20
Hauling	Using loader	2.40	2.80	10
Hauling	No loader used	5.00	5.00	5
All operations	All labor on alfalfa, 2 cuttings with loader	7.80	11.60	
	All labor on alfalfa—without loader	13.00	16.00	
Seed	From 10-22 pounds			

making tools are used. Two men and a small boy did all of the work of "putting up" the 33 acres of alfalfa on this farm. The yield on farm 7 was rather low and only one cutting was taken, which accounts for the low labor requirements.

Standard Requirements for Alfalfa

The standard requirements for alfalfa are shown in Table XXXII. The most interesting fact is that those farms using hay loaders handled their hay in about half the time required by those using no loader. Handling the hay is one operation which can be made more efficient. This means the loading of the hay in the field as well as hauling and unloading at the barn. Slings save much time in unloading the hay if the barn is large enough to permit their use. The use of a side delivery rake and hay loader also save much time in the field.

From 10 to 22 pounds of seed were sown per acre—the more common rates being from 15 to 18 pounds per acre.

Usual Dates for Performing Alfalfa Operations

Alfalfa operations in this area consist of two cuttings with the accompanying haying operations, (Chart 6). The first cutting period usually interferes with the field operations of but one of the three crops previously discussed. Corn cultivation occupies the whole of the period of June and July, so that there is direct competition during this time between the corn and the alfalfa crop for labor. The cultivation period is sufficiently extensive to make it possible for the individual farmers to work in the alfalfa haying operations unless the farm has too great a portion of the land into corn.

There is a more serious conflict of cropping operations during the second cutting of alfalfa than the first. Oat harvest is more exacting of its days than is corn cultivating, and this operation occurs during the time of the second cutting of alfalfa.

Usual Dates for Performing Operations—Alfalfa

Operation		Usual dates	Total days	Days available
Cutting	1st	June 15—July 1	15	12
	2nd	July 28—August 15	18	15
Raking & Tedding	1st	June 16—July 2	15	11
	2nd	July 29—August 17	19	14
Hauling	1st	June 17—July 4	17	12
	2nd	July 30—August 20	20	14

The second cutting usually extends over a longer period than does the first. It is also interesting to note that although the operations following cutting extend over a longer period there are no more days available for those operations. A small shower which will not stop the cutting of alfalfa may not only delay the raking and stacking operations but may necessitate re-raking or opening up in order to dry out preparatory to stacking.

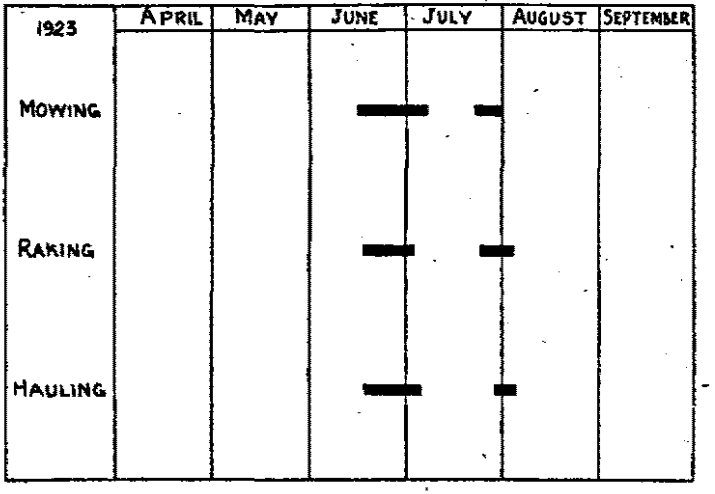


Chart 6.—Days Available for Performing Crop Operations (Alfalfa) Walworth County, Wisconsin.

Usual Practices in Mixed Hay Production

Practically all tame hay is seeded in the spring with oats, barley or peas. Seventy-five per cent of the tame hay, other than alfalfa, is seeded with oats, the other 25 per cent being seeded with barley. Those raising canning peas generally seed them down with alfalfa. Peas make an excellent nurse crop for alfalfa because they are cut so early in the summer.

Table XXXIII.—Cost of Producing Mixed Hay
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per ton*	Yield per acre tons	No. of acres	Cost per acre							
				Man labor	Horse work	Interest	Taxes	Equipment	Manure	Overhead	Total
19	$ 7.64	2.70	15.18	$ 1.52	$ 1.57	$ 5.79	$ 1.34	$ 4.90	$ 5.16	$ .60	$ 20.88
20	8.93	1.30	4.83	.64	.75	4.50	1.99	1.21	2.39	.54	12.02
21	10.92	1.40	9.03	1.02	1.15	6.48	1.48	.40	4.08	.78	15.39
18	11.83	1.70	2.10	1.31	1.04	5.00	1.68	4.01	5.75	.99	19.72
17	12.03	.80	10.62	.72	.67	4.35	1.27	.01	2.35	.54	9.91
14	13.83	.85	43.67	1.28	.72	4.24	1.35	.61	3.41	.18	11.79
11	14.43	1.10	4.77	1.04	1.09	4.56	1.68	1.35	4.77	1.85	16.34
7	15.44	.90	20.05	.94	1.22	7.00	2.21	.34	2.78	1.68	16.17
1	15.72	.80	31.35	.54	.39	6.00	1.69	.63	2.57	.71	12.53
2	15.73	1.00	28.10	.77	2.26	6.11	1.70	.99	1.59	1.23	14.65
9	18.33	.80	18.93	1.38	1.13	6.78	1.56	.28	4.03	.33	15.49
4	21.23	.56	4.90	1.05	1.19	4.80	1.30	.57	2.14	.86	11.91
6	23.01	.54	21.15	.71	.84	6.46	1.57	.49	2.16	.77	13.00
Av. 1923	13.73	1.02	16.60	.99	1.06	5.69	1.59	.92	3.03	.74	14.02
Av. 1922	11.01	1.40	20.82	1.32	1.34	5.89	1.45	1.18	3.71	.67	15.56
Av. 1924	7.70	2.65	18.37	2.98	2.26	5.60	1.58	1.17	6.24	1.17	20.40
Av. 3 yrs.	9.71	1.73	18.89	1.79	1.58	5.56	1.52	1.12	4.39	.85	16.81
Av. % cost 3 yrs.				10.7	9.4	33.0	9.1	6.6	26.1	5.1	100

*Does not include seed cost.

The grass seed is generally sown by means of an attachment on the grain drill, thus avoiding extra labor in the seeding process. The most common mixture is red clover and timothy, although there are many mixtures which contain some alsike clover, sweet clover or alfalfa in addition to red clover and timothy. The bulk of the alfalfa, however, is sown alone or with timothy and sometimes a small amount of red clover.

Side delivery rakes are coming into use more each year, but as yet only about 35 per cent of the farmers are using them. The ordinary type of dump rake is used on the remainder of the farms. Very few men attempt to load directly from the swath. Somewhat less than one-half the men use hay loaders.

Ordinarily very little tedding is done, although in 1924 which was a very wet season, nearly every farmer did some tedding. Where no loader is used, the hay is generally cocked or bunched by hand before hauling to the barn.

All hay is drawn directly to the barn from the field except in such seasons as 1924. The unusually large yield of these years caused a great deal of hay to be stacked in the open.

Mixed hay occupied an average of 13.4 per cent of the entire crop area for the three years. The average acreage per farm was 11.2 acres. Nine per cent of the total farm area was in mixed hay in 1923.

Cost of Producing Mixed Hay

Table XXXIII shows the per ton and per acre costs of producing mixed hay on the route farms in 1923. The range in cost per acre was from $9.91 to $20.88, which was more than double the lowest cost. The range in cost per ton was much greater, the highest cost being more than three times the lowest. These two extremes in costs were on the farms having the highest and lowest yields, again indicating the effect of yield on cost.

Over half of the farms producing mixed hay in 1923 secured less than a ton per acre, and the average of the entire group was just one ton per acre. This is quite a contrast to the yield of alfalfa in the same year, which was nearly two and one-half tons per acre. It is very difficult for a crop producing one ton to the acre to compete with a crop which produces more than two tons per acre.

Labor Requirement for Mixed Hay

Mixed hay required less than half the amount of labor used in harvesting alfalfa, but the average return per hour of man labor was less than one-third as great. This is accounted for by a larger yield per acre and greater value per ton of the alfalfa over the mixed hay. Table XXXIV shows the amount of man labor and horse work required in harvesting mixed hay on the route farms. The man hours per acre ranged from 1.24 to 4.01 and the horse hours per acre ranged from 3.76 to 12.08.

Hay loaders were used on farms 20, 17, 21, and 18. On farm 21 the 9.93 acres of hay was hauled in by four men and three teams in seven hours. The total hours per acre in the case of farm 18 were comparatively

Table XXXIV.—Man Labor and Horse Work Requirements Per Acre By Operations[1] for Mixed Hay
(Walworth County, Wisconsin, 1923)

Farm No.	Cost[2] per ton	Yield per acre tons	No. of acres	Hours of man labor per acre				Hours of horse work per acre			
				Cutting	Raking	Hauling	Total[3]	Cutting	Raking	Hauling	Total[3]
20	$ 8.93	1.30	4.83	1.25	.42	1.24	2.90	2.48	.84	2.48	5.80
21	10.92	1.40	9.93	1.21	.60	2.82	4.63	2.42	1.20	4.24	7.86
18	11.83	1.70	2.10	1.43	.71	3.81	5.90	2.86	1.43	3.81	8.09
17	12.03	.80	10.62	.71	.66	1.93	3.30	1.42	1.31	2.64	5.37
14	13.83	.85	43.67	1.07	1.51[4]	3.47	5.82	2.13	1.03	2.57	6.39
11	14.43	1.10	4.77	.84	10.42[5]	2.83	4.70	1.68	.84	5.66	8.18
1	15.72	.80	31.35	.45	.53[6]	1.71	2.70	.90	.74[8]	2.13	3.76
2	15.73	1.00	28.10	.89	.72[7]	2.24	3.48	1.78	.72	3.51	5.65
9	18.33	.80	18.93	1.11	1.92[9]	4.01	6.26	2.22	.88	4.26	7.32
4	21.23	.56	4.90	1.53	.61	2.65	4.79	3.06	1.22	2.86	7.14
6	23.91	.54	21.15	.92	----------	2.32	3.24	1.84	----------	2.75	4.59
Av. 1923	13.73	1.02	16.60	.96	.47	2.78	4.44	1.93	.94	3.09	5.96
Av. 1922	11.01	1.40	20.82	1.04	.54	5.01	7.38	2.08	1.08	6.01	9.95
Av. 1924	7.70	2.65	18.37	1.15	.54	5.93	10.78	2.23	1.07	7.29	14.76
Av. 3 yrs.	9.71	1.73	18.80	1.09	.52	5.04	8.37	2.13	1.04	6.09	11.40

[1]Ones over only.
[2]Does not include seed cost.
[3]Based on number of acres—times over not considered.
[4]Includes .99 hours cooking.
[5]Includes 10.00 hours cooking and turning hay after rain.
[6]Includes .28 hours cooking and tedding.
[7]Includes .36 hours cooking.
[8]Includes 1.48 hours cooking.
[9]Includes .23 hours tedding.

Table XXXV.—Standard Requirements Per Acre for Mixed Hay Production
(Walworth County, Wisconsin)

Operation	Equipment	Hours per acre		Acres in 10 hr. day
		Man labor	Horse work	
Cutting	5 ft. mower, 2 horses	1.00	2.00	10
Raking	10 ft. rake, 2 horses	.50	1.00	20
Hauling	With loader	2.00	2.50	10
Hauling	Without loader	3.25	3.00	6
All operations	All labor—with loader	3.50	5.50	
All operations	All labor—without loader	4.75	8.00	
Seed	Average of mixture 13.0 pounds			

high due to the fact that only a little over two acres of hay were harvested. In the case of farm 11, a good deal of the harvesting was done alone or with the aid of a small boy, which resulted in a very high labor requirement per acre.

Standard Requirements Per Acre for Mixed Hay

The standard requirements per acre for mixed hay are given in Table XXXV. The time for cutting and raking is the same as was required for alfalfa. The value of a hay loader in the handling of the crop shows up here as it does in alfalfa, although the difference is not quite so great. However, the use of a loader resulted in a saving of 1.25 hours of man labor per acre. The amount of seed used varied from 7 pounds to about 25.6 pounds per acre, the average being 13 pounds. The average mixture

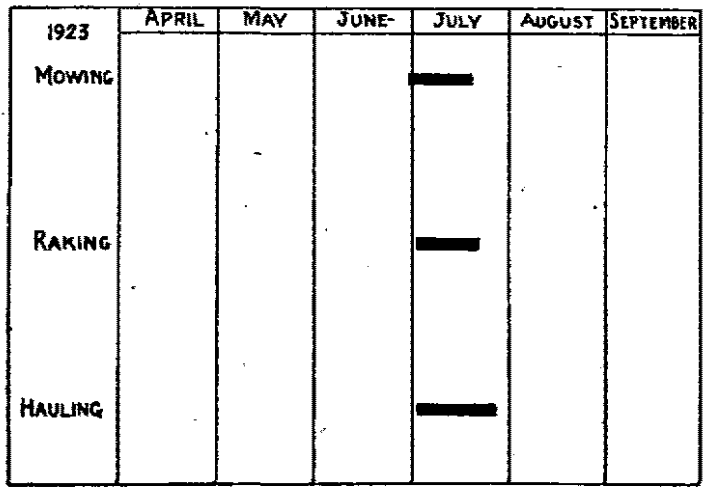


Chart 7.—Days Available for Performing Crop Operations (Other Tame Hay) Walworth County, Wisconsin.

consists of 9 pounds of medium red clover and 4 pounds of timothy. On those farms where alsike clover was used in the mixture, an average of 7.5 pounds of medium red clover, 4 pounds of timothy, and 1.5 pounds of alsike clover were used.

Usual Dates for Performing Timothy and Clover Operations

Haying operations for timothy and clover usually occur during the first half of July (Chart 7). They extend over a longer period than do either of the alfalfa cuttings and work in well between the two cuttings.

Usual Dates for Performing Operations—Timothy and Clover Hay

Operation	Usual dates	Total days	Days available
Cutting	June 25—July 20	25	19
Raking	June 26—July 22	27	20
Hauling	June 27—July 28	31	24

There is competition for labor with corn cultivation similar to the demands of alfalfa and corn. There is also the same possibility of individual farmers having no serious conflict of labor requirements if the farm does not have an unusually large portion of the cropped area in either of the competing crops.

Usual Practices in the Production of Peas

Canning peas was the only strictly cash crop grown by the route members in 1923. Small amounts of barley, oats, corn and hay were sold, but these crops were not grown primarily as cash crops. Nine of the route members raised 42.3 acres of peas, or an average of about five acres each. This is a little over 5 per cent of the crop area of these particular farms, and only 1.7 per cent of the crop area of the entire route.

All land for peas was plowed, about two-thirds of it being plowed in the spring, while the remainder was fall-plowed. One-half of the fields were disked after plowing, while the other half received no disking at all. The pea land was all harrowed twice, once before sowing and once after sowing. Two-thirds of the land was compacted after sowing and the other third before sowing. The peas were all sown with a grain drill.

The peas were cut with a regular mowing machine. The field man for the canning company notifies each farmer as the factory is ready to receive his peas. In this way a continuous movement of peas from fields to cannery is obtained. The green peas are taken to a vining station immediately after cutting, where the peas are separated from the pods and taken to the canning factory. The pea vines are stacked at the vining station and later sold to the farmers for cattle feed. The local price has been two dollars per ton at the vining station.

Cost of Producing Peas

The cost of producing peas, like other crops, varies greatly from farm to farm. Table XXXVI shows the cost of producing peas on nine farms in

Table XXXVI.—Cost of Producing Peas
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per 100 lb.	Yield per acre lbs.	No. of acres	Cost per acre									
				Man labor	Horse work	Tractor power	Interest	Taxes	Seed	Equipment	Manure	Overhead and other	Total
11	$ 1.78	1657	4.65	$ 3.17	$ 2.49	$ 2.36	$ 2.28	$ .84	$ 13.08	$ .50	$ 1.45	$ 3.35	$ 29.52
14	2.03	1388	7.60	3.36	2.24	2.37	4.24	1.35	11.97	.61	1.58	.45	28.17
22	2.29	1762	5.06	4.61	7.52	----------	7.25	1.59	14.13	1.26	1.79	2.19	40.34
7	2.51	1503	7.10	2.17	5.60	1.69	7.00	2.21	12.82	1.06	1.32	3.80	37.67
5	2.62	1107	5.45	4.12	3.32	----------	6.26	1.79	10.74	.41	1.03	1.38	29.05
12	2.91	1225	1.59	3.11	4.58	----------	6.23	1.65	16.36	1.10	.72	1.62	35.67
2	3.19	1114	7.80	1.67	4.08	1.46	6.12	1.71	14.07	1.88	.53	4.01	35.53
3	3.90	940	1.96	4.83	5.82	----------	6.91	1.63	14.50	.73	1.12	1.11	36.65
18	5.06	749	1.10	3.65	4.78	----------	5.00	1.68	17.73	2.41	.89	1.79	37.93
Av. 1923	2.60	1351	4.70	3.14	4.26	1.24	5.67	1.62	13.15	1.03	1.21	2.44	33.76
Av. 1922	2.22	1505	6.54	3.57	4.60	1.34	5.22	1.25	12.94	1.32	1.81	1.35	33.40
Av. 2 yrs.	2.35	1431	5.50	3.37	4.45	1.29	5.46	1.43	13.04	1.14	1.53	1.87	33.57
Av. % of cost 2 yrs.	----------	----------	----------	10.0	13.2	3.8	16.2	4.3	38.8	3.5	4.6	5.6	100

Table XXXVII.—Man Labor Requirements Per Acre By Operations[1] for Peas
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per 100 lbs.	Grand[2] total hours labor per acre	Yield per acre pounds	No. of acres	Plowing		Disking		Harrowing		Compacting		Hours per acre				
					Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Seeding	Cutting	Hauling	Total[2]	All crop
11	$ 1.78	14.40T	1657	4.65	1.00	2.37T			4.00	.32			.75	3.42	6.56	14.40T	
14	2.03	15.26T	1388	7.60	1.00	.92T	2.00	.72T			.65	.60	.66	3.82	8.03	15.26T	
22	2.29	20.95	1762	5.06	1.00	3.25	2.52	.62	2.00	.69	2.00	.89	.99	1.88	10.10	19.96	.99
7	2.51	9.86T	1503	7.10	1.00	1.27T	2.00	.35T			1.00	1.13	1.13	1.13	4.50	9.86T	
5	2.62	18.75	1107	5.45	1.00	1.75			4.00	.28	.74	.31	.50	3.40	11.20	18.20	.55
12	2.91	14.10T	1225	1.59	1.00	2.52	2.00	.46	2.00	.32	2.00	.94	1.21	2.52	4.40	14.10T	
2	3.19	7.56T	1114	7.80	1.00	1.28T	4.00	.19T	2.00	.26	1.00	.51	.58	.96	3.33	7.56T	
3	3.90	21.99	940	1.96	1.00	5.10	4.00	.45	4.00	.77			1.02	4.07	6.89	21.99	
18	5.06	15.68	749	1.10	1.00	3.18			4.00	.54	2.00	.23	.45	1.82	6.82	14.77	.91
Av.[3] 1923	2.50	18.91	1351	4.70	1.00	2.64	1.63	.55	1.93	.40	.93	.73	.79	2.39	6.84	18.58	.33

[1]Once over only.
[2]Based on the number of acres—times over not considered.
[3]Average number of hours based on records from farms not using tractors except for acreage and yield which are for all farms growing peas.
T Tractor used.

1923 together with the average cost for 1922 and 1923 and the average per cent of cost for the two years. The cost per acre ranged from a little over $28 to slightly more than $40, a difference of about $12 per acre. The average per acre cost for the group was $33.76. There was an even greater variation in the cost per hundred pounds, the range being from $1.78 to $5.06, a difference of $3.28 per 100 pounds of peas. The average cost of producing 100 pounds of peas in 1923 was $2.50. In 1922, the per acre cost ranged from about $30 to a little over $42, and the cost per 100 pounds from $1.56 to $3.29. But one farm of the route produced canning peas in 1924, and for this reason no averages are given.

Reasons for Variations in Cost

Yield per Acre. Yield per acre was the outstanding factor affecting costs per 100 pounds of canning peas. The low yields per acre on farms 3 and 18 were accompanied by high per acre costs. In the case of farm 11 the yield was well above the average and the cost per acre well below the average, which resulted in the lowest cost per 100 pounds. The cost per 100 pounds on the four farms having yields above the average was $2.18, while the cost per 100 pounds on those farms having less than the average yields was $3.13—nearly one dollar more per hundred. The average yield per acre on the four high-yielding farms was 1,550 pounds, while the average yield of the five low-yielding farms was 1,080 pounds per acre—nearly 500 pounds less per acre.

Interest, Labor and Seed Costs. The interest rate on farm 11 was very low due to the fact that a crop of millet was harvested from the same piece of land that season. The interest charge was divided equally between the two crops. The high per acre costs on farms 3, 7, and 22 can be largely accounted for by the fact that the labor cost on these farms was extremely high. The unusually high cost per 100 pounds on farm 18 was due to a combination of a very low yield and high per acre costs. The seed cost alone on farm 18 was $4.58 per acre above the average of the entire group. Nearly five and a half bushels of seed per acre were used on this farm, while the average of the group was about four bushels.

Variations in Labor Requirements

The variation in the amount of labor required in the production of peas was as great as the variation in the cost per acre and per 100 pounds. Tables XXXVII and XXXVIII give the amount of man labor and horse work used on the various farms in producing an acre of peas.

The number of hours of man labor used on the various farms in the production of an acre of peas ranged from slightly over seven and one-half hours to nearly twenty-two hours, and the number of hours of horse work from nearly twelve to forty-seven hours per acre.

Rate of Performing Field Operations. Farm 3 with the largest number of man hours per acre and the second largest number of horse hours per acre, had a comparatively high labor requirement for most of the field operations. The labor rate for plowing was especially high. The seedbed

Table XXXVIII.—Horse Work Requirements Per Acre By Operations[1] for Peas
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per 100 lbs.	Grand[7] total hours work per acre	Yield per acre pounds	No. of acres	Plowing		Disking		Harrowing		Compacting		Hours per acre				
					Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Times over	Hours per acre	Seeding	Cutting	Hauling	Total[7]	All crop
11	$ 1.78	20.97[6]	1657	4.65	1.00	2.37T			4.00	.83			1.50	3.42	10.33	20.97	
14	2.03	22.37[6]	1388	7.60	1.00	.92T	2.00	.72T			.65	1.20	1.32	5.00	12.90	22.37	
22	2.29	45.85	1762	5.06	1.00	11.50	2.52	2.27	2.00	2.07	2.00	2.67	2.97	3.16	14.25	44.66	1.19
7	2.51	24.09[4]	1503	7.10	1.00	1.27T	2.00	.63[4]			1.00	3.39	3.39	2.26	12.55	24.09	
5	2.62	33.20	1107	5.45	1.00	7.00			4.00	1.10	.74	.63	1.00	6.80	12.48	32.10	1.10
12	2.01	32.08	1225	1.59[5]	1.00	5.04	2.00	1.89	2.00	.63	2.00	2.82	3.77	5.04	7.55	32.08	
2	3.19	11.87[2]	1114	7.80	1.00	1.28T	4.00	.19T	2.00	.77	1.00	1.02	1.74	1.28	4.62	11.87	
3	3.90	46.93[3]	940	1.96	1.00	15.30	4.00	1.80	4.00	3.08			2.04	4.07	6.12	46.93	
18	5.06	35.23	749	1.10	1.00	0.54			4.00	1.02	2.00	.57	1.36	3.64	13.64	33.41	1.82
Av.[2] 1923	2.50	38.83	1351	4.70	1.00	8.74	1.63	2.06	1.93	1.26	.93	1.97	2.04	3.62	10.64	38.31	.52

[1]Once over only.
[2]Average for 1923 based on farms not using tractors except for acreage and yield which are for all farms growing peas.
[3]Includes 1.67 hours of tractor power.
[4] " .21 " " " "
[5] " 1.70 " " " "
[6] " 2.37 " " " "
[7]Based on the number of acres—times over not considered.
T All tractor power.

on this farm was disked and harrowed four times, which would tend to make the labor requirements high.

The Distance from the Viner. While there was no direct correlation between the number of hours required for hauling peas and the distance from the viner for the group as a whole, the long distance from the viner was undoubtedly the cause for the large amount of labor required on some of the farms. The number of teams hauling to a viner the same day will have an effect upon the hauling time. With a large number of teams hauling at the same time, there is apt to be a good deal of waiting in line at the viner, since at most viners only one wagon can be unloaded at one time.

Table XXXIX gives the distances that the farms were from the viner, together with the number of hours of man labor and horse labor required

Table XXXIX.—Distance from the Viner and Labor Required in Hauling Peas
(Walworth County, Wisconsin, 1923)

Farm number	12	3	7	18	22	11	14	2	5
Approximate length of haul	½	¼	½	½	¾	1	1¼	1½	1½
Man hours per acre for hauling	4.40	6.89	4.50	6.82	10.10	6.56	8.03	3.33	11.20
Horse hours per acre for hauling	7.55	6.12	12.55	13.64	14.25	10.33	12.90	4.62	12.48
Yield per acre—pounds	1225	940	1503	749	1762	1657	1388	1114	1107

in hauling peas and the yield. The time given for hauling includes loading in the field, driving to and from the viner, and unloading the peas at the viner.

Table XL.—Standard Requirements Per Acre for Pea Production in Southern Wisconsin

Operation*	Equipment	Hours per acre		Acres in 10 hr. day
		Man labor	Horse work	
Plowing**	2 bottom, 14" gang, tractor	1.40		7.10
Plowing	2 bottom, 14" gang, 4 horses	2.50	10.00	4.00
Plowing	1 bottom, 16" sulky, 3 horses	3.25	9.75	3.10
Plowing	2 bottom, 12" gang, 3 horses	2.75	8.25	3.60
Disking	6 ft. disk, 4 horses	.85	3.40	12.00
Disking	6 ft. disk, 3 horses	1.00	3.00	10.00
Harrowing	15 ft. harrow, 3 section, 3 horses	.40	1.20	25.00
Floating	10 ft. float, 2 horses	.60	1.20	16.70
Rolling	10 ft. roll, 2 horses	.50	1.00	20.00
Cultipacking	8 ft. culti, 2 horses	.60	1.20	16.70
Seeding	8 ft. seeder, 3 horses	.75	2.25	13.40
Seeding	6 ft. seeder, 2 horses	.85	1.70	11.80
Cutting	5 ft. mower, 2 horses	1.75	3.50	5.70
Hauling	Wagon, 2 horses	6.50	10.50	†
Seed	Seed per acre, with nurse crop, 4 bu.			

*Once over.
**Corn and grain stubble.
†The men usually exchange help—the number of acres to be done in one day depends upon the size of the crew.

Standard Requirements for Peas

The standard requirements per acre for the production of peas are given in Table XL. The time required in the performance of the various operations in seedbed preparation is the same as that required for the other crops. The cutting of the green peas takes almost twice as much time as is required in mowing hay, although the same unit of two horses and a five-foot mower is used. An extra man frequently follows the mower to prevent clogging of the cutting bar or to remove large bunches of the vines that often cling to the dividing board. Guards or lifters are frequently attached to the regular mower guards if the pea vines are lying close to the ground. Peas are hauled to the viner as soon as they are cut. The hauling, and sometimes the cutting, is done on a crew basis, several farmers getting together to haul their peas on the day designated by the field man representing the canning company.

Usual Dates for Performing Operations—Canning Peas

Operation	Usual dates	Total days	Days available
Plowing	April 22—May 10	18	14
Disking	April 25—May 12	17	13
Harrowing	April 25—May 20	25	19
Rolling and cultipacking	April 27—May 12	15	12
Sowing	May 1—May 14	14	11
Cutting and hauling			
Early peas	June 17—June 27	10	9
Late peas	July 1—July 13	13	11

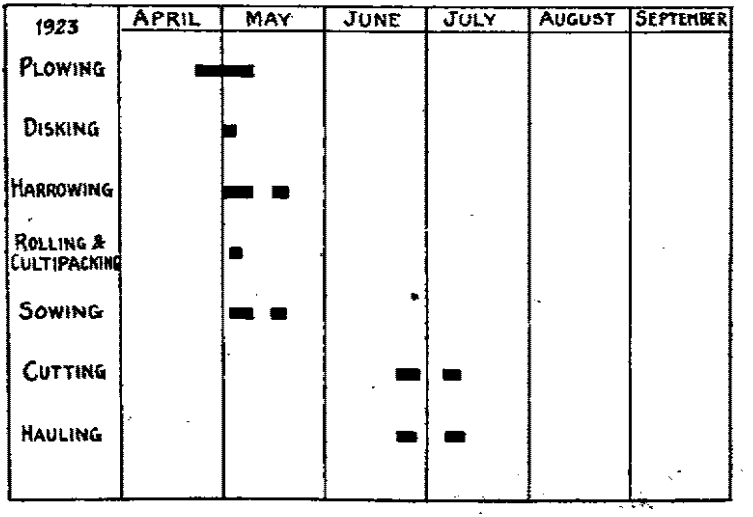


Chart 8.—Days Available for Performing Crop Operations (Canning Peas) Walworth County, Wisconsin.

Usual Dates for Performing Canning Pea Operations

The seedbed preparations for canning peas occupy approximately the same period as oats, barley and corn (Chart 8). They follow the beginning dates of the other crops and overlap during most of the time. The sowing dates are distinctly later, so that all seedbed and planting operations do not seriously compete with any of the crops previously discussed.

The harvest dates for peas cover two distinct periods. The early peas are harvested during the last of June and the late peas during the first two weeks of July. There is a serious conflict in the field operations for those farmers growing alfalfa who wish to diversify by growing canning peas. The harvesting period of the early canning pea crop coincides with the dates of the first cutting of alfalfa. During the second year of the route work there were nine farmers who had canning peas. In each case where the farmer had alfalfa he stopped in the middle of his haying operations in order to cut and deliver the early canning pea crop. This will result in many cases in a poorer grade of alfalfa.

Ordinary showers do not interfere with the cutting and hauling of canning peas to the viner so that there are as many days available for harvesting the crop as there are days during the period. In many instances peas are also canned on Sundays so that there is no break in the harvesting operations.

Reasons for Variations in Costs of Livestock and Livestock Products

Effective livestock production, like crop production, depends mainly upon the application of a few fundamental ideas to the problem.

Type and Quality of Livestock

It is necessary to select a type of livestock adapted to the production desired. An extreme beef type of cow is ordinarily not satisfactory for milk or butterfat production. Neither is it desirable to obtain the heavy draft type of horse for general farm work.

A well-bred beef animal which tends to put on fat easily will not transform the feed into milk so readily as will an equally well-bred dairy animal back of which are generations of breeding for the purpose of developing milk production as the important continuous function. Also when producing for butterfat market only, a dairy type of animal which gives a large quantity of milk with a low butterfat content is placed at a disadvantage compared to the dairy cow which produces milk containing a relatively large amount of butterfat.

The type of work horse adapted to the general farm operations of Wisconsin is not the one which can move the largest objects. Speed is a more desirable factor for many of these operations than is strength, and a horse which can walk two and one-half miles per hour while doing the ordinary

farm work is more valuable for most of the farm operations than one which can exert more power at a slower gait.

An important point with reference to hog types is the desired size at the time of marketing. The old-fashioned small type pigs are inefficient, especially when marketed at 225 pounds or over. Before they reach these weights they have become exceesively fat, which increases the cost of the gains. On the other hand, an extreme big type hog does not reach the desired finish at the usual market weights.

The difference in economy of gain between the bacon and the lard type hogs is not sufficient to justify the recommendation of the one over the other. The spread in market prices may in this case be the factor determining the type of pork produced.

Production or Returns per Animal. Every class of livestock is kept for what it will produce. Such livestock as hogs and beef cattle produce meat only. When the product is sold the producing unit is also sold. In these cases the relative gains per animal in a specified time are important if greatest economy in the production of meat is to be obtained. It is found, for example, that a pig can be raised to any given weight more economically by full feeding to the required weight than to extend the time of fattening. The rate of gain determines to a great extent the economy of gain.

With such livestock as dairy cattle and poultry the unit of production is milk, butterfat or eggs produced during the year. Ordinarily the cow producing 6,000 pounds of milk or an equivalent amount of butterfat will have lower costs per 100 pounds than will the cow producing but 4,000 pounds. The same holds true for the production of eggs, for a flock which averages 120 eggs per hen will ordinarily produce eggs at a less cost than a flock which produces but 75. The product to be obtained from horses is work. A large number of hours' work in a given period is the most important factor in reducing horse work costs per hour. The number of hours of work per horse for a year is usually small and costs per hour can be reduced if the organization can be so planned as to increase the work per horse.

Feed

Feed must contain sufficient quantities of the different elements necessary for animal growth and production and in the right proportion if each class of livestock is to use its feed effectively.

A heavy ration deficient in one element necessary for production may result in no more meat or product than a much lighter ration which supplies the deficient element. Too much of one element will not make up for the lack of another.

Consideration must also be given to the bulkiness of the ration. Some livestock, as cattle, require bulky feeds in order that proper assimilation may take place. Other livestock, as hogs, cannot use bulky foods to advantage. Their capacity for assimilating quantities of feed is so limited that sufficient nutrients for satisfactory gains cannot be handled by them unless the feeds are in concentrated forms, as grains, commercial concentrates, or other feeds carrying a relatively large amount of protein.

The conditions under which rations are fed are also factors influencing

the effectiveness of the feed. A ration supplementing summer pasture will have a different influence upon production than will the same ration fed with no pasture. Also a ration supplementing blue grass pasture results in different production than the same ration supplementing sweet clover pasture.

The availability of drinking water and salt, as well as the regularity of feeding, may account for differing degrees in the effectiveness of feeds. Well-ventilated barns result in better utilization of feeds than drafty, open barns.

The temperament of dairy cows requires that unusual disturbances be eliminated as far as possible. A change in the person milking and handling a herd is reflected in decreased production.

The Dairy Herd

The importance of the dairy herd in the system of farming developed in the southeast section of the state is apparent when it is realized that the farmers of this area depend almost exclusively upon the dairy herd for their cash income. A few farmers receive but two-thirds of their income from the dairy herd, but a vast majority receive from three-fourths to four-fifths of their aggregate income from this source.

There is a market for whole milk much of the year either through the sale of fluid milk to Chicago or through the manufacture of condensed and evaporated milk and milk powder. There is generally a short period each year when skimmilk has little or no sales value.

This area has been devoted to the dairy farming business more than one-half century, yet there is still great opportunity for herd development.

Approximately twenty-five per cent of the herds were classed as "mixed" or "scrub" herds. They belong to those farms which make no effort either at breeding up the herd through the continuous use of proven sires from any one of the dairy breeds or even at selection of producing stock through the purchase of one breed only. Purebred herds represent but 12 per cent of the total number.

Fifty-five per cent of the herds studied were Holsteins, eight per cent of which were purebred. The Guernsey breed was next in numbers. It represents approximately five per cent of the herds, while Shorthorns, Brown Swiss, and Jerseys, with an occasional herd of Herefords and Angus, make up the remainder of the purebred and grade herds.

The number of dairy cows per farm ranged from five to forty-five, the average being 18 cows per farm. This is an average of three crop acres per dairy cow, where the average for the county is 4.5 crop acres per cow. The state average of 5 crop acres per cow is much higher than the farms studied but not much larger than the county average.

About 45 per cent of the milk is produced during the summer six months from May to October, inclusive, and 55 per cent during the winter, or barn feeding months. Twelve of the twenty-two farms in 1923 had over one-half of their cows freshen during the three months of August, September and October, while but three of the herds had one-half or more of the cows freshen during the three months of November, December and January.

Table XLI.—Costs Per Year for a Dairy Cow
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per pound B. F.	Total costs	No. of cows	Man labor		Horse work		Feed	Pasture	Herd* decrease	Interest	Taxes and insurance	Real estate	Equipment	Vet. and medicine	Bull charge	Milk hauling	Overhead & misc.
				Hours	Value	Hours	Value											
11	$ .45	$140.30	14.2	113	$24.78	16.5	$ 2.21	$70.51	$ 9.04	$ 6.32	$ 3.37	$ .57	$ 3.88	$ 1.99	$ .05	$ .54	$ 8.44	$ 8.60
19	.47	101.06	26.8	90	19.86	7.5	1.46	49.83	7.33	.....	3.29	.98	4.11	4.33	.41	1.77	6.37	1.32
14	.48	115.48	44.4	140	30.80	9.7	1.09	53.29	9.37	.....	3.81	.76	2.55	3.29	.11	3.05	6.32	1.04
16	.50	117.48	13.4	79	17.46	22.8	3.15	54.02	9.57	8.21	2.40	.96	6.30	3.24	.....	1.72	7.01	3.44
1	.51	141.23	21.8	108	23.78	8.6	1.05	76.03	9.50	3.03	2.78	.79	4.82	2.10	2.69	2.34	7.21	5.11
9	.53	114.48	25.0	123	27.04	16.6	2.58	54.23	8.81	1.28	3.42	.76	4.25	.26	.....	1.66	8.77	1.42
10	.53	174.57	17.1	166	36.41	8.5	1.51	79.51	10.61	.....	13.37	.76	5.37	.64	.04	12.19	12.86	1.30
5	.54	112.47	16.0	168	37.03	22.5	2.25	46.92	8.85	.....	3.01	.80	3.72	.42	.28	.98	5.22	2.99
20	.55	169.95	25.6	104	22.98	16.7	2.15	95.45	7.61	1.41	6.56	.81	4.56	3.98	.81	6.35	7.58	9.70
22	.56	160.04	18.6	187	41.16	11.9	1.95	73.18	7.07	.....	6.77	1.08	3.79	4.47	3.29	6.55	5.16	5.57
17	.56	144.72	13.9	121	26.57	16.3	2.01	80.97	8.62	.....	3.54	.82	2.52	1.05	.25	1.11	13.55	3.71
6	.56	116.19	13.6	131	28.78	3.5	.65	52.16	8.46	3.76	5.03	.93	2.35	.64	.44	.....	6.92	6.07
4	.58	125.78	15.6	183	40.28	4.2	.69	51.43	11.99	.10	3.24	.95	2.51	.71	.04	2.07	6.76	5.01
3	.58	166.57	20.6	211	46.33	11.6	1.43	75.08	7.97	7.89	2.00	1.28	7.53	.13	1.00	1.38	9.34	5.21
12	.59	143.25	17.5	152	33.55	22.7	3.25	71.99	6.58	.....	7.57	1.37	2.42	.89	2.41	2.96	4.02	6.24
21	.60	110.07	11.6	99	21.83	1.7	.16	48.59	8.23	5.17	3.54	1.10	5.53	5.16	.....	4.47	3.67	2.62
18	.63	170.05	5.4	196	43.21	35.2	4.54	71.61	10.95	.....	7.66	1.66	13.00	5.35	.03	.....	5.90	6.14
2	.65	118.70	22.4	92	20.24	1.5	.59	59.42	7.11	6.15	2.33	.85	5.03	2.31	.47	3.38	6.85	3.97
8	.70	232.07	13.0	191	42.03	10.4	1.61	109.10	6.64	29.23	7.85	.93	5.94	.49	5.04	.82	12.64	9.75
15	.73	136.49	15.9	99	21.83	14.9	1.55	59.99	8.22	.....	5.03	.43	6.85	3.15	1.02	7.41	17.77	3.24
13	.75	152.02	9.4	197	43.38	27.9	3.82	57.23	9.11	13.98	4.09	.82	4.47	1.93	.....	9.88	2.10	1.21
7	.85	119.40	19.2	99	21.85	9.4	2.35	62.20	8.58	.....	3.09	.82	5.73	.98	.41	3.18	4.75	5.46
Av. 1923	.56	136.44	18.2	134	29.53	12.4	1.75	65.30	8.55	3.14	4.52	.89	4.49	2.18	.84	3.37	7.66	4.22
Av. 1922	.57	128.98	17.7	144	28.93	12.8	1.78	56.95	8.53	2.96	3.76	1.00	5.00	3.49	.56	3.99	6.89	5.14
Av. 1924	.62	142.14	18.2	136	35.42	8.2	1.19	65.34	8.09	2.23	3.95	.98	3.70	3.06	.54	3.97	8.63	5.04
Av. 3 yrs.	.58	135.52	18.0	138	31.12	11.3	1.59	62.34	8.40	2.80	4.07	.95	4.43	2.91	.65	3.78	7.68	4.80

*Herd depreciation is obtained by subtracting all sales, calves credited to the herd and second inventory from the sum of the purchases, value of heifers freshened and the first inventory.

There were 73 per cent of the herds which had more than three-fourths of the cows freshen in the six-month period between August and January.

Each of the twenty-two farms during 1923 supplemented part or all of the summer grass period with both roughages and concentrates. There was but one farmer during each of the other two years of the route work who did not supplement grass with both roughages and concentrates. A survey of 236[4] farms, covering the four townships in which the farms keeping the detailed cost records are located, showed that 60 per cent of the farmers supplemented the feed obtained from pasture in summer by the use of some roughages. Thirty per cent of these, or 18 per cent of all farmers of the area, used some concentrates in connection with the roughages.

Table XLII.—Relation of Butterfat Production Per Cow to Costs Per Pound

(In Cents Per Pound)

Butterfat production per cow	No. of farms	Man labor	Feed	Pasture
—200 lbs.	4	12.4	34.0	4.6
+300 lbs.	4	9.0	26.7	2.8
All	22	12.2	27.0	3.5

Total feed	Depreciation	Interest	Real estate	Equipment	Bull charge	Other	Total
38.6	1.7	2.0	2.7	1.5	2.6	8.5	70
30.5	.7	2.5	1.0	.8	2.1	6.4	52
30.5	1.3	1.9	1.8	.9	1.4	6.0	56

The practice of the farmers owning the higher producing herds is to feed some supplemental feeds during the whole of the pasture season. The amount fed is small during May and June when the blue grass pastures are at their best. During July and August when the pastures usually make very little growth the practice of these farmers is to supplement with heavier grain rations.

The usual dairy herd of this area is barn fed somewhat during the whole year. There are practically no chores for cattle except for milking and handling the milk during the period from the middle of May to the first of October. As the fall pastures are reduced by frosts and grazing and the cows freshen they are barn fed more heavily until by the last of October they are practically on full barn feed. From then until sometime during May, the chores for the dairy herd are heavy. There is a month during which the cattle have partial access to some pasture and before good pasture is actually available.

Milking machines are a part of the usual dairy equipment with herds of more than 15 cows. Fourteen of the 22 farms studied in 1923 had milking machines, while slightly more than 40 per cent of all farms of the four townships studied[5] had milking machines. A study of those farms using

[4]Unpublished material covering the year from May 1920 to May 1921.

milking machines showed that it required .2 hours man labor less per 100 pounds milk produced on those farms than on farms having the same size herds but using no milking machines. This represents a saving of approximately 225 hours man labor for the year on the average farm.

Costs of Producing Butterfat

Variations in Costs. The costs per cow for the cows of the dairy herd ranged from $101.06 to $232.07, the average cost being $136.44 (Table XLI). The costs of ten of the herds was between $100 and $130 per cow, or a variation of but $30 per cow. Nine of these ranged from $110 to $126 per cow. Of the remaining twelve herds five were between $130 and $150, five in the $150 to $170 group, and two in the $170 to $190 group. The highest cost herd of the group was nearly $58 higher than the next highest. This man had the highest production per cow of the farms studied. The herd depreciation and milk hauling charges, as well as the feed costs per cow, were very high.

The costs per pound of butterfat varied less than the costs per cow. The extreme variation in this case was from 45 cents to 85 cents per pound butterfat, or 90 per cent when expressed in terms of the lowest costs, while the extreme variation in costs per cow was over 130 per cent when expressed in terms of the low cost herd. The average costs of butterfat for 1923 were 56 cents per pound; in 1922 they were 57 cents, and in 1924 the average costs were 62 cents per pound butterfat.

Reasons for Variations in Costs

There are several factors which affect the costs per pound of butterfat. The two most important ones are production per cow and feed utilization.

Production per Cow. The four herds producing less than 200 pounds butterfat per cow (Table XLII) had an average of 70 cents per pound butterfat, while the average costs for all herds were 56 cents per pound. The four herds producing more than 300 pounds butterfat per cow averaged 52 cents per pound. One of the four herds produced butterfat at a cost of 70 cents per pound, which increased the average of the low cost herds considerably.

The high costs in this case were due primarily to an unusually large item of herd depreciation due to the death of four cows and greater feed costs. The herd depreciation amounted to nine cents per pound of butterfat produced or eight cents per pound more than the average of the three remaining high producing herds. The feed costs were nearly 6 cents per pound butterfat greater than the average of the three remaining herds. These two items account for practically all the increase in costs of this herd over the other three high producing herds. It represents an instance of overfeeding. The cows were pushed beyond the point of most economical production.

Feed Costs. The effective use of feed is the most important factor in the costs of producing butterfat. If all herds were fed equally effectively the production per cow would show a very close inverse correlation to costs

[8]Unpublished data of the survey of the four townships 1920-21.

Table XLIII.—Feed Required Per Cow
(Walworth County, Wisconsin, 1923)

Farm No.	Cost per lb. F. B.	B. F. per cow	Milk per cow	Succulent roughage		Pasture days	Dry roughage							
				High protein	Low protein		High protein				Low protein			
				Pea silage	Corn silage		Alfalfa	Clover	Other	Total	Timothy	Corn stover	Other	Total
8	$ 70	332	10027		9219	133	1600		2263	3863				
10	53	330	9963		8433	212	212		776	988	497	929		1426
11	45	311	8619		11193	181		718		718	167	627	223	1017
20	55	309	9002		9841	152	3271			3271		683		683
22	56	296	9988		8817	141	1217	1921	9	3147	54	812		866
[redacted]														
3	58	286	8350		8863	159	744	98	504	1346	126	1423		1549
1	51	276	6529		7107	199	489	244	1495	2228		1788		1788
18	63	269	5963	2037	4352	219	1517	231	1135	2883		1914		1914
17	56	258	7076		12146	172			1104	1104	405	2485		2950
12	59	241	8020	1935	7107	132	946	478	90	1514		839	446	1285
[redacted]														
14	48	238	6929		8994	187	21		1499	1520	100	1072		1172
16	50	235	4885		6000	191	143	130	1353	1626	655	985	152	1792
19	47	216	5432		6086	146		249	1471	1720	505	579		1084
9	53	216	5959		6733	176		910	810	1720	546			546
4	58	215	5778		705	240	32		3266	3298		1288	40	1328
5	54	207	5780	499	6895	177		404		404	1102	62	430	1594
6	56	207	4770		6220	169	338		1130	1468		965	240	1205
13	75	202	6703		6105	182	417		1543	1960		1130		1130
15	73	186	6074		6572	164	1107	252	767	2126	521	219		740
21	60	184	5496		7988	164			1588	1588		1712		1712
2	65	181	5898		8382	142		952		952	1181	1756		2937
7	85	141	4154		7439	172	1009	901	536	2446	570	1150	290	2010
Av. 1923	56	242	6890	132	7840	171	575	357	935	1867	311	975	73	1359
Av. 1922	57	225	6320	194	7364	171	624	616	875	2115	172	1031	108	1311
Av. 1924	62	228	6343	178	7572	162	783	203	964	1950	132	1123	41	1296
Av. 3 yrs.	58	232	6522	163	7585	168	656	402	922	1980	206	1040	76	1322

Table XLIII—(Continued).—Feed Required Per Cow
(Walworth County, Wisconsin, 1923)

Farm No.	Concentrates										Straw	Total nutrients per cow except pasture	Nutritive ratio 1 to
	High protein				Low protein								
	Oil meal	D. B. grains	Other	Total	Corn	Oats	Barley	Bran and middlings	Other	Total			
8					1294	696	802	372		3164	1556	5988	7.5
10	199		176	375	665	104	476	661	349	2255	791	4629	7.5
11	196		83	279	437	881	26	288		1632	541	4228	8.4
20	4		128	132	1142	784	39	344	3	2312	803	5581	7.4
22	68	70		138	363	398	36	256	16	1069	891	4438	7.5
3	247		56	303	594	714	18	429		1755	610	4392	7.9
1	123		23	146	1240	170	282	840	4	2536	561	5176	8.6
18	93			93	763	409		519		1691	9	4691	7.7
17	220			220	793	488	97	355		1733	32	5558	10.4
12	90	39		129	739	709	269	416		2133	356	4525	7.9
14	71		30	101	481	103	209	165		958	505	3697	10.5
16					668	101	11	405		1245	522	3618	10.4
19	59			59	262	391	13	226		892	768	3161	9.6
9	870			870	410	1661	6743	1629		10443	637	3207	7.4
4	109			109	231	753		295		1279	763	3565	8.1
5	71		62	133		253	56	376		685	495	2903	9.3
6	90			90	679	366		301		1346	790	3444	9.2
13	258			258	459	245	39	475		1218	486	3039	7.8
15	6			6	197	145	70	148		560	161	3534	8.8
21					274	631				905	241	3055	11.7
2					548	533				1081	664	4156	11.9
7	35			35	719		10	100	120	949	265	4225	9.2
Av. 1923	86	5	29	120	563	391	155	305	22	1436	590	4138	8.7
Av. 1922	52	29	6	87	754	352	255	194	8	1563	740	4247	9.0
Av. 1924	83	47	30	160	491	439	155	137	26	1248	569	3850	8.6
Av. 3 yrs.	74	26	21	121	609	391	191	214	18	1423	637	4122	8.7

per pound butterfat. It is found,[6] however, that herds of good inherent capacities can be fed as ineffectively as can herds of poor quality. In other words, one herd may produce 300 pounds of butterfat per cow with relatively low feed costs. If the production is forced to 350 pounds per cow the costs may increase out of proportion to production. The costs per pound of the higher production will be greater than those of the smaller production. Farm 8 had a herd of this type. In addition to a high feed cost per cow this farm also had an average depreciation figure of $29.23, which is $26.27 per cow greater than the average of the area. Farm 18 had a cost of 66 cents per pound butterfat even with the production of 269 pounds butterfat per cow. The feed cost was 32 cents per pound butterfat, which was 6 cents per pound larger than the average.

It is also interesting to note that it cost as much for feed for some of the low production cows as it did for some of those of higher production. Farm 7 used feed valued at $71 per cow in order to obtain 141 pounds of butterfat. This represents a feed cost of over 50 cents per pound butterfat, where the average is but 26 cents.

Quantities of Feed Used. The quantities of feed used along with the nutritive ratio of the ration[7] account for over one-half of the variation in butterfat production. For this reason a detailed study of the feed requirements per cow and per pound butterfat are important.

The quantities of the various feeds used per cow during 1923 is shown in Table XLIII. In general it may be said that the low producers received less feed with wider nutritive ratios than do the higher producers. The quantity of good hay, as alfalfa, is conspicuously greater with the high-producing herds, as is also the amount of high protein concentrates. The higher producing herds also ate more grain per cow and slightly more silage. They were not fed as much low protein roughages, as timothy and corn stover as the low-producing herds. In other words, this indicates that high production is not possible with small quantities of feeds.

This is further illustrated by Table XLIV where the feed requirements of the 66 farms studied for the three years are presented. It is here seen that the low producing herds used 3,400 pounds of nutrients in addition to pasture. Those herds producing approximately twice as much butterfat used only 50 per cent total digestible nutrients. The amount of protein used increased at a faster rate than did the total digestible nutrients. An increase of 50 per cent in the total digestible nutrients was accompanied by an increase of 88 per cent in the amount of protein. This resulted in a narrower ration—the nutritive ratio being reduced from 1:9.2 to 1:7.3.

The effect of these varying quantities of feed when expressed in terms of butterfat produced is indicated in Table XLV. Although more nutrients were required per cow for the higher producing herds, the quantity of nutrients per pound butterfat is reduced from 20.5 pounds to 16.6 pounds. The quantity of protein used does not vary so much as does the amount of nutrients. There is a drop from 2.0 pounds protein per pound butterfat for the low producing herds to 1.6 pounds protein per pound butterfat for

[6]Refer to bulletin by Ezekiel, McNall and Morrison of Wisconsin Agricultural Experiment Station, entitled, "Factors Affecting the Production of Milk."

[7]Bulletin in the press, "Relation of Feeds" Mr. Ezekiel, McNall, Morrison.

Table XLIV.—Relation of Butterfat Production to Feed Requirements
(Average Per Cow)

B. F. production per cow	Production		No. of herds	Succulent roughage		Dry roughage		Concentrates		Nutrients		Nutritive ratio
	F. B.	Milk		High P.	Low P.	High P.	Low P.	High P.	Low P.	Total dig.	Protien	
141-170	166	4891	7	0	7055	1482	1762	30	887	3404	333	9.2
171-210	193	5402	16	337	7175	1111	1845	70	1121	3650	343	9.0
211-240	224	6155	17	96	6567	1260	1958	106	1194	3708	308	9.1
241-270	252	7206	12	399	8668	1062	1843	150	1644	4659	488	8.5
271-300	284	7816	8	0	7638	1807	1804	227	2010	4762	534	7.9
301+	314	8741	6	0	9386	2408	1139	195	2195	5207	625	7.3
All	232	6522	66	179	7579	1569	1795	122	1425	4122	427	8.7

Table XLV.—Relation of Butterfat Production Per Cow to Feed Requirements
(Reduced to Per Pound Butterfat)

B. F. production per cow	Production per cow		No. of herds	Succulent roughage		Dry roughage		Concentrates		Nutrients		Nutritive ratio
	B. F.	Milk		High P.	Low P.	High P.	Low P.	High P.	Low P.	Total dig.	Protein	
141-170	166	4891	7	0	42.4	8.9	10.6	.2	5.3	20.5	2.0	9.2
171-210	193	5402	16	1.8	37.2	5.8	9.6	.4	5.8	18.9	1.8	9.6
211-240	224	6154	17	.4	29.3	5.6	8.7	.5	5.3	16.6	1.6	9.1
241-270	252	7206	12	1.6	34.0	6.6	7.3	.6	6.5	18.4	1.9	8.5
271-300	284	7815	8	0	26.9	6.4	6.3	.8	7.1	16.8	1.9	7.9
301+	314	8741	6	0	29.9	7.7	3.6	.6	7.0	16.6	2.0	7.3
All	232	6522	66	.8	32.7	6.5	7.7	.5	6.0	17.7	1.8	8.7

the herds producing the average quantity of butterfat. From this point the protein used per pound butterfat again increases until the herds producing the largest quantities of butterfat use as many pounds protein per pound butterfat as do the least productive herds.

The higher production herds used greater quantities per cow of the high protein concentrates and roughages.

Labor Utilisation. The labor expended on the dairy herds varied from 79 hours to 211 hours per cow. There were six men who used less than 100 hours man labor per cow. Four of these men were careless with the herds and neglected the cleaning of the barns. Farm 19, which averaged 90 hours man labor per cow had a larger herd than is usually found. Here also less time was spent in cleaning his barn.

The farmer on farm 21 spent 99 hours per cow. He took very good care of his stock as well as keeping his barn clean. The small number of hours labor per cow is accounted for by the organization of the barn for the livestock and the system of choring worked out by this man. All feed is so placed that containers are filled by gravity, thus eliminating shoveling. A milking machine which milks two cows at a time is used, and the machine does the stripping. While the unit is milking, the farmer does such chores as feeding the horses, calves and hogs. In this way the over-all milking time is divided between calves, horses, hogs and cows.

There were also six men who spent more than 180 hours per cow with th dairy herd. Five of the six had purebred herds, and the cows received better care than the usual herd. The farmer on farm 3, which averaged 211 hours man labor per cow, was in the cow barn practically all the time during the winter. Part of this time was spent in "tinkering" around the cows and their stalls. On the other hand, farm 13 was occupied by a man who was exceedingly slow in all his farming operations. It required a longer time for him to feed or milk or clean up the barn than for any other man of the route, not because he "loafed on the job" but because he was slow.

Feed and Labor Standards

In attempting to set up satisfactory feed and labor standards for the dairy herd it should be remembered that standards are to be used only as guides. The quantities of feed on hand or available determine to a great extent what should be fed, and the standards are useful in this case in indicating the approximate quantities of the various classes of feeds necessary for the production of a given quantity of butterfat or milk.

A cow can handle but a limited amount of feed. For this reason it requires a ration with a narrower nutritive ratio to produce 300 pounds of butterfat than to produce 200 pounds. It not only requires more feed per cow to produce the larger quantities of butterfat but the ration must also consist more largely of concentrates. This feed is supplied either in the form of alfalfa, commercial concentrates, oats, or bran.

The summer feeding of livestock usually differs from the winter feeding both in kind and amount.

The use of pasturage reduces the amount of barn feeding required during

the summer months; it also permits the use of feeds containing relatively less proteins than are required for winter milk production. The winter ration suggested for the cows producing 200 pounds of butterfat per year is about as follows:

Table A.—Standard Requirements for Cows Producing Different Quantities of Butterfat

(Milk Testing 3.6 Per Cent)

FEEDS	Quantities for cows producing			
	200 lb. B. F.		300 lb. B. F.	
Corn silage		8000		8000
Hay		1800		3100
Alfalfa	600		1900	
Clover and timothy	1200		1200	
Protein poor concentrates		1500		2100
Corn	500		1100	
Oats	800		500	
Barley	200		300	
Bran			200	
Protein rich concentrates		150		200
Pasture days		150		150
Nutritive ratio—except for pasture		1:8.1		1:7.4
Total digestible nutrients—except for pasture		3550		4952
Crude protein—except for pasture		390		588
Hours man labor		135		150
Pounds bedding—straw		700		700

The following indicates the theoretical amount of feed required as worked out from the feeding standards appearing in Henry & Morrisons' "Feeds and Feeding," p. 746.

Total digestible nutrients	4600	5500
Digestible crude protein	570	735

To add 2500 lbs. 3.6% milk would require approximately:—
Total digestible nutrients—900 lbs.
Crude protein—165 lbs.

Corn silage	27	pounds
Alfalfa hay	3	"
Clover and timothy	6	"
Corn and barley	3½	"
Oats	2	"
Cottonseed meal	¾	"

The nutritive ratio of this ration is 1 to 7.8.

The summer daily ration in addition to pasture consists of 15 pounds of corn silage and 4 pounds of grain. The daily winter ration for cows producing 300 pounds of butterfat a year is:

Corn silage	27	pounds
Alfalfa hay	9½	"
Timothy and clover	6	"

Corn and barley	5	"	
Oats, bran, and cotton seed meal	1	"	each.

This ration has a nutritive ratio of 1 to 6.6.

The summer feeds are 15 pounds corn silage and 4½ pounds of grain daily. The nutritive ratio of this ration is approximately 1 to 12.

The labor requirements used represent the time required to take feed, care for, and milk the dairy herd. Where any special care was given the milk while in the milk room this time was considered a part of the labor on the herd.

Heifers

The heifer group includes all heifer calves from one year of age to the time of freshening. There was an average of 4.8 heifers per farm during 1923 and 5.6 heifers per farm for the three years. This is about the number needed for maintaining the dairy herds which have a yearly turnover of approximately one-sixth of the herd. There were 3.8 cows per heifer for 1923 and 3.2 cows per heifer during the entire period of the study. Since the heifers freshen at one and one-half to two years of age there are about five cows in the herd to each heifer freshening during the year.

Some of the farms, as 9, 21, 1, 10, and 20, sell a sufficient number of calves to make up for the purchases in such herds as 19, 16, 4, 6, 17, and 11. The remaining eleven herds raised the necessary number of heifers for their herd replacement.

Costs of Heifers

Variation in Costs. The costs of keeping a heifer a year varied from $31.32 to $149.55, the average cost being $53.04 (Table XLVI). There were but three herds whose costs were less than $40 and seven herds whose costs were more than $60 per heifer. The other twelve herds had costs between $40 and $60 per heifer.

Six of the seven farms having high per heifer costs had purebred herds. The remaining two purebred herds, farms 1 and 12, had lower than the average per heifer costs.

The gains in weight for the heifers were not obtained, so that the economy of gains cannot be given.

Reasons for Variations in Costs. Feed costs represent seventy per cent of the total costs of keeping a heifer a year and man labor about nine per cent, while eight other items compose the other twenty-one per cent. Farms 20, 8, 6, and 22 had losses in the heifer herds, which increased the costs on these farms. Some of the losses were the result of deaths in the herd, while others represent the sales of reactors to the tuberculin test. With this factor removed the total costs varied with the feed costs per heifer.

Four of the six highest cost group had from one-tenth to four and two-tenths heifers per farm. Three of these had less than two heifers per farm. Farm 16 was the only other farm having less than two heifers for the year. The costs per heifer in this case were $54.05.

Table XLVI.—Cost of Heifers Per Head
(Walworth County, Wisconsin, 1923)

Farm No.	No. of heifers	Total cost	Man labor		Horse work		Feed cost	Pasture		Depreciation	Interest	Taxes	Insurance	Real estate	Overhead	Misc. cash expense
			Hours	Value	Hours	Value		Unit days	Value							
9	10.1	$ 31.32	11.4	$ 2.50	4.0	$ .57	$ 19.16	74.9	$ 3.74	$	$ 1.94	$ .60	$ .15	$ 2.47	$ .19	$
21	4.6	38.30	15.1	3.32			23.71	97.1	3.88		2.22	.37	.33	4.02	.54	
19	2.1	38.67	18.0	3.94	.7	.14	20.48	137.0	6.85		2.28	.66	.02	3.98	.82	
7	4.3	40.07	15.5	3.41	1.5	.38	25.32	120.0	6.00		1.34	.31	.02	2.40	.89	
11	2.3	40.42	4.8	1.05			26.62	107.4	5.37		1.70	.24	.05	4.44	.95	
5	5.6	41.12	22.5	4.95	3.6	.35	24.73	58.8	2.93	3.57	1.82	.43		1.70	.64	
2	3.6	42.23	12.0	2.64			28.39	84.4	4.22		1.11	.36		4.73	.78	
14	14.4	42.68	23.7	5.20	5.7	.64	27.36	81.0	4.04	1.39	1.98	.38	.03	1.35	.18	.13
1	8.6	44.82	18.0	3.96	.2	.02	31.35	84.0	4.20		1.58	.38	.07	2.27	.52	.47
18	3.0	47.37	31.2	7.02			24.69	101.3	5.07		1.88	.52	.09	7.26	.84	
12	6.3	52.39	18.5	4.06	3.6	.52	37.46	64.6	3.23		3.66	.62	.03	2.18	.63	
16	1.1	54.05	28.4	6.26	2.8	.38	31.37	124.7	6.24		2.53	.72	.29	5.37	.89	
13	2.9	55.80	35.8	7.87			38.25	46.5	2.32		4.21	.81	.25	1.94	.24	
3	2.5	56.18	38.4	8.46	1.2	.14	28.19	227.9	11.39		1.64	.67	.18	4.78	.73	
4	2.0	59.41	32.9	7.24			41.33	81.5	4.07		.86	.82	.17	3.90	1.02	
10	7.9	61.04	19.8	4.36	1.4	.25	41.75	107.7	5.39		5.22	.72	.06	3.00	.29	
20	10.1	62.28	13.3	2.92	2.1	.27	32.39	109.9	5.50	10.89	4.50	.43		3.29	1.10	.99
15	7.0	74.42	27.9	6.14			57.14	38.4	1.93		3.75	.60		3.75	.97	.14
8	4.2	96.71	21.6	4.76	1.7	.26	46.76	89.0	4.45	25.18	6.74	.76	.13	5.83	1.84	
6	1.3	110.26	22.3	4.90			29.04	117.7	5.88	61.15	.78	.14	.18	3.69	4.50	
17	0.1	115.80					44.60	220.0	11.00		20.00	4.00	1.60	9.50	25.10	
22	1.6	149.55	6.7	12.48	2.2	.36	62.05	101.3	5.06	46.88	10.16	1.29	.32	5.08	4.46	1.41
Av. 1923	4.8	53.04	20.5	4.52	2.1	.27	32.39	89.3	4.42	3.88	2.94	.52	.08	3.08	.76	.18
Av. 1922	6.1	39.72	20.8	4.15	4.5	.60	29.45				2.17	.40	.10	2.14	.30	.32
Av. 1924	6.1	44.86	13.3	3.46	1.7	.26	29.07	84.7	5.10	1.08	2.24	.47	.13	2.40	.64	.01
Av. 3 yrs.	5.6	45.34	18.3	4.03	2.9	.40	30.20	54.0	2.97	1.50	2.42	.46	.10	2.50	.58	.18

Man labor costs varied inversely with the number of heifers per farm except for the purebred herds. There were nine farms having three or fewer heifers per farm. The average time required for their care was 25.2 hours per heifer. The five farms having between three and six heifers per farm had an average of 17.8 hours per cow. There were seven farms with more than six heifers per farm. The average labor per heifer for this group was 18.8 hours. The labor item in this case was larger than for the farms having from three to six heifers per farm, the reason being the number of purebred herds in this group. Five of the seven farms of this group had purebred herds, while one of the five farms having from three to six heifers per farm kept purebreds and two of the nine farms having three or fewer heifers per farm had purebreds. The farmers having the better quality herds kept more heifers per farm than did the farmers with the poorer quality. Aside from farm 22, which was preparing to sell out, the farms having purebred herds averaged one heifer for every 2.5 cows, while the remaining farms averaged one heifer for every 4.6 cows.

The farms with a small number of heifers have higher real estate—building—costs than do those having more heifers. The items of interest, taxes and insurance are higher on the purebred herds than on the grade or scrub herds.

Feed Costs. Feed costs per heifer varied in approximately the same order as did total costs if farm 22 is omitted. This farm had an unusually large per heifer cost because of the losses in the herd. There was but one farm, 9, which had feed costs of less than $20 per heifer. This farm was overstocked and under manned, so that there was neither sufficient feed nor enough labor to effectively care for the herd. Ten farms had feed costs between $20 and $30 per heifer, five between $30 and $40 per heifer, and four had costs between $40 and $50 per heifer. Farms 15 and 22, both with purebred herds, were the only farms having feed costs in excess of $50 per heifer. The feed costs of one-half of the herds were between $30 and $41 per heifer.

Quantities of Feed. The quantities of feed consumed per heifer varied greatly with the different classes of feed, Table XLVII. Very little high protein concentrates were used on any of the farms. The herd on farm 22 received more than any other herd. This herd was conspicuously overfed, and the heifers were in good condition. On the other hand, the herd which received the next largest quantity of high protein concentrates was on farm 13, and it was a conspicuously poor herd. The men with the better quality herds fed more grain and grain products than did those having the poorer quality herds. Seven of the ten best herds were fed more than the average quantity of grain per heifer. These seven herds received an average of 730 pounds grain per heifer, which is more than twice the average for the twenty-two herds.

The quantity of high protein roughage ranged from 59 pounds to 3,300 pounds per heifer. The average of approximately 1,000 pounds per heifer along with the usual quantity of concentrates—350 pounds per year—is not sufficient to produce good heifers unless there is an unusually abundant supply of some summer pasture, as sweet clover.

Table XLVII.—Feed Required Per Heifer
(Walworth County, Wisconsin, 1923)

Farm No.	No. of heifers	Succulent roughage		Pasture unit days	Dry roughage							
		High protein	Low protein		High protein				Low protein			
		Pea silage	Corn silage		Alfalfa	Mixed	Clover and other	Total	Timothy	Corn stover	Other	Total
9	10.1		3665	75			411	411	27			27
21	4.6		5840	97		126		126		1261		1261
19	2.1		2286	137		964	67	1031	65	272		337
7	4.3		3810	120	221	82	589	892	366	415	42	823
11	2.3		7280	107			457	457	216		286	502
5	5.6	196	5065	59			59	59	1067			1067
2	3.6		5746	84			679	679	622	919		1541
14	14.4		6091	81		998		998	113	597		710
1	8.6		3049	84	110	782		892		2963		2963
18	3.0	833	3717	101		495	83	578		1081		1081
12	6.2	686	3464	65	640	57	349	1046		1119	260	1379
16	1.1		3594	125	193	949	55	1197	519	1208	55	1872
13	2.9		4995	46	133	1224	94	1451		697		697
3	2.5		5200	96	206	356	64	626	229	1414		1643
4	2.0		288	81		3300		3300		1715	45	1760
10	7.9		5792	108	179	488		667	461	710		1171
20	10.1		5632	110	1029			1029		772		772
15	7.0		8431	38	897	914	85	1886	1375	680		2055
8	4.2		3441	89	950	1195		2145				
6	1.3		3938	118		779		779		454	131	585
17	.1		1200				2000	2000	1800	3340		5140
22	1.6		7695	10	903		1828	2731		756		756
Av. 1923	4.8	75	4956	89	287	513	164	964	255	820	26	1101
Av. 1922	6.1	45	3964	86	106	679	232	1017	32	870	78	980
Av. 1924	6.1	192	4617	85	384	606	222	1212	123	932	55	1110
Av. 3 yrs.	5.6	102	4470	86	250	606	209	1065	128	875	55	1058

Table XLVII—(Continued).—Feed Required Per Heifer
(Walworth County, Wisconsin, 1923)

Farm No.	No of heifers	Concentrates									Straw
		High protein			Low protein						
		Oil meal	Other	Total	Corn	Oats	Barley	Bran middlings etc.	Other	Total	
9	10.1	2		2		3	39	5		47	2008
21	4.6				206					206	1457
19	2.1	9		9	88	140	4	53		285	544
7	4.3	28		28	252			41		293	301
11	2.3	13		13							403
5	5.6					2	1	16		19	323
2	3.6										529
14	14.4				113					113	519
1	8.6				142	13	31	140		326	602
18	3.0	53		53	339	108		68		515	
12	6.3	37	10	47	372	252	91	168		883	253
16	1.1					220				220	532
13	2.9	131		131	209	112	31	268		620	471
3	2.5	2	2	4	7	7		7		21	698
4	2.0				224					224	880
10	7.9		14	14	511		247	240		998	761
20	10.1				180	39		30		249	428
15	7.0				107	72	33	15		227	20
8	4.2				263	247	280	152		942	1010
6	1.3	48		48	215	233		196		644	465
17	.1										200
22	1.6	95	69	164	105	304	106	304		869	766
Av. 1923	4.8	11	3	14	168	54	46	69		337	655
Av. 1922	6.1	10	5	15	220	53	55	52		380	768
Av. 1924	6.1	5	13	18	110	85	17	18		230	515
Av. 3 yrs.	5.6	9	7	16	169	64	40	46		319	655

The average heifer ration for 1923 supplied approximately 185 pounds digestible crude protein and 2,140 pounds digestible nutrients in addition to the feed received from pasture. The nutritive ratio of this ration is 1:10.7, which is too wide for the young stock to handle effectively. If the same quantity of nutrients was supplied with a nutritive ratio of 1:7.0 there would be 270 pounds digestible crude protein supplied. The average time for heifers on pasture is 170 days, which is longer than for the dairy cows. If the pasture is to supply the remainder of the feed required for the maintenance of a growing heifer averaging 600 pounds weight it will be necessary for each heifer to consume 70 pounds of blue grass a day. If, on the other hand, the same quantity of nutrients were supplied with the nutritive ratio of 1:7.0 it would be necessary for the heifers to consume but 40 pounds bluegrass per day in order to be supplied with sufficient nutrients for good growth. If sweet clover pasture were used rather than blue grass it would be necessary for the heifers to consume 42 and 25 pounds daily to be supplied with the desired amount of nutrients.

Labor on Heifers. The number of hours man labor per heifer was about one-seventh the number required per dairy cow. The range in hours was from 4.8 to 38.4 hours per heifer. It is difficult to explain the extreme variations in heifer care as is indicated by the variation in time required for their care. There were five farms, for example, that had less than fifteen hours man labor per heifer. Farms 22 and 13 had good herds well taken care of. There were but 1.6 heifers on farm 22 and they were with the cow herd so that little time was required for getting them from the pasture and caring for them. Farms 9 and 2 had poor herds and there was not enough labor to effectively care for the heifers. Because of this neither the cows nor the heifers received as much care as they should. The four men who gave the heifer herds the most care were also high in their labor requirements per cow.

Table B.—Feed and Labor Standards Per Heifer
(Average weight of 600 pounds for year)

Item	Amount
Corn silage	3000 pounds
Alfalfa hay	800 "
Mixed hay	800 "
Corn meal	200 "
Bran	100 "
Oats	200 "
Pasture	160 days
Man labor	15 hours
Total digestible nutrients except pasture	1700 pounds
Digestible crude protein except pasture	206 "
Nutritive ratio	1:7.3

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Total digestible nutrients	3150
Digestible crude protein	400
Nutritive ratio	1:8.9

Feed and Labor Standards

The following table is for growing heifers whose average weight for the year is 600 pounds. The feeds given in this table are higher than the

amounts used by the average herd, and this ration should result in better heifers. It is still a question among nutrition authorities whether it is more desirable to feed heifers a fairly heavy grain ration and keep them quite heavily fleshed until they enter the milk herd, or to feed just enough grain to bring them through in good thrifty condition. It is expected that the feeding standards set up here will accomplish the latter result.

The quantity of feed and time required to carry a calf from birth until two years old—which approximates the age at which it enters the producing herd—are the sum of the heifer and calf requirements.

Heifers receiving these quantities of feed should be in good thrifty condition at the time of freshening if the feed supplied by the pasture is enough to keep them in good condition during the pasture season.

The heifers are barn fed for 200 days. During this period they receive a daily ration of 15 pounds of silage, 8 pounds of hay, and 2.5 pounds of concentrates. For the balance of the year the heifers are on pasture, and receive no supplementary feed except in unusually poor pasture seasons.

Calves

The calf herd consists of all calves between the ages of four days and one year. The average number of calves kept for a year, or calf units, is 6.2 per farm for 1923 and 5.4 for the average of the three years.

The usual practice is to sell the calves when ten to twenty days old. The bull calves are generally sold for veal, while many of the heifers are kept for herd replacements. There were four purebred herds which sold the young stock for breeding purposes. The calves from the remaining eighteen herds were sold in the ordinary market.

Calves are ordinarily taken from the cows at three to four days of age, from which time they are fed whole milk for a period of two to four weeks. During the latter part of this period about one-third of the farmers begin feeding skimmilk. The other farmers usually feed no milk after the calves have reached the age of one month.

There were 371 calves born from a total of 401 cow units. Seventy per cent, or 259, of the calves were sold, and slightly more than nine per cent died. The remaining twenty to twenty-five per cent of the calves were kept for herd replacements. There were over 35 per cent of the purebred calves kept for herd replacement, while less than 20 per cent of the calves from grade herds were kept for the same purpose. The sale of the calves from the four purebred herds was also for herd replacement.

Costs per Calf

The annual costs of calves is made up of the calves sold as veal plus the calves kept for the year. There was no practical way of separating the costs of calves for veal from the costs of calves kept for the year. For this reason the costs per calf represent the costs of the calves sold as veal reduced to a yearly basis plus the costs of the calves actually kept through the year. There was an average of 11 grade calves sold for veal and 3 kept during the year.

Table XLVIII.—Cost of Calves Per Head
(Walworth County, Wisconsin, 1923)

Farm No.	No. of calves	Total cost	Man labor		Horse work		Feed cost	Pasture		Depreciation	Interest	Taxes	Insurance	Real estate	Overhead	Misc. cash expense	No. of calves	
			Hours	Value	Hours	Value		Unit days	Value								Sold	Kept for year
19	7.4	$30.84	8.4	$ 1.85	2.1	$ .40	$21.35	52.4	$ 2.62	$	$ 1.07	$ .31	$ .01	$ 2.55	$ .18	$	22	2
16	2.4	32.18	13.0	2.85	1.3	.17	20.18	64.4	3.22		.84	.23	.10	4.25	.34		8	2
17	5.0	32.43	20.7	4.54	1.5	.18	21.53	73.6	3.68		.43	.08	.02	1.48	.39	.10	13	4
7	4.5	38.47	13.7	3.02	.9	.25	29.68	19.1	.96		1.15	.27	.06	2.30	.78		8	4
2	4.8	39.21	30.0	4.62	1.5	.58	26.64	59.6	2.98		1.25	.39	.01	1.97	.77		15	3
21	6.0	39.42	18.2	4.00	1.3	.13	30.69	37.6	1.88		.60	.10	.09	1.50	.35	.08	8	3
1	6.7	47.41	25.9	5.70	5.5	.66	34.35	56.6	2.83		.67	.15	.03	2.44	.58		8	5
11	2.3	49.84	14.4	3.17	3.2	.43	35.13	92.5	4.63	1.76	.53	.08	.01	2.51	1.09		9	2
5	6.0	49.59	24.4	5.36	3.3	.33	38.62	44.3	2.22		.71	.16		1.77	.42		10	5
13	4.6	49.88	35.7	7.85	8.8	.12	36.72	71.3	3.56		.11	.02	.01	1.34	.15		8	4
6	2.5	50.53	35.6	7.83			26.54	66.8	3.34	8.80	.80	.13	.04	1.82	1.23		9	2
8	12.1	51.05	22.4	4.93	4.4	.68	38.17	46.4	2.32		2.22	.22	.04	1.54	.43	.50	8	12
20	15.8	54.00	11.3	2.48	.8	.10	45.49	33.2	1.66		1.38	.13		2.10	.31	.35	8	12 P.B.
14	12.5	58.06	11.6	2.54	2.5	.28	50.41	43.2	2.16		1.15	.21	.02	1.21	.08		31	5
12	8.1	65.03	36.1	7.94	1.9	.27	48.35	35.4	1.77		1.24	.21	.01	4.44	.80		11	8 P.B.
10	9.5	69.61	22.5	4.94	.7	.13	54.05	22.9	1.15		2.89	.67	.06	5.42	.30		4	9 P.B.
9	1.5	73.35	18.8	4.14	3.9	.60	58.24				2.20		.20	7.62	.35		20	
15	7.2	78.66	25.6	5.63	6.9	.72	65.94	43.3	2.17		1.73	.41		1.45	.61		16	2
22	7.6	85.88	28.4	6.24	.7	.11	68.65	9.3	.47		3.21	.40	.10	3.83	.91	1.96	9	3 P.B.
3	3.8	93.68	64.3	14.16	2.2	.28	69.32	63.7	3.18		.16			3.61	.63	2.34	14	3
Av. 1923	6.2	55.75	21.8	4.79	2.3	.32	43.41	42.9	2.14	.20	1.38	.24	.03	2.50	.46	.28	11	3
Av. 1922	4.7	47.71	32.6	6.33	4.9	.73	32.09	66.6	3.33		1.44	.22	.05	2.33	.52	.70		
Av. 1924	5.4	44.49	17.7	4.62	2.6	.40	33.32	54.6	2.72		1.01	.22	.05	1.60	.54	.01		
Av. 3 yrs.	5.4	49.15	23.9	5.21	3.2	.47	36.15	53.9	2.69	.07	1.28	.23	.04	2.17	.51	.33		

Variation in Costs. The costs per calf varied from $30.84 to $93.68. (Table XLVIII.) The variations in total costs are due practically altogether to the variation in feed costs. There is no other factor that varies consistently with costs. Feed costs represent approximately 80 per cent of the total costs, while man labor costs account for approximately 10 per cent.

Reasons for Variations in Costs. Feed costs account for practically the whole variation in costs. Farms 6 and 12 have the only herds whose total costs do not vary practically as the feed costs per calf. The large net decrease in herd 6 was caused by the death of six calves. Farm 12 had both labor costs and real estate charges larger than the average, and these items increase the per calf costs out of proportion to the feed costs.

Farms 16, 10, and 9 also had conspicuously large real estate costs. In each case this is caused by the size of the barn space kept for the calves. The labor charge for farm 3 was the result of a great deal of personal care by the farmer and the boys. Two of the calves were fattened especially for home consumption and received every attention which might add to their growth.

The quality of the calves corresponds very closely to the cost of feed used. The five farms having the lowest feed costs had five of the seven poorest quality herds. Farm 13 also had poor quality calves despite higher than average feed costs. On the other hand, seven of the nine high cost calf herds were purebred herds. The quality of the young stock was conspicuously better than the remaining herds. Farms 20, 12, 10, and 22 sold calves for herd replacements. The calves on farm 9 were fed whole milk until they were sold. None were kept longer than two weeks, so the costs in this instance are high because of the type of feed used. Farm 15 kept four calves for herd replacement, one of which was a purebred animal. It was fed heavily of whole milk for several months, which accounts for the unusually high feed costs for this herd.

Quantities of Feed Used. A table of the quantities of feed used (Table XLIX) means very little when expressed in terms of the number of calves kept a year. The reason for this is that distinctly different feeds are used for calves after they are three or four weeks old as compared with the feeds used during the first few weeks of their existence.

Every calf received whole milk for a period after it was born. In many herds the calves were with the cows from three to four days, at the end of which time they were removed from the cows. Other farmers removed the calves from the cows and fed them by hand from the time they were born. Farm 15 is the only exception to this rule. The calves were allowed to remain with the cows for a period of ten days, during which time they received all the whole milk they would take.

Since practically all veal calves are sold between the ages of ten days and three weeks they receive nothing but milk. This is a high cost feeed, and if the quantity of feed used by the calves is expressed in terms of calf years the whole milk portion of the ration becomes unusually large. Farm 9, for example, sold all its calves for veal, none of which were kept over 20 days. As a result nothing but whole milk was fed, and each calf actually received 200 pounds of milk. If the feed used by the twenty calves

Table XLIX.—Feed Required Per Calf
(Walworth County, Wisconsin, 1923)

Farm No.	No. of calves	Succulent roughage		Pasture unit days	Dry roughage							
					High protein				Low protein			
		High protein	Low protein		Alfalfa	Mixed	Clover and other	Total	Timothy	Corn stover	Other	Total
		Pea silage	Corn silage									
19	7.4		1059	52		640	122	762	20	202		282
16	2.4		1451	64		441	17	458	236	385	17	638
17	5.0		915	74		59	56	115	189	961		1150
7	4.5		2740	19	511	305	83	899	76	554	139	769
2	4.8		2395	60			269	269	221	160		381
21	6.0		1300	38		608		608		477	83	560
1	6.7		726	57	99	390		489		336		336
11	2.3		1803	92			170	170	55		13	68
5	6.0	100	1154	44		264	37	301	354		134	488
13	4.6		526	71	562	240	159	961		947	66	1013
6	2.5		1507	67		288		288		144	68	212
8	12.1		902	46	414	882		1296				
20	15.8		1367	33	272			272				
14	12.5		498	43	8	482		490	43			43
12	8.1	118	762	35	542	62	294	898		222	50	272
10	9.5		2359	2	217	421		638	367	101		468
9	1.5											
15	7.2		1044	43	1080	333	12	1425	151	59		210
22	7.6		1432	9	797		884	1681	51	208		259
3	3.8		1435	64	243	55	25	323	19	86		105
Av. 1923	6.2	12	1229	43	276	313	103	692	83	88	131	302
Av. 1922	4.7	36	1264	67	121	358	104	583	87	273	72	432
Av. 1924	5.4	14	1334	55	284	301	134	719	35	426	15	476
Av. 3 yrs.	5.4	20	1272	54	230	324	113	667	70	250	77	397

Table XLIX—(Continued).—Feed Required Per Calf
(Walworth County, Wisconsin, 1923)

Farm No.	No. of calves	Concentrates								Straw	Milk	
		High protein			Low protein							
		Oil meal	Other	Total	Corn	Oats	Barley	Bran middlings etc.	Total		Skim	Whole
19	7.4	33		33	118	178	8	125	429	399		179
16	2.4					128			128	322		271
17	5.0	39		39		197			197	65	63	435
7	4.5				67		1	6	74	69		484
2	4.8				70	132			202	246	443	527
21	6.0				238	403			641	275	2161	308
1	6.7				94	49	85	200	428	485		739
11	2.3	33	11	44	54	62		45	161	220		1073
5	6.0	2		2		2	39	2	43	293		1254
13	4.6				389	101			490	107	4140	113
6	2.5	51		51	261	192		101	554	330		246
8	12.1	58		58	240	250	75	185	750	960		353
20	15.8				112	308		57	477	346	1585	996
14	12.5	21	3	24	66	249	124	39	478	303		1670
12	8.1	38	2	40	160	545	26	37	768	415	2969	558
10	9.5		7	7	126	39	138	324	627	640	3660	513
9	1.5									101		3219
15	7.2				24	82	150	106	392	216	170	1630
22	7.6	15	2	17	3	437		3	443	743	4930	1156
3	3.8	56	9	65	105	100	2	90	297	459		2535
Av 1923	6.2	17	2	19	112	208	47	83	450	409	1281	883
Av. 1922	4.7	12	2	14	132	170	77	58	437	455	917	860
Av. 1924	5.4	15	9	24	100	240	23	29	392	375	600	510
Av. 3 yrs	5.4	15	4	19	114	206	49	59	428	413	956	760

were sold for veal is expressed in terms of calf years it would indicate that each calf receives 3,220 pounds whole milk for the year. It is very probable that had the calves been kept they would not have received more than 300 or 400 pounds of whole milk per calf. The ration would have been changed to include grains, hays and green grasses.

The amount of whole milk fed ranged from 39 pounds per calf on farm 6 to 684 pounds on farm 20, the average being 311 pounds. There were six farmers who fed more than 400 pounds milk per calf. Four of these had purebred herds. One was farm 15, which allowed the calves to run with the cows for 10 days and continued the feeding of whole milk later. The sixth herd, on farm 5, kept ten of the seventeen calves born for herd replacements.

Labor on Calves. The number of hours of man labor ranged from 8.4 to 64.3 hours per calf. The average time required per calf was about 22 hours. There were five farms which used less than 15 hours man labor per calf and a like number which used more than 30 hours. The location of the calf pen and the number of pens are important factors in reducing labor on calves. The largest variations, however, were found in the type of care actually given. A few pens, as those on farms 12 and 3 were kept much cleaner than the usual calf pen. Farms 2 and 6 had poor arrangements for caring for the calves, while the operator of farm 13 was so slow that practically all the enterprises required more than the normal amount of time. The usual practice requires not to exceed 15 minutes for the calf herd during the summer season and approximately twice that amount of labor for the fall, winter and spring where the calf pen cleaning requires more time.

Feed and Labor Standards

Standards for calves must consist of separate standards for the production of veal and for calves kept for herd replacement.

The usual weight of calf at birth is approximately 80 pounds. When sold for veal at twenty days of age it weighs about 120 pounds. During this time the calf should consume from 180 to 220 pounds whole milk.

The standards set up for the calves to be kept during the year should

Table C.—Feed and Labor Standards Per Calf

Item	Veal at 20 days	Calf kept 1 year
Whole milk	200	400
Skimmilk	----	3000
Grain mixture	----	600
Alfalfa or clover hay	----	1500
Corn silage	----	1300
Pasture (days)	----	60
Man labor (hrs.)	3	20
Total digestible nutrients*	27.0	1750
Digestible crude protein*	6.6	300
Nutritive ratio	1:3.1	1:4.8

*Except pasture.

result in good thrifty calves rather than calves carrying much meat. The skimmilk requirement represents the smaller amount that should be used. Should there be no hogs or poultry on the farm to consume part of the skimmilk, it may be desirable to increase the amount fed to calves. The total amount should not exceed 5,600 pounds skimmilk for the year, however.

The calves are barn fed for about 300 days. Inasmuch as the calf ration changes in both character and amount for the various age periods, any daily ration that might be given would mean little. The concentrate mixture for the first six months would consist of two parts of corn, two parts of oats, one part of bran, and one part of oil meal. The older calves would not require as narrow a ration as this, so less bran and oil meal can be fed. All of the whole milk would be fed to the younger calves, while most of the hay and silage would be consumed by calves over six months of age.

Bulls

The number of bulls on the farm includes the bull calves over one year old which are kept for breeding purposes. Practically every farm has one or more bulls. On some of the farms they are kept but a part of the year, but the common practice is to keep the bulls throughout the year.

Six of the 22 farms permitted the bulls to run in the pasture with the milking herd, while two of the farms had no bull during the year. The remaining farms, or 64 per cent of the total number, barn fed the bulls practically the whole year. This accounts for the low average of 40 pasture days per bull. Exercise is ordinarily obtained in a dry lot or on the end of a tether rope where some grass feed is also received.

There are approximately 20 cows to each bull kept on the farm a year. If the number of cows per bull is expressed in terms of the total number of each kept either all or a part of the year it is reduced to 18 cows per bull.

Fifteen of the twenty-two bulls were purebred. This means that seven of the grade herds were headed by purebred bulls. Purebred bulls only were used with the eight purebred herds.

Cost of Bulls

Variation in Costs. The costs per bull range from $46.39 to $156.89. There is a wider spread in the costs per bull than in the costs per cow on the same farms. The costs are also more uniformly spread over the range of costs than in the case of the cows. There are six farms having costs between $60 and $80 per bull and five farms between $80 and $100 per bull. The remaining nine farms are spread over a range of nearly $100 per bull. Every bull whose costs exceed $100 for the year is a purebred animal. None of these were permitted free range of pasture but were barn fed and received limited exercise.

Farm 3 has an exceedingly high real estate charge against the bull. This is because of the unusually large stall set aside in the barn for the bull. Farms 11, 12, 22, and 8 have interest charges which are more than twice the average interest charge. High bull valuations are responsible for these

Table L.—Cost of Bulls Per Head
(Walworth County, Wisconsin, 1923)

Farm No.	Total	No. of bulls	Man labor		Horse work		Feed	Pasture		Depreciation	Interest	Taxes	Insurance	Real estate	Overhead	Miscellaneous
			Hours	Value	Hours	Value		Unit days	Value							
5	$46.39	0.9	47.8	$10.51	4.4	$ .44	$19.70	142.2	$ 7.11	$	$ 2.78	$ .64	$	$ 3.94	$ 1.27	$
9	54.89	1.0	15.8	3.47	6.0	.93	35.68	.4	7.20		1.13	.61	.15	5.45	.27	
7	65.97	1.0	66.5	14.63	4.0	1.00	37.02	23.0	1.15		5.00	1.15	.27	2.95	2.80	
21	67.84	1.0	42.3	9.30	5.5	.52	47.84				5.00	.84	.73	2.60	1.01	
11	68.40	0.2	48.8	10.70			33.45				12.50	1.80	.35	5.65	3.95	
12	74.51	1.5	22.3	4.91	1.3	.20	51.24	20.7	1.03		11.25	1.93	.07	2.68	1.20	
20	75.08	2.0	31.6	6.96	6.8	.87	50.54				7.50	2.03		4.97	1.71	.50
6	75.26	0.9	49.7	10.93			50.36	102.2	5.11		4.00	.67	.07	2.94	1.18	
4	80.84	0.9	61.1	13.44			52.77	104.4	5.22		2.65	.92	.19	3.65	1.66	.34
2	88.72	1.0	90.5	19.91			50.17	144.0	7.20		2.75	.90	.10	5.14	2.55	
1	89.46	1.0	74.5	16.38	.5	.06	62.42				3.81	.92	.17	4.18	1.52	
16	91.28	0.6	32.9	7.23	3.5	.49	66.23				4.39	1.26	.49	9.82	1.37	
13	95.08	1.0	89.0	19.58			59.29	107.0	5.35		3.75	.48	.22	3.43	.48	2.50
3	103.00	0.6	98.3	21.63	9.2	1.13	55.90				2.08	1.40	.37	18.97	1.52	
10	116.20	1.8	49.2	10.82			76.63			22.22	1.11	.79	.07	2.88	.79	.89
19	124.02	0.5	51.0	11.22	36.0	6.98	89.22	34.0	1.70		3.80	1.10	.04	9.00	.96	
15	120.00	1.0	84.0	18.48	15.0	1.56	80.70				6.75	.43		9.80	2.28	
14	143.51	1.0	125.3	27.55	21.0	2.35	78.71			25.00	5.00	.93	.07	2.87	1.03	
22	144.32	0.9	114.2	25.11	3.3	.56	87.18				11.11	2.12	.53	7.67	3.10	6.94
8	156.89	1.0	94.5	20.79	3.0	.46	119.04				10.00	1.00	.20	3.87	1.53	
Av. 1923	93.85	.99	62.0	13.63	5.2	.72	60.62	39.5	1.98	3.30	5.25	1.11	.17	4.98	1.50	.59
Av. 1922	85.33	.94	63.5	12.70	9.5	1.34	35.79	86.0	4.30	15.55	4.42	.92	.30	5.38	1.33	3.30
Av. 1924	110.05	.85	64.0	16.64	6.3	.99	63.75	39.6	1.98	11.13	6.83	1.26	.34	3.71	2.46	.96
Av. 3 yrs.	95.16	.93	63.1	14.12	7.1	1.03	52.12	57.1	2.85	10.11	5.38	1.08	.27	4.78	1.70	1.72

Table LI.—Feed Required Per Bull
(Walworth County, Wisconsin, 1923)

Farm No.	No. of head	Succulent roughage		Pasture unit days	Dry roughage								
		High protein	Low protein		High protein					Low protein			
		Pea silage	Corn silage		Alfalfa	Mixed	Clover	Other	Total	Timothy	Corn stover	Other	Total
5	.9	300	3476	142						1021			1021
9	1.0		6809	144			831	712	1543	325			325
7	1.0		3423	23	1385	629	589	33	2636	629	1927	178	2734
21	1.0		8557			3293			3293		280		280
11	0.2		1700				330		330				
12	1.5	950	5023	20	2367	67	750		3184		623	350	973
20	2.0		9510		3894				3894				
6	0.9		5022	102		1389			1389		750		750
4	0.9		1680	104		4428			4428	167	1439	50	1656
2	1.0		7321	144			881		881	1223	1635		2858
1	1.0		4180		421	1831	95		2347		1379	210	1589
16	.6		3885		2361	1369	105		3835	175	1167	105	1447
13	1.0		7430	107	272	1757		80	2109		1788		1788
3	.6		1370			745	267		1012	708	1860		2568
10	1.8		11867		547	1404			1951	1748	583		2331
19	0.5		12382	35		2823	549		3372	383	1123		1506
15	1.0		12865		2441	800	85		3326	981	365		1346
14	1.0		8971		72	3253			3325	160	463		623
22	.9		535		1557		3111	84	4752	292	539		831
8	1.0		1900		2491	3572			6063				
Av. 1923	.94	61	6913	39	867	1325	344	57	2593	456	775	65	1296
Av. 1922	.99	194	4184	86	250	842	602	10	1704	240	1048	117	1405
Av. 1924	.85	169	5985	40	833	1482	80	176	2680	156	1200	13	1369
Av. 3 yrs.	.93	138	5626	57	627	1189	367	59	2242	289	999	84	1372

Table LI—(Continued).—Feed Required Per Bull
(Walworth County, Wisconsin, 1923)

Farm No.	No. of head	Concentrates									Straw
		High protein			Low protei						
		Oil meal	Other	Total	Corn	Oats	Barley	Bran middlings etc.	Other	Total	
5	.9	----	----	----	----	----	----	----	----	----	420
9	1.0	----	----	----	----	----	110	----	----	110	525
7	1.0	----	----	----	833	----	----	----	----	833	200
21	1.0	----	----	----	----	----	----	----	----	----	400
11	0.2	----	----	----	----	----	----	----	----	----	125
12	1.5	180	36	216	501	723	311	294	----	1829	540
20	2.0	----	----	----	885	809	42	453	----	2189	1025
6	0.9	90	----	90	899	563	----	288	----	1750	639
4	0.9	----	----	----	362	300	----	----	----	662	774
2	1.0	----	----	----	353	295	----	----	----	648	615
1	1.0	61	----	61	568	189	296	650	----	1703	989
16	.6	----	----	----	262	82	----	133	----	477	2767
13	1.0	188	----	188	650	161	45	468	----	1333	508
3	.6	----	----	----	----	----	----	----	----	----	770
10	1.8	----	11	11	497	13	56	206	----	772	1113
19	0.5	110	----	110	482	682	26	410	----	1600	1410
15	1.0	----	----	----	60	42	15	28	----	145	229
14	1.0	----	----	----	473	439	905	139	----	1956	486
22	.9	78	74	152	572	560	----	369	----	1501	1202
8	1.0	----	----	----	2072	719	611	294	----	3696	1797
Av. 1923	.94	83	6	39	476	276	127	186	----	1065	782
Av. 1922	.99	21	24	45	423	194	136	78	----	831	615
Av. 1924	.85	43	57	100	447	402	84	127	----	1060	537
Av. 3 yrs.	.93	31	28	59	448	282	118	128	----	976	649

charges. Other items of cost, except feed, do not vary to any considerable extent.

Again, the variation in feed costs account for the great variation in total costs per bull.

Feed Costs. The highest feed costs (Table L) were two and one-fifth times the lowest costs, while the highest total costs per bull were nearly three times the lowest costs. Farm 5, whose feed costs per bull were less than $20, had an underfed, poor animal. Farms 9, 7, and 11 also had bulls which were not well kept. On the other hand, it is probable that some of the bulls were fed more than was necessary to keep them in good condition.

Quantities of Feed. The nutritive ratio of the feed used by the average bull was 1 to 8.8 (Table LI). This is much narrower than is suggested by nutrition authorities[8] to keep the animal in good condition. The feed also supplied over 400 pounds digestible crude protein in addition to the quantity supplied by 40 days' pasture where Morrison's figures indicate that 390 pounds protein is sufficient for the yearly maintenance of a 1,500 pound bull with no pasture.

It is interesting to note that farm 21, whose feed cost was $47.84 per bull, used 3,300 pounds nutrients and 275 pounds protein with a nutritive ratio of 1 to 10.9. His bull weighed 1,300 pounds and was in thrifty condition, although he was not fat in the least. He was tethered out in the yard several weeks of the year, where he picked up some grass.

The bull on farm 10 weighed 2,000 pounds and was in better condition than the bull on farm 21. He was an aged bull. The feed used on this farm carried 4,800 pounds total digestible nutrients and 400 pounds digestible crude protein with a nutritive ratio of 1 to 11. This bull was tethered 90 days of the year. His feed cost was $3.83 for each 100 pounds live weight, while the feed cost for the bull kept on farm 21 averaged $3.70 per 100 pounds live weight.

The labor spent upon the bull varies more with the man than with the type of bull. Bulls which are tethered out require as much time as those exercising in a dry lot. On the other hand, those running in the pasture a part of the summer require less time than those barn fed during the year. The range in labor on bulls was from 15.8 hours on farm 9 to 125.3 hours on farm 14. Four of the farmers required less than 40 hours man labor per year to care for and feed the bull. Farms 5 and 16 let their bulls run with the dairy herd, while farm 20 used a dry exercise lot which was cleaned up once or twice a year. The labor requirements per bull were low on farm 12 because one of the bulls was but one and one-half years old at the end of the year and required very little time. The older bull also ran with the cow herd part of the year.

Three of the four farms having more than 90 hours' labor per bull had purebred animals and gave them a great deal of attention. They were in the barn continuously. The bull on farm 2 was also kept in a separate stable except for the short time he was in a dry lot.

[8]See Henry & Morrison, "Feeds & Feeding," pp. 745 and 787.

Feed and Labor Standards

The ration received by the bulls of this area does not differ greatly from that received by the milking herd. A more satisfactory ration for the bull should contain a smaller proportion of protein than is found in the usual ration.

The standards here suggested are for bulls which have 60 to 90 days' grass available during the summer in addition to the ration suggested.

Table D.—Feed and Labor Standards Per Bull

Item	Quantity per bull	
	1400 lb. bull	2000 lb .bull
Legume hay		
Timothy and clover	1400 lb.	2000 lb.
Non-legume hay, timothy	1400 lb.	2000 lb.
Protein poor concentrates		
Corn	400 lb.	500 lb.
Oats	300 lb.	300 lb.
Bran	100 lb.	100 lb.
Corn Silage	9000 lb.	12000 lb.
Pasture days	90	90
Man labor hours	80	65
Total digestible nutrients, except pasture	3600	4800
Digestible crude protein, except pasture	275	370
Nutritive ratio	1:12	1:12

The daily ration for the 1,400 pound bull is approximately 33 pounds corn silage, 10 pounds hay, and 3 pounds grain for nine months. The remaining three months the bull is on pasture or staked out in the yard with no supplementary feed.

The daily ration for the 2,000 pound bull is approximately 44 pounds of silage, 15 pounds of hay, and 3½ pounds of grain for nine months. For three months the bull is pastured or staked out in the yard with no supplementary feed.

Horses

The horses includes all horses kept for farm or road work. Colts and ponies are not placed in this group.

Horses are usually fed some grain throughout the year. There is a little work, as manure or feed hauling, to be done every day, so that the horses get some exercise, although they are barn fed practically the whole time. About one-fourth of the farmers fed no grain for one month or six weeks during the late summer or early fall at the time when there was little farm work and pastures still supplied green feed.

Costs of Horse Work

Variations in Costs of Horse Work. The range in costs for 1923 was from 9.5 cents to 40.0 cents per hour horse work. This is an extreme

Table LII.—Horse Labor Costs—Analysis of Cost Per Horse
(Walworth County, Wisconsin, 1923)

Farm No.	No. of horses	Cost per hour of horse labor cents	Man labor		Feed cost	Pasture	Depreciation	Interest	Taxes	Insurance	Real estate	Equipment	Shoeing	Vet. and med.	Other costs	Total costs	Hours work per horse
			Hours	Value													
21	4.0	9.5	18.9	$ 4.15	$44.45	$ 6.69	$	$ 8.68	$ 1.09	$ .63	$ 4.17	$ 1.88	$ 5.97	$	$ .25	$77.91	688
5	4.0	10.0	61.0	13.42	53.75	8.49	.62	1.58	.74		2.60	2.28	.02		.46	83.96	715
15	4.0	10.4	57.9	12.73	47.49	2.94		7.62	1.04		5.90	.78		.62	.08	79.18	712
14	10.1	11.2	50.8	11.18	80.01	2.03		5.12	.96	.07	5.15	2.88	1.64	5.69	.21	114.94	912
1	5.5	12.1	42.4	9.32	61.46	3.81	18.18	5.52	1.00	.24	4.16	4.19	6.18	.55	.41	115.03	854
17	4.0	12.3	48.2	10.60	51.95	5.65		2.94	.54	.14	3.65	3.90	.60		.10	80.07	574
3	4.0	12.4	69.8	15.34	72.25	3.23	2.50	2.50	1.42	.22	5.22	5.76	1.89	.50	3.24	114.07	838
18	4.0	12.9	68.5	15.00	36.94	4.44	4.25	2.21	.97	.09	6.04	3.32	2.65		.22	76.22	567
20	7.8	12.9	46.5	10.24	52.49	4.65		3.68	1.37	.14	6.40	1.49	1.24		.07	81.77	549
11	3.0	13.4	60.3	13.28	61.59	3.20		2.17	.93	.06	3.26	.55			.11	85.15	592
13	4.0	13.7	67.2	14.81	64.70	2.75		4.69	1.06	.28	3.46	2.46	1.65		.30	96.16	680
16	4.0	13.8	55.8	12.26	76.15	3.00	5.00	2.01	1.03	.17	7.39	2.35	3.50		.31	115.17	769
12	11.0	14.3	36.2	7.97	38.68	5.08		3.32	.88	.05	2.06	4.80	2.21		.12	65.17	409
8	6.0	15.5	54.1	11.91	85.36	5.02	19.17	4.73	1.05	.09	2.01	1.98		1.67	.12	133.10	785
9	6.0	15.5	41.9	9.22	47.32	4.38	3.33	4.98	.80	.24	4.54	4.10				78.91	486
22	7.0	16.4	64.7	14.23	95.97	6.27	7.14	4.52	.79	.14	4.39	4.10	3.58		.19	141.82	806
4	4.0	16.7	116.8	25.68	58.42	2.89	7.50	2.10	.88	.12	5.21	2.93			.14	105.87	606
10	4.0	17.8	65.5	14.41	98.28	3.39	11.25	1.44	.40	.08	5.02	1.14	3.85		.07	139.33	755
6	3.0	18.3	69.5	15.29	61.84	5.90		2.93	1.00	.16	3.76	4.86			.72	96.46	489
19	6.0	19.4	51.6	11.35	70.27	4.12		6.07	.88	.05	8.53	4.01	1.96	.56	.25	108.05	532
7	4.0	25.0	73.8	16.22	58.76	.96	10.00	4.28	1.20	.22	5.09	4.67	.80		.33	102.53	391
2	6.0	40.0	56.8	12.50	71.83	4.68	13.83	4.03	1.37	.13	5.24	3.37		1.17	.79	118.94	288
Av. 1923	5.2	14.6	55.4	12.18	63.54	4.26	4.61	4.09	.98	.14	4.66	3.19	1.78	.74	.34	100.50	635
Av. 1922	4.8	15.0	53.4	16.78	64.46	3.64	13.16	4.51	.97	.25	5.54	4.11	2.04	.44	.22	116.12	707
Av. 1924	4.8	14.6	51.4	12.36	69.14	2.62	6.36	3.70	.99	.20	4.30	2.37	2.45	.42	.21	106.12	675
Av. 3 yrs.	4.9	14.7	64.1	14.15	65.50	3.56	8.15	4.13	.98	.20	4.86	3.28	2.07	.54	.25	107.67	672

variation of more than 420 per cent when expressed in terms of the low costs (Table LII). Total costs per horse varied from $65.17 on farm 12 to $141.32 on farm 22. Feed costs, including pasture, comprised nearly 70 per cent of the total costs, and man labor a little over 12 per cent. Three of the remaining items, *e. g.*, depreciation, interest, and real estate costs, account for another 12 per cent, while the six remaining items comprised the other six per cent of the costs. The extreme variation in feed costs is from $36.94 on farm 18 to $98.28 per horse on farm 10. Man labor costs ranged from $4.15 on farm 21 to $25.68 on farm 4. It is seen that the variations in both feed and labor are greater than are the variations in total costs per horse.

The costs per horse in 1922 were influenced by several farms which had horse losses. This increased the depreciation per horse to $13.16.

Reasons for Variations in Costs. The most important factor in the variations in costs per hour of horse work is the total hours work per horse during the year. The seven farms having less than 12.5 cents costs per horse hour averaged 786 hours horse work per year for each horse. The eight farms whose horse labor costs ranged from 12.5 cents to 15 cents per hour averaged 573 hours work per horse during the year, while the seven farms whose horse labor costs were more than 16 cents per hour averaged 560 hours horse work per year.

There were six of the seven farms with low per hour horse work costs which had more than the average number of hours work per horse. Two of the seven farms having the highest per hour horse work costs had more hours work per horse than the average.

There were but two colts raised on the 22 farms during 1923. One was on farm 15 in the low cost group, and the other was on farm 19, which is one of the high cost group. The tractors were so divided that their influence upon horse work costs should be negligible in this discussion. Farms 5, 15 and 14 of the low horse work costs had tractors, while farm 11 of the medium cost group had a tractor, and farms 10, 7 and 2 of the high horse work cost farms had tractors. The tractor influence should thus be as noticeable upon one group of farms as the other.

The total costs per horse did not vary with the costs per hour. The eight farms whose horse work costs varied less than two cents per hour from the average had an average total cost of $88 per horse; the seven farms with low per hour costs had an average total cost of $98 per horse, while the seven farms with the high per hour horse costs had an average total cost of $119 per horse.

Feed costs varied approximately with the total costs per horse, so that they influenced the costs per hour horse work approximately as did the total costs per horse. Feed costs influenced the horse work costs per hour more in the case of the seven high cost farms than in the others. There is a spread of ten dollars, from $55 to $65, between the average feed costs of the medium cost group and the low cost group, while the high cost group had twenty dollars greater feed costs per horse, or $85, than did the low cost group. The large per horse feed costs of the seven high cost farms is associated with but ten hours work per horse less than the eight farms whose costs approximate the average.

It may be interesting to note that the seven farms with low costs per hour horse work had an average of 16.5 crop acres per horse, while the eight with the medium costs per horse hour had an average of 13.7 crop acres per horse, and the seven farms with the high per hour horse work costs averaged 19.9 crop acres per horse.

There were 38.2 hours horse work per crop acre in the case of the low cost farms, while the medium cost farms averaged 41.7 hours of horse work per crop acre and the high cost farms averaged 28.1 hours horse work per crop acre. It is thus seen that the farms with the large horse work costs spent less time on their crops than did the other farms, and the farms with the smallest number of crop acres per horse spent the greatest amount of time per acre of crops.

Labor Utilization. There were two outstanding farms in the utilization of man labor for the care of horses. Farm 21 used an average of 16.9 hours man labor per horse for feeding and caring for the horses. He has his farm so arranged that no time is required for watering, and all feed granaries and mows have openings near the horses. The granaries are above the livestock, so no time is required for shoveling grain. Farm 4 on the other hand required 116.8 hours man labor per horse for feeding and caring for the horses. One source of feed supplies all livestock so that much walking is necessary in the feeding and caring for these horses. It would be logical to expect those farms having the larger number of hours work per horse to also use the greater number of hours man labor in horse chores, but such is not the case. The seven farms with low costs per hour had the same number of hours labor per horse as did the farms with the medium costs per hour, while the seven farms with the high per hour horse work costs averaged five hours man labor per horse more than the remaining farms.

The usual practice for the farmer with five horses is to spend about one-half hour with them during the summer season and about an hour a day during the winter period.

Quantities of Feed Used. The average quantities of feed per horse are shown in Table LIII. This feed supplied nearly 400 pounds digestible crude protein and over 3,900 pounds total digestible nutrients with a nutritive ration of 1:8.9. In addition to this feed the horses were on pasture an average of 85 days per horse.

The quantities of concentrates used varied from 174 pounds per horse to 3,780 pounds. Farms 5, 15, 18, 9, 4, 7, and 2 were distinctly underfed as indicated by the condition of the animals. They also received the smaller quantities of grain. Farms 17, 11, and 19 also had rather poor horses, not so much because they were low in the grain ration as because of the failure to feed sufficient good hay.

It may be said that most of the horses were underfed rather than overfed and each could have carried one or two hundred pounds more flesh without being fat in the least.

Feed and Labor Standards

The feeding standards given below are for 1,400 pound horses maintained in flesh and working 90 to 100 days a year. It is a heavier ration than is

Table LIII.—Feed Required Per Horse
(Walworth County, Wisconsin, 1923)

Farm No.	No. of horses	Weight per horse pounds	Pasture days[1]	Dry roughage								
				High protein					Low protein			
				Alfalfa	Mixed	Clover	Other	Total	Timothy	Corn stover	Other	Total
21	4.0	1325	134	----	2380	----	----	2380	----	280	----	280
5	4.0	1100	170	----	423	81	----	504	1617	----	1463	3080
15	4.0	1300	50	1752	----	129	----	1881	2254	389	----	2643
14	10.1	1400	41	----	1220	----	----	1220	1317	----	----	1317
1	5.5	1400	70	172	1782	----	----	1054	----	517	----	517
17	4.0	1250	113	----	----	----	274	274	775	970	----	1745
3	4.0	1300	64	50	1026	355	----	1431	607	2050	----	2747
18	4.0	1050	80	625	1610	----	----	2235	287	----	1000	1287
20	7.8	1270	93	1172	----	----	----	1172	----	3012	----	3012
11	3.0	1300	64	----	----	----	----	----	1400	----	----	1400
13	4.0	1200	55	744	2156	----	538	3438	----	972	600	1572
16	4.0	1300	60	----	2462	----	----	2462	3425	392	----	3817
12	11.0	1350	101	91	91	1216	----	1398	----	2735	----	2735
8	6.0	1400	100	393	2346	----	----	2739	----	3778	----	3778
9	6.0	1300	88	----	----	150	----	150	1859	----	----	1859
22	7.0	1500	125	138	----	2653	54	2845	3762	2047	----	5809
4	4.0	1250	58	70	3815	----	----	3885	218	141	50	409
10	4.0	1700	68	880	1087	----	----	1967	4305	2678	250	7233
6	3.0	1225	118	----	1815	----	----	1815	----	----	733	733
19	6.0	1150	82	----	818	----	----	818	2323	2321	----	4644
7	4.0	1100	19	460	250	1236	100	2046	1867	1251	----	2618
2	6.0	1175	94	----	208	----	----	208	4336	----	----	4336
Av. 1923	5.2	1300	85	285	950	347	35	1616	1341	1246	136	2723
Av. 1922	4.8	----	73	75	1852	449	7	2383	1015	651	553	3120
Av. 1924	4.8	----	52	876	1014	661	67	2116	779	662	91	1532
Av. 3 yrs.	4.9	----	71	237	1288	475	34	2034	1379	865	273	2517

[1]Horses using night pasture were debited with one day's pasture for each three nights on night pasture.

Table LIII—(Continued)—Feed Required Per Horse
(Walworth County, Wisconsin, 1923)

Farm No.	No. of horses	Weight per horse lbs.	Succulent roughage	Concentrates					Straw
			Low protein	Low protein					
			Corn silage	Corn	Oats	Barley	Other	Total	
21	4.0	1325	----	----	1497	----	----	1497	2300
5	4.0	1100	1262	130	1432	----	----	1562	2367
15	4.0	1300	----	228	113	88	72	501	177
14	10.1	1400	----	353	3400	----	----	3753	2995
1	5.5	1400	----	1379	852	127	487	2845	2511
17	4.0	1250	----	1429	1142	----	----	2571	4605
3	4.0	1300	----	2209	1184	----	----	3393	1598
18	4.0	1050	3962	38	136	----	----	174	----
20	7.8	1270	----	805	1295	----	----	2100	1287
11	3.0	1300	----	----	2494	----	----	2474	5435
13	4.0	1200	60	429	1937	----	----	2366	926
16	4.0	1200	----	593	1818	----	----	2411	1291
12	11.0	1350	----	1367	737	----	----	2104	1184
8	6.0	1400	----	1379	2402	----	----	3781	1154
9	6.0	1300	----	433	1376	----	----	1809	2529
22	7.0	1500	----	1104	1578	24	----	2706	1122
4	4.0	1250	945	376	1282	----	----	1658	944
10	4.0	1700	----	1924	193	19	921	3057	612
6	3.0	1225	----	813	2203	----	----	3016	2083
19	6.0	1150	----	85	2114	117	50	2366	1038
7	4.0	1100	1200	1769	----	----	215	1984	2177
2	6.0	1175	----	756	1486	----	----	2242	2551
Av. 1923	5.2	1300	257	824	1469	17	68	2378	1812
Av. 1922	4.8	----	190	944	1443	85	20	2501	2038
Av. 1924	4.8	----	471	488	1599	107	16	2210	1820
Av. 3 yrs.	4.9	----	296	768	1498	67	39	2372	1893

customary in this area but should result in the horses being maintained in better condition than the usual farm horse of this area.

The horses will be out on pasture about 70 days with little other feed. For the balance of the year they will receive an average daily ration of six pounds of corn, three pounds of oats, and twelve pounds of hay. This ration will vary in amount with the nature of the work to be done. For heavy work like plowing, the amount of grain will be increased and the amount of hay decreased. For idle horses, the ration will be largely hay.

Table E.—Feed and Labor Standards Per Horse

Item	Quantity
Corn	2000 pounds
Oats	1000 "
Alfalfa or clover	1200 "
Timothy, straw or corn fodder	2500 "
Pasture	70 days
Total digestible nutrients*	4170 pounds or less
Digestible crude protein*	440 "
Nutritive ratio*	1:8.5
Man labor	40 hours

*Except pasture.

Hogs

The income from hogs is a small portion, 8 per cent, of the total income of the farm. Approximately 80 per cent of the farmers keep a few hogs, while 70 per cent of them keep brood sows and raised pigs. During the year of 1923 there were a little over 3,300 pounds pork produced per farm.

Most of the sows farrowed in the spring and had but one litter a year. One-half the herds were supplied with green pasture, while the other half had the run of a dry lot in which they ate off much of the weed growth. Skimmilk was fed on one-half the farms, and a small amount of whole milk was fed on one-third the farms.

The pigs were usually not forced but were kept nearly a year and sold at weights varying from 200 to 300 pounds.

Costs of Producing Pork

Variations in Costs. The costs of producing pork ranged from $5.28 to $34.64 per 100 pounds (Table LIV). The costs on fourteen of the eighteen, or approximately 80 per cent of the farms, were between $7 and $17 per 100 pounds of pork produced, while nine of the eighteen, or 50 per cent of the total number, were between $8 and $12 per 100 pounds.

Feed and labor costs constitute from 80 to 90 per cent of the total costs, while building costs rank third in amount, being approximately six per cent of the total costs.

On farms 16, 19, 14, 11, and 22 real estate costs varied from $1.66 to $2.18 per 100 pounds of pork produced. The costs were high on these farms because the hog space in the buildings was not used to capacity.

Table LIV.—Cost Per 100 Pounds Pork Produced
(Walworth County, Wisconsin, 1923)

Farm No.	Total cost	Pounds of pork produced	Man labor		Horse work		Feed cost	Pasture	Interest	Taxes	Insurance	Real estate	Equipment	Med. and vet.	Misc. and cash	Overhead
			Hours	Value	Hours	Value										
17	$ 5.28	5805	3.1	$ .09	.67	$ .08	$ 4.02	$ .07	$ .17	$ .01	$ .01	$ .01	$ .01	$ .12	$ .02	$ .07
18	7.01	4013	2.8	.62	.37	.05	5.35					.92				.07
16	7.18	3559	4.7	1.04	.90	.12	3.90	.05	.13	.03		1.98	.03			.20
5	8.00	3245	7.5	1.66	1.51	.16	5.24					.79	.03			.13
10	8.54	5630	3.2	.71	.28	.05	7.11		.25	.01		.04	.06		.28	.03
20	8.67	6150	3.0	.67	.52	.06	5.62	.37	.15	.02		1.05	.09		.50	.14
12	9.05	3390	5.0	1.11	.09	.01	7.18	.23	.07	.01		.34			.10	
21	9.06	3675	4.0	.88	.11	.01	7.43	.26	.24	.04	.01	.04			.07	.08
2	9.38	4875	3.7	.82	.06	.02	7.25		.31	.02		.54			.25	.17
4	11.16	3165	13.8	3.05	1.58	.26	4.87	2.21	.15	.01		.26	.02		.03	.30
1	11.24	9757	3.8	.84	.49	.06	9.16	.09	.25	.01	.01	.21	.09	.03	.37	.12
15	11.51	2300	6.4	1.41	.17	.02	8.56		.27	.03		.94	.02		.11	.15
19	14.86	3855	5.8	1.28	.52	.12	10.83		.42	.05		2.01	.02		.01	.12
14	15.43	1689	11.9	2.63	.71	.08	10.57		.35	.07		1.66				.07
13	16.60	2055	19.4	4.27	.98	.13	10.89	.12	.27	.04	.02	.67	.10			.09
18	17.06	1035	25.3	5.57	2.22	.28	9.81	.15	.41	.04		.20	.24			.36
11	19.13	729	14.3	3.15	5.08	.68	11.44		.56	.10		1.81	.10		.41	.88
22	34.64	1869	16.9	3.71	4.97	.82	26.45		.75	.13	.03	2.18	.13			.44
Av. 1923	10.58	3306	6.0	1.33	.75	.11	7.66	.19	.22	.02		.70	.04	.01	.16	.14
Av. 1922	6.96	3813	5.3	1.04	.66	.10	4.49	.23	.24	.03	.01	.50	.06	.01	.17	.08
Av. 1924	9.94	2735	5.1	1.33	.66	.10	7.49	.11	.26	.03	.01	.37	.05		.05	.14
Av. 3 yrs.	8.84	3284	5.5	1.21	.69	.10	6.23	.19	.24	.03		.54	.05	.01	.13	.11

Table LV.—Feed Required Per 100 Pounds of Pork Produced
(Walworth County, Wisconsin, 1923)

Farm No.	No. of sows	Succulent roughage	Dry roughage	Concentrates								Straw	Milk	
				High protein			Low protein							
		Low protein Silage	Low protein Corn stover	Oil meal	Other	Total	Corn	Oats	Barley	Bran and middlings	Other	Total		Skim	Whole
17	3	--	--	2	--	2	229	16	41	--	--	286	12	10	--
18	--	--	--	--	5	5	502	--	--	--	--	502	45	--	--
16	3	--	--	--	--	--	128	11	134	8	--	281	--	--	--
5	3	--	--	--	3	3	307	32	117	--	--	456	14	--	--
10	4	--	40	4	--	4	396	2	27	13	110	548	14	187	--
20	5	--	--	--	--	--	302	27	17	11	51	408	16	136	8
12	2	2	--	--	--	--	341	9	7	--	--	357	--	812	--
21	5	--	--	--	--	--	522	--	--	--	--	522	54	52	--
2	6	--	--	--	--	--	400	--	16	--	--	416	9	589	--
4	--	--	--	3	--	3	494	88	--	13	--	595	53	320	--
1	8	--	--	--	17	17	284	49	206	89	37	645	42	--	6
15	5	--	--	1	--	1	186	6	147	21	--	360	7	--	--
19	7	--	1	--	29	29	594	3	192	47	--	836	--	--	5
14	--	--	--	--	--	--	658	36	95	18	--	807	--	--	64
13	2	83	4	13	--	13	201	76	37	95	--	409	50	1282	--
18	2	--	63	--	--	--	459	--	--	54	--	513	15	297	--
11	2	--	--	--	2	2	544	166	169	--	--	879	21	--	18
22	4	--	--	--	3	3	1090	18	299	13	20	1440	96	2895	13
Av. 1923	2.8	3	5	1	5	6	406	25	88	22	20	561	29	282	4
Av. 1922	2.9	2	--	1	2	3	260	17	103	11	--	391	29	168	1
Av. 1924	2.5	1	6	--	2	2	295	75	102	16	6	494	22	407	4
Av. 3 yrs.	2.7	2	3	1	3	4	314	34	98	16	8	470	27	264	2

Low pork costs were usually obtained on those farms producing the larger quantities of pork. It may be possible, however, to produce a small quantity of pork with small costs on some farms. There is always a greater or less amount of kitchen and farm waste which can be used effectively only by hogs. When these by-products compose a considerable portion of the total feed used, the costs per pound purchased may be low.

Reasons for Variations in Costs. There are but three factors which affect total costs to an appreciable extent. The cost of feed is the most important of all. With but few exceptions the feed costs varied directly with total costs. Farm 18 had high real estate costs and farm 10 had low real estate costs, which accounts for these two farms being out of array. The labor costs were high on farms 4, 15 and 18, while farm 15 also had high building costs.

Quantities of Feed Used. The quantities of feed per 100 pounds pork produced are shown in Table LV. Farms 17 and 16 supplemented the small quantities of concentrates per 100 pounds pork with considerable pasture. There were seven other farmers who pastured their hogs to some extent.

The basic part of the hog ration on every farm but one was corn. Farm 16 used more barley than corn in the hog ration. Skimmilk was used on eleven of the farms. The herds on farms 13 and 22 received much more than any other herds, and these were both high cost herds. The six highest cost herds were not fattened rapidly but were carried along with little gains for several months, so that the feed requirements were high.

Hog pastures ordinarily were not used to advantage in this area. There were but two men of the group, farmers 16 and 17, whose hogs used pasture effectively.

The average ration used by these farmers contained 45 pounds digestible crude protein and 452 pounds total digestible nutrients per 100 pounds pork production. The nutritive ratio was 1:9.0, which is wider than the most effective ration for pork production.

Feed and Labor Standards

The quantities of feed necessary to produce 100 pounds of pork are shown below. If barley is substituted for corn there will be 1.9 pounds more digestible crude protein and 2.3 pounds less total digestible nutrients per 100 pounds grain.

Table F.—Feed and Labor Standards Per 100 Pounds Pork Produced

Item	Quantity
Corn	350 pounds
Skimmilk	550 "
Pasture	40 days
Total digestible nutrients*	336 pounds
Digestible crude protein*	44.6 "
Nutritive ratio	1:6.5

*Except pasture.

Table LV.—Feed Required Per 100 Pounds of Pork Produced
(Walworth County, Wisconsin, 1923)

Farm No.	No. of sows	Succulent roughage	Dry roughage	Concentrates									Straw	Milk	
				High protein			Low protein								
		Low protein Silage	Low protein Corn stover	Oil meal	Other	Total	Corn	Oats	Barley	Bran and middlings	Other	Total		Skim	Whole
17	3	--	--	2	--	2	229	16	41	--	--	286	12	10	--
18	--	--	--	--	5	5	502	--	--	--	--	502	45	--	--
16	3	--	--	--	--	--	128	11	134	8	--	281	--	--	--
5	3	--	--	--	3	3	307	32	117	--	--	456	14	--	--
10	4	--	40	4	--	4	366	2	27	13	110	548	14	187	--
20	5	--	--	--	--	--	392	27	17	11	51	498	16	136	8
12	2	2	--	--	--	--	341	9	7	--	--	357	--	812	--
21	5	--	--	--	--	--	522	--	--	--	--	522	54	52	--
2	6	--	--	--	--	--	400	--	16	--	--	416	9	589	--
4	--	--	--	3	--	3	494	88	--	13	--	595	53	320	--
1	8	--	--	--	17	17	284	49	206	69	37	645	42	--	6
15	5	--	--	1	--	1	186	6	147	21	--	360	7	--	--
19	7	--	1	--	29	29	594	3	192	47	--	836	--	--	5
14	--	--	--	--	--	--	658	36	95	18	--	807	--	--	64
13	2	83	4	13	--	13	201	76	37	95	--	409	50	1282	--
18	2	--	63	--	--	--	459	--	--	54	--	513	15	297	--
11	2	--	--	--	2	2	544	166	169	--	--	879	21	--	18
22	4	--	--	--	3	3	1090	18	299	13	20	1440	96	2895	13
Av. 1923	2.8	3	5	1	5	6	406	25	88	22	20	561	29	282	4
Av. 1922	2.9	2	--	1	2	3	260	17	103	11	--	391	29	168	1

The daily ration for hogs will vary greatly, depending on both age and weight. Just after weaning, pigs should receive not to exceed four to six pounds of skimmilk to each pound of corn. Pigs weighing from 50 to 100 pounds should get two and one-half to three pounds of skimmilk to one pound of corn. Pigs weighing 100 to 150 pounds should get two to two and one-half pounds of skimmilk to one pound of corn. Pigs weighing over 200 pounds should get but one to one and one-half pounds of skimmilk to one pound of corn. Old sows should probably receive even a smaller proportion of skimmilk to corn.

Poultry

The poultry flock includes all chickens, ducks, geese and turkeys kept on the farm. The average number per farm is approximately 150 head. The poultry flock is usually the most neglected enterprise of the farm.

During the summer the poultry have the run of the farm and pick up much of their feed in the form of weed seeds, insects and waste grain. When the cold weather sets in they are more closely confined to the coops, which are frequently cold and drafty. Very few of the flocks are supplied with scratching pens in places protected from wind and so arranged that winter sunshine may be used to advantage.

Chicks are hatched in the late spring, and the losses through unfavorable weather and disease are large. More eggs are received during June and early July than any other period of the year, and many of the flocks do not lay enough eggs during the winter months to supply the farm homes with fresh eggs. The poultry is kept both for meat and for eggs.

Costs of the Poultry Flock

The costs are shown in terms of 100 head, Table LVI, rather than per dozen eggs or per pound of meat produced. The egg production was obtained more accurately than was the meat production, and for this reason the production of eggs alone is shown.

Variations in Costs. The gross costs varied from $61.70 to $213.26 per 100 head. The two items of feed and labor account for approximately three-fourths of the total costs. The variation in feed was from $9.55 to $96.35, while man labor costs varied from $2.71 to $69.78 per 100 head.

Because of the rapid turnover of the flock and of the impossibility of showing a figure which approximates depreciation, no depreciation figure is shown. The purchases of poultry and of eggs for setting were added to inventorial charge plus sales to get a net flock income figure. This was not considered an item of cost, but was deducted from gross costs to obtain the net cost in producing eggs.

Reason for Variations in Costs. The variations in costs per 100 head are accounted for to a great extent through the variations in the costs of feed, man labor, and real estate or buildings for the poultry. It is seen that the feed costs follow the total cost array quite closely. Whenever it is conspicuously out of array, the explanation is found either in the cost of man labor or real estate costs.

Table LVI.—Cost of Poultry Per 100 Head
(Walworth County, Wisconsin, 1923)

Farm No.	No. of head	Man labor		Horse work		Feed	Interest	Taxes and insurance	Equipment	Real Estate	Overhead	Miscellaneous
		Hours	Value	Hours	Value							
19	250	82.5	$ 18.15	.2	$ .04	$ 27.05	$ 3.32	$	$ .30	$ 9.16	$ 1.12	$ 2.56
17	230	74.1	16.31	2.6	.32	33.20	3.40	.18	.48	7.71	.70	
5	126	65.7	14.45			20.41	4.26		1.63	20.67	2.10	1.19
9	130	132.6	24.92	3.1	.48	40.72	2.70		2.33	9.43	.89	1.42
10	55	12.3	2.71			27.56	6.51		4.27	43.04	1.56	.91
18	60	272.5	59.95	10.0	1.28	9.55	6.63		.80	9.42	3.85	
21	140	129.8	28.56	1.4	1.09	44.00	5.56		.03	9.53	2.59	3.93
3	145	154.6	34.03			40.40	5.43	.30	2.90	16.50	2.77	.51
2	155	98.2	17.21	3.5	1.42	47.96	3.71	.05		29.78	5.48	.52
6	158	130.2	28.65			48.86	5.53	.16	3.56	17.34	3.50	
1	222	104.7	23.04	5.9	.71	68.62	3.75	.17	7.51	4.57	2.41	.67
11	150	141.7	31.16	16.0	2.15	51.05	4.04	.11	5.85	10.47	6.80	
20	270	70.6	15.54	1.9	.24	70.08	3.40		2.44	21.20	2.11	2.23
8	200	94.5	20.79	1.0	.16	48.60	4.44	.09	2.56	36.47	2.82	2.37
14	180	136.9	30.13	1.1	.12	82.96	5.35	.07	1.30	6.87	1.70	3.04
13	138	199.8	43.96	25.0	3.38	63.91	4.89	.29	7.52	6.37	1.49	10.01
7	100	112.3	24.70			92.75	3.85	.17	.05	12.30	6.81	3.00
4	155	316.0	69.52			75.01	6.28	.07	.61	.96	6.05	
15	50	152.5	33.56			70.16	5.80			46.32	4.70	
12	240	268.3	59.03	2.4	.36	57.89	4.16		6.92	33.59	6.03	1.74
16	40	201.8	44.40	5.0	.70	96.35	7.83		5.40	28.75	5.02	
22	410	317.2	69.78	11.7	1.92	89.92	5.78	.18	4.94	31.30	6.99	2.45
Av. 1923	164	154.3	33.94	4.8	.71	57.11	4.58	.10	3.04	18.14	3.58	1.83
Av. 1922	130	221.6	44.32	5.0	.75	53.56	5.52	.22	3.21	13.79	3.58	3.13
Av. 1924	175	109.6	28.50	6.3	.94	70.44	3.80	.05	2.43	8.69	4.15	1.05
Av. 2 yr.	155	159.6	35.26	5.4	.80	60.58	4.60	.12	2.88	13.58	3.70	2.81

Table LVI—(Continued).—Cost of Poultry Per 100 Head
(Walworth County, Wisconsin, 1923)

Farm No.	No. of head	Gross cost	Eggs per 100 head	Gross cost per dozen eggs—(cents)	Total credits other than eggs	Net cost per 100 head
19	250	$ 61.70	2040	36.3	$ -4.39	$ 63.44
17	230	62.39	4591	16.3	50.04	12.35
5	126	64.70	2495	31.1	17.48	47.22
9	130	82.98	2206	45.1	63.35	19.63
10	55	86.56	4844	21.4	-39.22	125.78
18	60	91.48	5160	21.3	29.55	61.93
21	140	95.29	6000	19.1	119.57	-24.28
3	145	102.84	2317	53.3	-28.47	131.31
2	155	106.13	1262	10.1	99.03	7.10
6	158	107.60	2445	52.7	16.13	91.47
1	222	111.45	4578	29.2	85.68	25.77
11	150	111.72	4240	31.6	41.43	70.29
20	270	117.24	5844	24.1	30.63	86.61
8	200	118.30	4440	32.0	19.38	98.92
14	180	131.63	6760	23.4	93.59	38.04
13	138	141.82	2904	58.6	1.74	140.08
7	100	143.63	6528	26.4	-14.75	158.38
4	155	158.48	1750	108.6	117.53	40.95
15	50	160.54	6336	30.3	5.16	155.38
12	240	169.72	6325	32.3	167.14	2.58
16	40	188.45	4590	49.2	51.10	137.35
22	410	213.26	1109	230.7	16.49	196.77
Av. 1923	164	123.03	3783	39.0	47.73	75.30
Av. 1922	130	128.03	----------	----------	67.02	61.01
Av. 1924	175	120.05	4284	33.6	45.61	74.44
Av. 3 yr.	155	124.19	*3358	*36.2	*46.68	*74.88

*Based on 2 years only.

The eight farms whose flocks produced more than four dozen eggs per head did so at a cost of 25.4 cents per dozen, while the eight with average production (between two and four dozen eggs per head) had an average cost of 32.4 cents per dozen, and the six whose flocks produced less than two dozen eggs per head averaged 99.0 cents per dozen eggs. In these results no credit is allowed for meat produced. When this is done the costs of producing eggs are reduced for all the flocks. Farm 17, for example, shows a cost of 16.3 cents per dozen as the table stands. If the value of the meat sold and used by the household is deducted, the net cost of producing eggs becomes 3.2 cents per dozen. Likewise on farm 21, the gross cost of producing one dozen eggs is 19.1 cents per dozen. The net cost in this case is 4.8 cents less than 0 cents, as the deductions for meat sold and used by the household more than made up for all costs of the flock.

The data indicates that the flocks which received the greater quantities of feed produced more eggs than those receiving the smaller quantities. There were seven flocks which received no more than 40 cents worth of feed per head and their production was a little over three dozen eggs per head. The eight flocks receiving between 40 cents and 70 cents worth of feed per head produced approximately four dozen eggs per head, while the seven flocks receiving more than 70 cents worth of feed per head averaged four and one-half dozen eggs per head.

It cannot be said that feed was wholly responsible for the increased production. The flocks receiving the greater quantities of feed also received better care than did the more poorly fed flocks.

The conspicuous exceptions to this generalization are farms 17, 10, 4 and 22. Farms 17 and 10 had relatively large egg production with small quantities of feed, while farms 4 and 22 had a relatively low production per head with large quantities of feed used. The egg production records of farms 10 and 22 were poor so that too great dependence cannot be placed upon them individually; farm 4 produced over $1.00 worth of meat per head and this may account for the low egg production. There is no apparent reason for the high egg production of farm 17 with its low feed cost.

Feed Requirements

The feed requirements as such will not be discussed as the data obtained do not indicate what portion of the feed is picked up on the farm. Unit requirements in these conditions would not be sufficiently complete to be desirable.

CONCLUSIONS

The complete utilization of the data presented in the preceeding pages necessitates a detailed knowledge of the individual farm business and operations that is available on but a very small percentage of the farms. Certain phases of the data, however, may be used to advantage by individual farmers. One farmer will stress a special phase of the farm business represented by a particular part of the data, while a second farmer, because of his personal interests or information, will utilize an entirely different part of the information.

There are certain types of facts, or standards, which should be of value to every dairy farmer of Wisconsin, as they represent the outstanding enterprises, sources of income or costs of the farms. Because of their importance as either major sources of income or items of farm expense, changes in the organization or operation of the farm which directly affect these items will be reflected in the net farm income more quickly and tangibly than will other changes of minor importance.

A third series of facts pertain to the probable relationship of future prices of both the sources of income and items of farm expense. These are important whenever the present relationships of either the sources of income or expenses are changed to a considerable degree. This work necessitates the study of the probable trends of prices of these commodities over the series of years during which the suggested organization is effective. If the changes in price relationships are not large these factors will be of less importance than are effective organizations based upon economy of production.

Wisconsin farmers, for example, depend upon the dairy herd for from two-fifths to four-fifths of their gross income. The newer areas of the state have relatively fewer dairy cows than the older areas. The east central and southeastern part of the state receive about three-fourths of the gross income from the dairy herd. There were practically no farmers who did not depend upon the dairy herd for the main source of income. The market demands for dairy products will probably be maintained with no considerable change in price relationships. It is desirable for these reasons to remember that any farm system suggested for this part of the state will be built around the dairy herd.

The costs of producing milk or butterfat upon the individual farms are of first importance if the sale of dairy products is to continue to be the important enterprise. The factors affecting costs per pound butterfat, as indicated by the points brought out under the discussion of the dairy herd, should be considered in connection with the individual farm. For example, what farm practices, as found upon the farms of this area, resulted in greater economy of butterfat production? A categorical list of the factors may indicate their relative importance in this connection and will suggest the comparisons to be made. Butterfat production and the quantity and

types of feed used per cow account for most of the variations in costs per pound butterfat, while differences in labor utilization was a minor factor in its effect upon the production of butterfat.

Likewise with the crops which not only form the basic part of the feed for the dairy herd, but also are the major crop enterprises of the area, it will be desirable to indicate those practices and factors which make for economy of production. The factors as worked out for the area covered by this study will be found discussed under the respective major crops, *e. g.*, corn, oats, barley, timothy and clover hay, and alfalfa hay.

In determining what crops to produce either to supplement or to complement the basic part of the rotation the "principle of comparative advantage"[9] is the active principle. The application of this principle requires attention to the maintenance of soil fertility and competition of crops for labor as well as the livestock requirements and market demands. The selection of secondary livestock enterprises also is the result of the application of the same "principle of comparative advantage"; and this can be done only as the relation of the respective enterprises to other phases of the farm business as well as to market conditions are determined.

Economic considerations cannot be divorced from political action and economic implications which result from political actions necessitate a study of and, in some cases, the anticipation of political action.

True it is that the possibility of economic gain serves as a premise for economic action and that the success of this action is usually measured by some monetary yardstick. If the effectiveness of a particular farm organization is altered because of a change made in some law of the state or because of the change made in some public regulation, it should result in a net income which varies in proportion to the change.

[9] J. D. Black—"Production Economics." Part Two—Chapter VI.

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HOLT, F. J., Agr. Journalism
KLEVEBEN, S. W., Agr. Chemistry
LANGDON, GRACE Agr. Journalism
MANSFIELD, HARRIET, Agr. Bacteriology
MARVIN, G. E., Economic Entomology
MILLER, P. W., Plant Pathology
PATTON, STELLA, Home Economics
ROCHE, B. H., Animal Husbandry
RUPEL, I. W., Animal Husbandry
SCHAARS, MARVIN, Agr. Economics
SHAW, MYRTLE, Agr. Bacteriology
STRANGE, C. R., Vet. Science
THOMSEN, L. C., Dairy Husbandry
WILHELMI, ARTHUR F., Agr. Economics

CARTTER, J. L., Agronomy
JOHNSON, O. N., Poultry Husbandry
McCOY, ELIZABETH, Agr. Bacteriology
MILLER, B., Plant Pathology
MYKLAND, RUTH, Asst. to Dir. Home Econ.
OGDEN, W. B., Horticulture
RISING, B. M., Agr. Chemistry
SCHRADER, G. A., Agr. Chem.
SCOTT, H. L., Agr. Chemistry
WHITCOMB, W., Economic Entomology
ZEMET, AGNES, Genetics


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