Cost of Producing Feed Crops

Based on Farm Cost-account Records
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Contents

Purpose

The purpose of this report is to present information from farm cost accounts to help answer such questions as the following:

How important is the production of hay, grain, and silage on New York farms?

What does it cost New York farmers to produce hay, grain, and silage?

How are the costs calculated?

How do some farmers make a profit on the production of crops which are usually grown at a loss?

Under what circumstances would it pay a New York farmer to buy rather than raise his own feed crops?

Is it ever good farm management to continue to produce a crop if the account with that crop shows a loss?

How would changes in the accounting procedure affect the answers?

Relative Importance, Yields, and Trends in Production

About one-half of the eight million acres of crop land in New York State is in hay (table 1). New York farmers raise about 1 acre of corn silage for every 10 acres of hay. Less than one-half acre of corn is husked for every acre put in the silo.

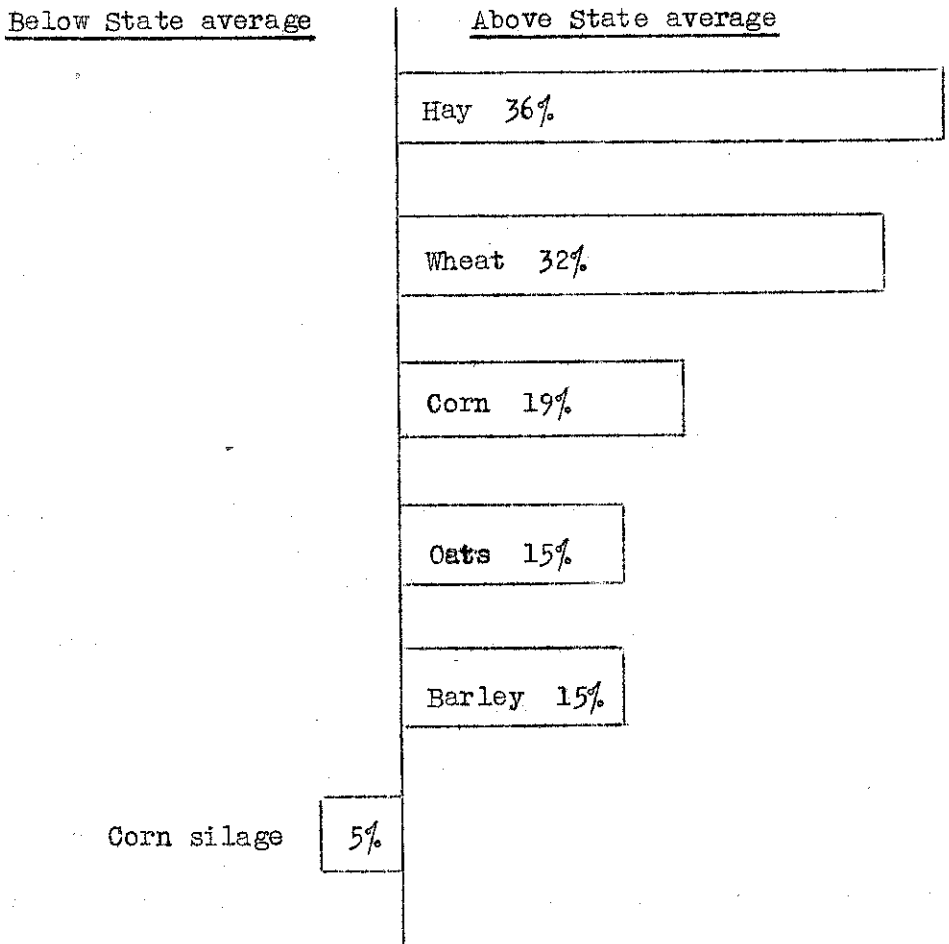
Small grains are grown on twice the acreage planted to corn. The oat crop is by far the most important small grain, and is grown on approximately 3 times the acreage in wheat, and 5 times the acreage in barley. Wheat is grown on about one-third of a million acres.

Those farms on which cost accounts are kept in cooperation with the College differ from the average of the State. Hay and oats occupy a smaller proportion of the crop land. Wheat and corn silage are more important.

Corn silage outyields all other feed crops in terms of digestible nutrients. Although the 8.6 tons of corn silage harvested per acre is largely water, it does contain more than one and one-half tons of digestible nutrients.

No other crop produces as much as one ton of digestible nutrients per acre. The nearest competitor is corn for grain. The grain contains about one-half as much digestible nutrients as the grain and stalks harvested in the form of silage. Wheat produces more feed from an acre than any other small grain. About as much nutrients are supplied by an acre of hay as by an acre of small grain. The smallest yield, in terms of total digestible nutrients, is from oats.

Figure 1. Yields on cost-account farms compared with the average of the State



Yields of hay and wheat on cost-account farms are about one-third above the average of the State. Corn for grain, oat and barley yields are significantly higher than average. Corn silage yields, on the other hand, are a little below the State average.

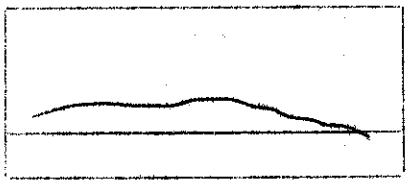
Table 1. Relative importance and yields of grain and roughage crops, New York State and cost-account farms, 1939

	New York State		Cost-account farms	
	acres		acres	
Crop land	8,154,315		8,036	
	per cent of total		per cent of total	
Crop area:				
Oats	10		6	
Barley	2		2	
Wheat	3		7	
Corn for grain	2		2	
Corn silage	5		8	
Hay	50		37	
	bushels or tons	pounds	bushels or tons	pounds
Yield per acre:				
Oats	33	1,056	38	1,216
Barley	27	1,296	31	1,488
Wheat	23	1,403	31	1,860
Corn for grain	35	1,960	42	2,343
Corn silage	8.6	17,200	8.1	16,285
Hay	1.05	2,094	1.4	2,850
		pounds		pounds
Total digestible nutrients per acre:				
Oats		755		869
Barley		1,020		1,171
Wheat		1,173		1,555
Corn for grain		1,641		1,961
Corn silage		3,216		3,045
Hay		1,053		1,434

Figure 2. TRENDS IN PRODUCTION

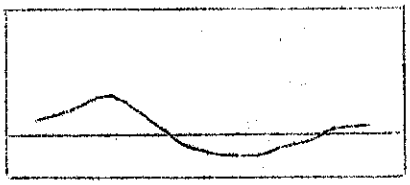
NEW YORK STATE

The curved line shows the trend in production during the seventy-five years since the Civil War. In each graph, the five-year period, 1926-30, represents 100. The lines are ten-year moving averages except for corn silage. The graphs are from Cornell Experiment Station Bulletin 693 by T. E. LaMont.



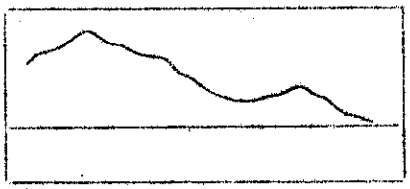
Oats

Oat production reached a peak about 1900 but has been declining since that time.



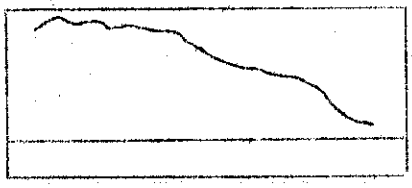
Barley

Barley production started a steady decline about 1890 and has remained relatively low except for a few high years during the war and post-war period.



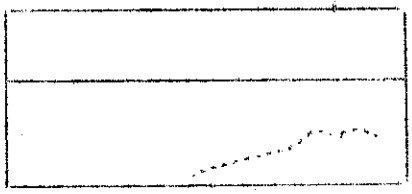
Wheat

New York produced about three times as much wheat in the Civil War period as at present. Production in this State was stimulated again during the World War period and has been increasing in recent years.



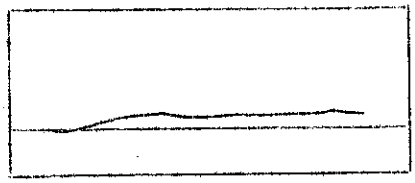
Corn for grain

Corn for grain production has trended downward for the past fifty years but has shown some increase in recent years.



Corn silage

Corn silage has replaced most of the corn for grain on New York farms. (Annual figures)



Hay

Hay production has declined only slightly since 1890.

1866 1900 1940

Costs of Grain, Hay, and Silage

Less money is spent per acre for hay than for any other feed crop, averaging about $17 (table 2). Small grains cost about $3 per acre more than hay. About twice as much is spent on an acre of corn silage as on an acre of hay. Corn harvested as grain costs about as much as, or a little more than, an acre of corn silage.

Only about 7 hours of direct labor are spent in mowing, raking, loading, hauling, and storing the hay produced on an acre. Small grains require twice as much labor per acre, silage 4 times and corn for grain 7 times as much labor as hay.

Labor on each cost-account farm was charged at the average cost to each enterprise. If Smith's cost of labor for all farm help, including the value of his own time, was 28 cents, each enterprise was charged for labor at that rate. If Jones' cost was 32 cents, each enterprise on the Jones farm was charged at 32 cents per hour, regardless of whether Jones or his hired man did the work. Hence there is a slight variation in the cost of labor for different enterprises, but for each one the cost was within a few cents of 30 cents per hour.

Returns for labor in 1939 were about the same for the different types of feed crops. Corn for grain paid 32 cents per hour, or 3 cents per hour more than the cost of labor on this enterprise. A profit of about 3 cents per hour for the 48.5 hours resulted in a profit per acre of $1.47, or a profit per bushel of 3 cents. The small grains paid 40 cents per hour, or 10 cents more than the cost of labor. Hay paid 44 cents per hour, or 14 cents more than cost. Silage is charged to the animal account at cost, since there is usually no well-established market for this product. At $4.33 per ton, it paid 28 cents per hour.

Table 2. Costs of grain, hay, and silage
75 farms, 1939

	All small grains	Corn for grain	Silage	Hay
Number of accounts	106	23	46	106
Acres	1,661.2	185.7	614.8	3,002.8
Yield per acre	34 bu.	42 bu.	8.1 tons	1.4 tons
	Average per acre			
Cost:				
Growing	$16.24	$25.13	$23.56	$ 9.53
Harvesting	5.52	12.56	11.18	4.79
Storing and selling	2.06	2.60	3.00	3.01
Total cost	23.82	40.29	37.74	17.33
Value of by-products	3.41	2.82	2.46	.35
Cost of grain, hay, or silage	20.41	37.47	35.28	16.98
Value of grain, hay, or silage	21.75	38.94	35.28	17.99
Profit	1.34	1.47	-	1.01
Hours of labor	13.5	48.5	29.4	7.2
	Average per hour			
Cost of labor	$.30	$.29	$.28	$.30
Return for labor	.40	.32	.28	.44
	Average per bushel or ton			
Cost	$.60	$.89	$4.33	$11.92
Value	.64	.93	4.33	12.63
Profit	.04	.04	-	.71

Yields and costs on fields of small grains, some of which are seeded and some are not

About one-fourth of the new hay seedings in the spring of 1939 were with wheat, one-fourth with oats, and one-fourth with mixed spring grains (table 3). Less than 100 acres, or 8 per cent of the new seedings, were made without a nurse crop. The remaining 17 per cent were made with barley, peas, rye, oats cut for hay, or other crops.

Wheat is much more important on cost-account farms than for the State (table 1). Probably one-tenth of the new seedings in the State are made with wheat compared with one-fourth on cost-account farms.

Table 3. Nurse crops for new seedings
60 farms, 1939

Nurse crop	Acres seeded	Percentage of total acreage of new seedings
None (seeded alone)	96.9	8
Oats	298.2	25
Barley	105.1	9
Mixed spring grain	300.1	25
Wheat	292.4	25
Peas	32.3	3
Rye, and miscellaneous	64.4	5
Total	1,189.4	100

Not all the small grain acreage is seeded to hay. About 40 per cent of the acreage was not seeded down (table 4). About one-third of the oats and mixed spring grain was not seeded to hay as compared with nearly 50 per cent for wheat and barley. A larger proportion of the oats and of the mixed spring grain than of the wheat and barley acreage was seeded to hay.

Table 4. Proportion of small grain acreage seeded to hay
217 fields, 1939

	Seeded	Not seeded	Total
	Acres		
Oats	298.2	153.4	451.6
Barley	105.1	87.7	192.8
Mixed spring grain	300.1	155.0	455.1
Wheat	292.4	269.3	561.7
Total - all small grain	995.8	665.4	1,661.2
	Per cent of grain acreage		
Oats	66	34	100
Barley	55	45	100
Mixed spring grain	66	34	100
Wheat	52	48	100
All small grain	60	40	100

Yields of grain were almost as high on the seeded acreages as on the unseeded acreages (table 5). If the grain crops were sown very lightly, with a view to giving the grass seeding every advantage, the seeded acreage would have lower yields than the unseeded acreage.

Table 5. Yields of small grains on fields seeded to hay compared with fields not seeded, 217 fields, 1939

	Seeded	Not seeded	Increase, not seeded over seeded fields
	Bushels per acre		
Oats	35	43	8
Barley	34	27	- 7
Mixed spring grain	35	37	2
Wheat	31	31	0
All small grain	34	35	1

The four diagrams show the distribution of yields by fields for each of the small grain crops, comparing the fields seeded to hay with those not seeded (figure 3). It is quite obvious that the high average yield on the unseeded oat acreage was due to the abnormally high yields of a few fields. In 3 of the 4 diagrams, the modal yield was the same for the seeded as the unseeded fields. In the case of mixed spring grain, the modal group of seeded fields had a yield of 35 bushels per acre compared to 25 bushels for the modal group of unseeded fields.

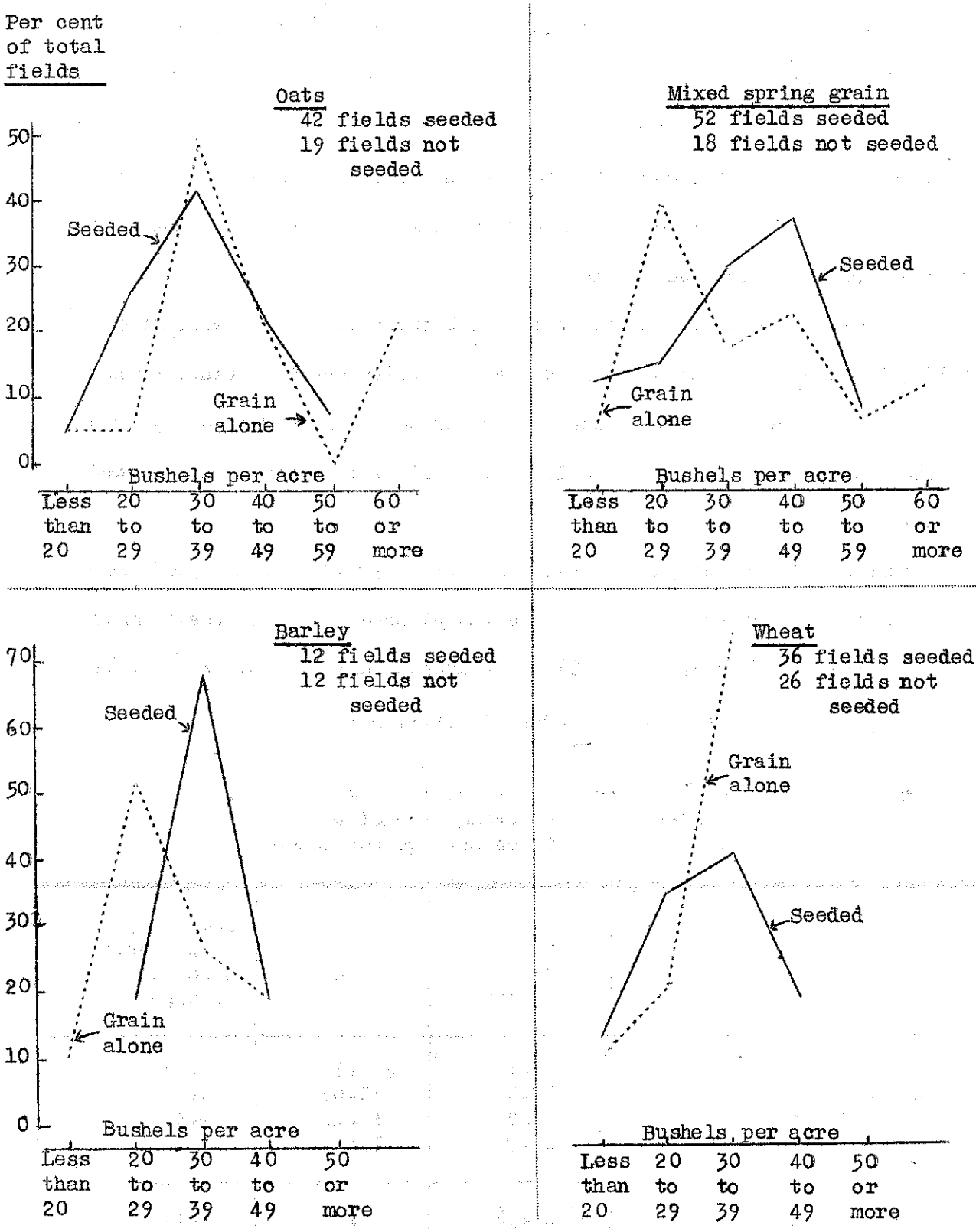
The evidence on yields indicates that there is a great variation in yields, but that the yields of grain are not influenced by whether or not the field is seeded to hay. A field of grain which is seeded to hay is just as likely to have a high yield as is a field of grain which is not seeded to hay.

Farmers who seeded part or all their small grain acreage spent more in preparing the seedbed than did those who planned to follow their small grains by some other crop (table 6). The average extra cost, as indicated by the difference in costs of growing, was $1.17 per acre.

Table 6. Cost per acre of raising small grain to harvest time on acreage seeded to hay compared to costs on acreage not seeded

	Part or all seeded	Not seeded	Increase, seeded over unseeded acreage
Oats	$15.19	$14.57	$ .62
Barley	18.39	15.09	3.30
Mixed spring grain	16.92	17.31	-.39
Wheat	16.99	15.25	1.74
All small grain	16.56	15.39	1.17

Figure 3. Yields of small grains on fields seeded to hay compared with yields on fields not seeded



It is an established practice of farm accounting to keep the accounts with fields of small grain seeded to hay comparable to the accounts with fields which are not seeded. All the cost of preparing the seedbed, all the charge for the use of land, and all other costs which would have been incurred if the grain had not been seeded to hay, have been considered costs of producing grain.

On these farms, the cost of establishing a new seeding when made with a nurse crop is considered to be the cost of the grass seed and inoculant, two-thirds of any superphosphate applied with the grain, all the lime, and any special labor or equipment used for the seeding. On this basis, an acre of new seeding cost about $7 (table 7). Mixtures containing a large proportion of alfalfa cost about $10 per acre. Clover and timothy mixtures cost about $5. The cheapest hay seeding was sweet clover which cost about $1.50 per acre.

Table 7. Cost per acre of hay and pasture seedings made with nurse crops, 1939

	Alfalfa	Alfalfa clover and timothy	Clover and timothy	Sweet clover	Other clovers	Pasture mixture	All other	All
Number of accounts	15	46	33	5	7	6	5	117
Acres	115.5	399.6	334.0	89.0	70.4	41.2	42.8	1092.5
Cost per acre:								
Seed and inoculant	$4.82	$4.42	$2.46	$1.07	$2.27	$5.29	$2.96	$3.43
Fertilizer	1.87	2.44	1.34	--	.29	1.85	1.40	1.64
Lime	2.11	1.78	.95	--	--	.41	1.17	1.23
Other	.53	1.01	.55	.41	.04	.17	.40	.65
Total	9.33	9.65	5.30	1.48	2.60	7.72	5.93	6.95

Seedings made alone are more expensive than seedings made with a nurse crop. The use of the land is given up for part or all the year. Only one purpose is served by plowing and fitting the land, viz, to prepare a seedbed for the grass seed. Hence the cost of new seedings put in without a nurse crop averaged almost $18 an acre, or more than twice the cost of seedings made with a nurse crop (table 8). Most of these seedings were either straight alfalfa, or contained alfalfa in the mixture.

Table 8. Cost per acre of hay and pasture seedings made without nurse crops, 1939

	Alfalfa	Alfalfa, clover, and timothy	Pasture mixture	All
Number of accounts	8	3	3	14
Acres	64.3	15.0	17.6	96.9
Cost per acre:				
Use of land	$ 1.52	$ 1.40	$ .57	$ 1.33
Cost of preparing seedbed and planting the seed	5.30	2.40	6.31	5.04
Seed and inoculation	6.32	2.73	4.94	5.51
Fertilizer	3.73	5.87	2.96	3.92
Lime	2.27	----	1.36	1.75
Total	19.14	12.40	16.14	17.55

Suggested changes in accounting methods

The cost of the butter you had for lunch cannot be determined accurately. Your wife may have paid 35 cents for a pound of butter at the store. But the use of the automobile to go to town, the penny in the parking meter, the cost of shopping and the cost of refrigeration, may be among the costs involved in getting the butter to your table. If both butter and bread are purchased on

the same trip, and if these errands are combined with a bridge party, how can one determine the exact cost of the butter as it appears on the table?

A reasonable basis for the allocation of most farm costs can be developed without much difficulty. The cost of maintaining the plows can be charged to the crops in proportion to the acres plowed. It's true that more stones were hit in field A than in field B, and that the sod in field C caused more wear than plowing after potatoes in field D. But for all practical purposes, we are satisfied to charge the cost in proportion to the acreage plowed.

Grain crops seeded to hay present a peculiar problem. When the grain crop was drilled in the spring of 1939, the grass seeding attachment dropped the alfalfa, clover and timothy seed for the hay crop to be harvested in 1940 and in the following years. During the growing season of 1939 the grain crop used the land at the same time the tiny alfalfa plants became established between the oat plants. Which crop used the land during 1939? How much of the interest and taxes should be charged to the oats and how much to the new hay seeding? The land was used for both purposes. Any division of costs must be arbitrary. No experimental evidence provides an answer to the problem.

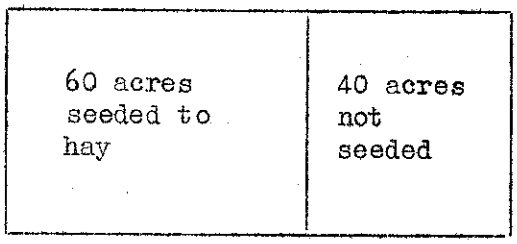
The standard farm accounting procedure has been to charge the grain accounts with all the costs that would have been incurred if the grain had been grown alone, that is, as if the field had not been seeded to hay. The cost of the new hay seeding is considered to be the grass seed, lime, the part of the fertilizer that experimental evidence indicates is left after the grain crop, and any special labor such as seeding the grass seed on wheat. This accounting procedure is designed to help answer the question, "How much does it cost to produce grain?" It is based on the assumption that most of the hay acreage is seeded with small grain as a nurse crop. This procedure tends to favor the hay account at the expense of the grain account.

The criticism has been made that the end results of cost accounts have tended to discourage farmers from producing small grains. One set of suggestions is to charge to the new seeding established in 1939 one-half the use of land; one-half the manure which was used in 1939; and two-thirds of the cost of labor and equipment to prepare the seedbed and to put in the crop. No change is suggested in the usual practice of charging all the grain seed to the grain, all the grass seed and all the lime to the new seeding, and dividing the superphosphate application one-third to the grain and two-thirds to the seeding. These changes would result in a transfer of about $8.50 for each acre of grain seeded to hay from the grain accounts to the hay accounts.

If one is interested in determining the effect of these changes in the method of accounting upon the net results, he must take into account the fact that not all the grain acreage is seeded to hay, not all the hay acreage is seeded with a nurse crop, and that the cost of a hay seeding is charged to the hay crops over the life of the stand. The results of such a change would have been to reduce the cost of grain by 15 cents per bushel and increase the cost of hay by $1.27 per ton, based on the 1939 figures. The diagram and explanation on page 15 show this calculation in detail. Based on 1938 data, the cost of producing a bushel of grain would have been reduced by about 14 cents and the cost of producing hay would have been increased by about 93 cents, if these suggested changes in the accounting procedure had been followed.

Figure 4. Effect of reducing the cost of producing grain by $8.50 for each acre seeded to hay and transferring this amount to the hay accounts

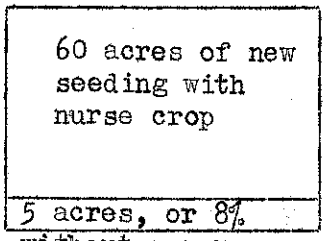
100 acres of small grain



Only 60 per cent of the grain acreage was seeded to hay or pasture. Hence, the cost of producing grain would be reduced by $510 (60 acres x $8.50) for each 100 acres of small grains, and not by $850. A total of 3400 bushels (or 1523 hundredweight) of grain was produced on the 100 acres. Hence the reduction in cost would amount to 15 cents per bushel (or 33 cents per hundredweight).

A total of 590 hours was spent in growing the grain on 100 acres and 760 in harvesting and storing, or a total of 1350 hours. If one-half the labor of growing grain on the seeded acreage is considered labor on new seeding, the total labor on grain would be reduced from 1350 to 1173, or a reduction of 2.95 hours per acre on the 60 acres. If the costs are reduced $510, the profit would be increased from $134 to $644 for each 100 acres of small grains. The profit per hour for the reduced number of hours would be 55 cents ($644 divided by 1173 hours). Since the cost of labor was 30 cents per hour, the returns per hour would have been 85 cents instead of the 40 cents shown in table 2.

65 acres of new seeding



For each 60 acres of new seeding with a nurse crop, 5 acres were seeded without a nurse crop. The increase in the cost of the new seedings of $510, transferred from the grain accounts, would mean an average increase of $8.50 per acre of new seedings made with a nurse crop, but only $7.85 increase as an average for all new seedings. The increased cost would be charged over the life of the stand. No one knows how long the 1939 seedings will last. On some fields no crops were mowed. Other fields seeded to alfalfa, clover, and timothy probably will be down for many years. The fact that 996 acres of new seedings were made with small grains and that 3003 acres were mowed for hay in 1939 suggests that the average life of the seeding is about three years. Some of the new seedings are failures and some are plowed under for green manure crops. The history of a few fields that were harvested for hay indicates that 4.4 years was the life of these seedings.

If the 1939 seedings have an average life of three years, and if all the seedings had been for hay, the suggested change in the accounting procedure would result in an increased cost of hay of $2.61 per acre ($7.85 divided by 3). The increased cost would be $1.86 per ton ($2.61 per acre divided by 1.4 tons per acre). If 4.4 years is more nearly the correct average life of the seedings, the increase would be $1.78 per acre per year, or $1.27 per ton. Since 7.2 hours of direct labor were used per acre of hay, this change would result in a reduction of 25 cents per hour, assuming a 4.4-year length of stand. The returns per hour from hay would have been 19 cents instead of the 44 cents reported in table 2.

Another possible procedure is to base the cost of producing grain exclusively on the accounts for fields which were not seeded. No significant difference was found in yields of small grain on seeded and on unseeded fields (table 5 and figure 3). Costs were $1.17 per acre higher on the seeded than on the unseeded acreage. If $1.17 per acre of grain seeded to hay should be subtracted from the costs of producing grain, it would reduce the cost by 2 cents per bushel, or 5 cents per hundredweight. Returns per hour from grain would be increased by 5 cents. The addition to the cost of producing hay would be 18 cents per ton. Returns per hour on hay would be lowered by 3 cents.

A third possibility is to regard the grain and straw as a by-product in the major enterprise of establishing a hay seeding. All costs would be charged to the new seeding account and the value of the grain and straw credited to this account. This method would result in concealing any information about costs and returns from grain. The cost of the hay seeding would be high or low depending upon the returns from the grain. Seedings made with wheat would have cost less than nothing in 1939, while the seedings with oats would have been very expensive. The variation on individual farms is even larger. For example, Farmer 266 made a profit of $20.43 per acre on his wheat while Farmer 174 made a loss of $23.08 per acre on his wheat. If the accounts had been kept as though wheat was the by-product, and if both of these farmers had seeded with their wheat, the seeding on the first farm would have cost less than nothing while the seeding on the second farm would have been very expensive. The cost of the succeeding hay crops would thus have depended largely upon the yields and prices of the grain used as a nurse crop.

No one can increase his income by changing his accounting procedure. A farmer cannot change his income by changing his books to show that the grain cost less and the hay cost more than his first calculations had shown. The receipts and expenses from the entire farm business are not debatable, except for differences of opinion on inventory values. The purpose of cost accounts is to throw some light on how much of the expenses are incurred because of each enterprise, and how much of the receipts can logically be credited to each enterprise. That system of cost accounting is best which is simplest, clearest, most consistent from year to year and from farm to farm. The completed record should be a good basis on which an individual can plan his farm management program.

Would New York farmers make higher labor incomes if they produced more grain and thus reduced their purchases from other states and countries?

A farmer could increase his acreage of small grain by any one, or any combination, of the following methods:

(1) Plow his meadows a year or more sooner than has been his practice, thus shortening his rotation.

(2) Reduce the hay acreage and increase the acreage of grain.

(3) Reduce the acreage of crops other than hay and increase the acreage of grain.

(4) Use land for grain production which is now in pasture or idle.

Whether or not John Smith, an individual farmer, should or should not increase his small grain acreage will depend not only upon which of these methods he uses but also upon how much of his costs are "sunk" in the sense that he may have the investment in equipment which otherwise will be idle; and upon his alternative opportunities.

The allocation of costs was discussed by Dr. G. F. Warren in 1923.* His comments are so pertinent to the present discussion that they are quoted below.

> "Some crops, such as oats, are not highly profitable but fit into the year's work in such a way that they are grown even though not highly profitable. The recommendation is sometimes made that the rental charge and the rate per hour for labor should be reduced, so that oats will show a profit and reduce the profit on hay or other crops. This is based on the belief that if any part of the business is desirable, it should be so charged as to show a profit. If such a method were carried to its logical conclusion, all enterprises on a well-balanced farm would be so charged as to make them all equally profitable since all are needed. The writers believe that an analysis of a business is easier to make when the various crops are all treated as nearly alike as possible. For example, by the methods of accounting here used, the seven-years average returns for the oat crop paid all other costs and left an average of 1 cent per hour for human labor. Wheat left 57 cents, hay 88 cents. So far as type of farming is concerned, this would indicate that on these farms the oat crop should be looked upon as a supplemental crop. It is not often desirable to expand the oat acreage beyond the area that can be grown without interfering with other crops. On some farms, oats supplement the hay crop by filling the step between a cultivated crop and hay. It would not be desirable to make a combination of enterprises giving such low returns as oats, nor would it be desirable to have too large a proportion of the farm devoted to oats; but there is no reason for eliminating the crop unless it can be replaced by something better, nor is there any reason for expanding the area of a highly profitable crop unless it will result in greater profits for the farm as a whole. Accounts provide information that is an aid in business analysis; they do not provide automatic rules."

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* "Cost Accounts for Six Years on Some Successful New York Farms", by G. F. Warren, Van B. Hart, W. I. Myers, R. L. Gillett, C. V. Noble, and others. Cornell Agr. Exp. Sta. Bul. 414, page 132.

Costs and returns from individual feed crops

Costs and returns from each feed crop are given on the following pages in sufficient detail so that the reader can interpret them in the light of his own situation.

Almost $23 per acre was spent in growing, harvesting, and storing an acre of oats (table 9). Straw is an important by-product, accounting for 14 per cent of the total value, or almost $3 per acre. The total cost, less the value of the straw, was the cost of producing the grain, or $20 for the 38 bushels of grain on an acre, or 53 cents per bushel. Farmers valued the oats at 48 cents per bushel, or 5 cents less than the cost of production.

Barley costs were about the same as oats (table 11). Both barley and oats lacked a little of paying all costs.

Mixed spring grain yielded about the same number of pounds of grain as the barley, but a larger amount of straw was recovered (table 13). The difference in the value of straw accounts for most of the difference in the average returns from the mixed grain as compared with straight oats or barley.

Wheat outyielded each of the other small grains in terms of pounds per acre (table 15). The higher yield of grain accounts, in large measure, for the profit of $5 per acre from this grain compared with less than $1 from the mixed spring grain and losses on both oats and barley.

Corn for grain costs were almost double the costs per acre of small grain, but the good yield of 42 bushels, or 2343 pounds, of shelled corn per acre, together with the value of the stover, more than offset the costs (table 17). About one-fifth of the corn for grain acreage was hybrid corn grown for seed. Both costs and returns were higher for seed corn than for corn grown for feed.

Corn silage cost $4.33 per ton (table 19). One-third of the cost was incurred after the corn was ready to cut.

Alfalfa hay cost almost $2 per acre more than other hay, but the higher yield more than offset the higher cost per acre and resulted in a lower cost per ton (tables 21 and 23). Alfalfa accounts showed a profit of almost $6 per acre, compared with a loss of almost $1 per acre on other types of hay.

Averages are likely to be misleading unless one keeps in mind that individuals vary above and below the average. Some of the variation, and the association of factors, are brought out in the following even-numbered tables where the accounts are grouped or arranged by size, yield, cost, hours of labor, and profit.

The procedure in calculating the costs of grain and hay, when the hay seeding has been with a grain nurse crop, has been as follows. The grain crop was charged with all the cost of preparing the seedbed, the grain seed, drilling the seed and fertilizer, interest and taxes on the land, the manure used during the year (estimated on the assumption that 40 per cent is used the first year after application, 30 the second, 20 the third, and 10 the fourth) and one-third of the superphosphate. The cost of the grass seeding, when made with a grain crop, was the cost of the grass seed, all the lime, two-thirds of the superphosphate, and the cost of any special labor. The cost of the seeding was charged to hay accounts as "share of seeding cost".

Table 9. Costs and returns from an acre of oats
451.6 acres on 29 farms yielding 38 bushels per acre
Cost-account farms, 1939

Items	Cost per acre		Per cent of total	
	dollars		per cent	
Costs before harvest:				
Use of land	3.51		15.3	
1.9 tons of manure at $1.93 per ton	3.67		16.0	
113 pounds of fertilizer at $22.12 per ton	1.25		5.4	
2.3 bushels of seed at 53 cents per bushel	1.23		5.4	
5.9 hours of labor at 28 cents per hour	1.67		7.3	
6.2 hours of horse work at 19 cents per hour	1.15		5.0	
2.6 hours of tractor work at 50 cents per hour	1.29		5.6	
Other equipment	.89		3.9	
Interest	.15		.7	
All other	.25		1.0	
Total growing		15.06		65.6
Costs of harvesting:				
7.5 hours of labor	2.16		9.4	
2.6 hours of horse work	.48		2.1	
0.9 hour of tractor work	.53		2.3	
Threshing and combining	1.60		7.0	
2.3 pounds of twine	.17		.7	
All other	.71		3.1	
Total harvesting		5.65		24.6
Storing and selling:				
Use of buildings	1.49		6.5	
Interest	.49		2.1	
0.4 hour of labor	.11		.5	
All other	.15		.7	
Total storing and selling		2.24		9.8
Total cost per acre		22.95		100.0
Returns from 38 bushels of grain at 48 cents per bushel	18.14		86.5	
Returns from straw at $4.68 per ton	2.83		13.5	
Total returns per acre		20.97		100.0
Gain per acre		-1.98		

Averages from 29 accounts:	
Grain per farm	16 acres
Yield per acre	38 bushels
Cost per acre	$23
Cost per bushel	$.53
Returns per bushel	$.48
Profit per bushel	$-.05
Hours of labor per acre	14 hours
Minutes of labor per bushel	22 minutes
Return per hour of labor	$.14
Profit on the enterprise	$-31

Table 10. OATS

Averages, weighted by farms, for the high third, middle third, and low third. The box indicates the factor on which the sort was made. For example, the top line shows averages for farms with the largest acreage of oats while the third line from the top shows averages for the farms with the smallest acreage of oats. In each arrangement, there are 9 farms in the first group, 10 in the second, and 10 in the third.

Grain per farm	Yield per acre	Cost per acre	Cost per bushel	Labor per acre	Profit on enter-prise
acres	bushels	$	$	hours	$
		Grouped by acres of oats			
[31]	38	22	.55	12	-18
[13]	38	24	.62	17	-31
[4]	35	32	.80	18	-42
		Grouped by yield per acre			
18	[51]	31	.57	17	8
18	[36]	25	.60	18	-31
10	[25]	22	.79	13	-66
		Grouped by cost per acre			
9	41	[36]	.80	21	-57
17	42	[24]	.59	15	5
20	29	[18]	.60	12	-43
		Grouped by cost per bushel			
9	31	32	[.91]	18	-99
14	38	26	[.65]	16	-34
22	42	20	[.44]	14	33
		Grouped by hours per acre			
8	43	34	.73	[23]	-16
17	38	24	.59	[15]	-36
21	30	21	.66	[11]	-39
		Grouped by profit on the enterprise			
21	41	21	.48	14	[60]
9	40	32	.70	20	[-40]
18	30	24	.78	14	[-104]

Table 11. Costs and returns from an acre of spring barley
192.8 acres on 14 farms yielding 31 bushels per acre
Cost-account farms, 1939

Items	Cost per acre		Per cent of total	
	dollars		per cent	
Costs before harvest:				
Use of land	3.68		15.4	
2.4 tons of manure at $1.79 per ton	4.30		18.0	
115 pounds of fertilizer at $21.74 per ton	1.25		5.2	
2.1 bushels of seed at 79 cents per bushel	1.65		6.9	
5.8 hours of labor at 30 cents per hour	1.75		7.3	
3.5 hours of horse work at 23 cents per hour	.79		3.3	
3.5 hours of tractor work at 49 cents per hour	1.71		7.2	
Other equipment	1.54		6.4	
Interest	.18		.8	
All other	.05		.2	
Total growing		16.90		70.7
Costs of harvesting:				
6.3 hours of labor	1.96		8.2	
1.2 hours of horse work	.23		1.0	
1.0 hour of tractor work	.46		1.9	
Threshing and combining	1.28		5.4	
1.1 pounds of twine	.08		.3	
All other	1.07		4.4	
Total harvesting		5.08		21.2
Storing and selling:				
Use of buildings	1.05		4.4	
Interest	.55		2.3	
0.4 hour of labor	.11		.5	
All other	.22		.9	
Total storing and selling		1.93		8.1
Total cost per acre		23.91		100.0
Returns from 31 bushels of grain at 67 cents per bushel	20.67		90.8	
Returns from straw at $4.63 per ton	2.09		9.2	
Total returns per acre		22.76		100.0
Gain per acre		-1.15		

Averages from 14 accounts:

Grain per farm	14 acres
Yield per acre	31 bushels
Cost per acre	$24
Cost per bushel	$.71
Returns per bushel	$.67
Profit per bushel	$-.04
Hours of labor per acre	12 hours
Minutes of labor per bushel	24 minutes
Return per hour of labor	$.21
Profit on the enterprise	$-16

Table 12. SPRING BARLEY

Averages, weighted by farms, for the high third, middle third, and low third. The box indicates the factor on which the sort was made. For example, the top line shows averages for farms with the largest acreage of barley while the third line from the top shows averages for the farms with the smallest acreage of barley. In each arrangement, there are 5 farms in the first group, 4 in the second, and 5 in the third.

Grain per farm	Yield per acre	Cost per acre	Cost per bushel	Labor per acre	Profit on enter-prise
acres	bushels	$	$	hours	$
		Grouped by acres of barley			
[22]	33	25	.75	12	-23
[12]	29	20	.72	12	-12
[7]	29	23	.81	13	-12
		Grouped by yield per acre			
14	[39]	20	.43	12	166
17	[30]	28	.86	12	-136
11	[22]	22	1.02	13	-102
		Grouped by cost per acre			
17	29	[29]	.98	17	-34
13	34	[22]	.64	12	4
11	29	[18]	.65	9	-14
		Grouped by cost per bushel			
12	24	27	[1.10]	17	-103
16	27	21	[.76]	8	-134
14	39	20	[.43]	12	166
		Grouped by labor per acre			
10	31	26	.87	[19]	48
18	30	24	.76	[12]	-110
14	31	19	.65	[7]	- 4
		Grouped by profit on the enterprise			
14	39	20	.43	12	[166]
8	26	24	.97	13	[-45]
18	25	25	.93	13	[-174]

Table 13. Costs and returns from an acre of mixed spring grain
455.1 acres on 31 farms yielding 36 bushels per acre
Cost-account farms, 1939

Items	Cost per acre		Per cent of total	
	dollars		per cent	
Costs before harvest:				
Use of land	3.14		13.0	
2.4 tons of manure at $1.85 per ton	4.45		18.4	
135 pounds of fertilizer at $22.81 per ton	1.54		6.4	
2.3 bushels of seed at 70 cents per bushel	1.60		6.6	
6.5 hours of labor at 30 cents per hour	1.93		8.0	
6.7 hours of horse work at 19 cents per hour	1.26		5.2	
3.0 hours of tractor work at 54 cents per hour	1.61		6.7	
Other equipment	1.18		4.9	
Interest	.17		.7	
All other	.10		.4	
Total growing		16.98		70.3
Costs of harvesting:				
7.7 hours of labor	2.21		9.2	
3.5 hours of horse work	.71		2.9	
0.6 hour of tractor work	.31		1.3	
Threshing and combining	1.42		5.9	
2.1 pounds of twine	.17		.7	
All other	.84		3.5	
Total harvesting		5.66		23.5
Storing and selling:				
Use of buildings	.82		3.4	
Interest	.48		2.0	
0.1 hour of labor	.02		.1	
All other	.18		.7	
Total storing and selling		1.50		6.2
Total cost per acre		24.14		100.0
Returns from 36 bushels of grain at 56 cents per bushel	20.27		81.6	
Returns from straw at $5.37 per ton	4.58		18.4	
Total returns per acre		24.85		100.0
Gain per acre		.71		

Averages from 31 accounts:	
Grain per farm	15 acres
Yield per acre	36 bushels
Cost per acre	$24
Cost per bushel	$.54
Returns per bushel	$.56
Profit per bushel	$.02
Hours of labor per acre	14 hours
Minutes of labor per bushel	24 minutes
Return per hour of labor	$.34
Profit on the enterprise	$10

Table 14. MIXED SPRING GRAIN

Averages, weighted by farms, for the high third, middle third, and low third. The box indicates the factor on which the sort was made. For example, the top line shows averages for farms with the largest acreage of mixed spring grain while the third line from the top shows averages for the farms with the smallest acreage of mixed spring grain. In each arrangement, there are 11 farms in the first group, 10 in the second, and 10 in the third.

Grain per farm	Yield per acre	Cost per acre	Cost per bushel	Labor per acre	Profit on enter-prise
acres	bushels	$	$	hours	$
Grouped by acres of mixed grain					
[25]	36	21	.48	14	108
[12]	37	29	.77	14	-41
[7]	32	30	1.22	18	-45
Grouped by yield per acre					
14	[49]	30	.52	18	38
18	[35]	24	.53	16	68
12	[20]	26	1.42	12	-77
Grouped by cost per acre					
10	36	[36]	1.23	18	-84
17	42	[24]	.48	15	94
18	28	[19]	.70	12	30
Grouped by cost per bushel					
9	24	32	[1.45]	15	-106
18	41	27	[.57]	17	21
18	42	21	[.37]	14	128
Grouped by labor per acre					
13	45	32	.64	[21]	13
13	28	23	.91	[14]	-14
18	31	24	.91	[10]	32
Grouped by profit on the enterprise					
22	40	21	.41	14	[145]
12	39	28	.60	18	[-10]
9	26	32	1.47	13	[-117]

Table 15. Costs and returns from an acre of wheat
561.7 acres on 32 farms yielding 31 bushels per acre
Cost-account farms, 1939

Items	Cost per acre		Per cent of total	
	dollars		per cent	
Costs before harvest:				
Use of land	4.48		18.6	
1.2 tons of manure at $1.92 per ton	2.31		9.5	
146 pounds of fertilizer at $27.95 per ton	2.04		8.4	
2.0 bushels of seed at 87 cents per bushel	1.74		7.2	
5.5 hours of labor at 32 cents per hour	1.78		7.3	
4.0 hours of horse work at 16 cents per hour	.66		2.7	
3.2 hours of tractor work at 50 cents per hour	1.60		6.6	
Other equipment	1.02		4.2	
Interest	.45		1.9	
All other	.27		1.1	
Total growing		16.35		67.5
Costs of harvesting:				
6.4 hours of labor	1.91		7.9	
2.2 hours of horse work	.43		1.8	
0.7 hour of tractor work	.36		1.5	
Threshing and combining	1.49		6.2	
1.5 pounds of twine	.11		.4	
All other	1.16		4.7	
Total harvesting		5.46		22.5
Storing and selling:				
Use of buildings	1.00		4.2	
Interest	.49		2.0	
1.0 hour of labor	.29		1.2	
All other	.63		2.6	
Total storing and selling		2.41		10.0
Total cost per acre		24.22		100.0
Returns from 31 bushels of grain at 85 cents per bushel	26.22		88.6	
Returns from straw at $5.92 per ton	3.38		11.4	
Total returns per acre		29.60		100.0
Gain per acre		5.38		

Averages from 32 accounts:	
Grain per farm	18 acres
Yield per acre	31 bushels
Cost per acre	$24
Cost per bushel	$.67
Returns per bushel	$.85
Profit per bushel	$.18
Hours of labor per acre	13 hours
Minutes of labor per bushel	25 minutes
Return per hour of labor	$.73
Profit on the enterprise	$94

Table 16. WHEAT

Averages, weighted by farms, for the high third, middle third, and low third. The box indicates the factor on which the sort was made. For example, the top line shows averages for farms with the largest acreage of wheat while the third line from the top shows averages for the farms with the smallest acreage of wheat. In each arrangement, there are 11 farms in the first group, 10 in the second, and 11 in the third.

Grain per farm	Yield per acre	Cost per acre	Cost per bushel	Labor per acre	Profit on enterprise
acres	bushels	$	$	hours	$
		Grouped by acres of wheat			
[32]	31	24	.66	11	146
[14]	31	24	.72	14	139
[6]	29	30	.90	21	2
		Grouped by yield per acre			
18	[38]	28	.55	17	180
20	[31]	26	.72	15	85
15	[22]	24	1.00	14	17
		Grouped by cost per acre			
14	33	[34]	.87	19	53
17	32	[25]	.71	17	124
22	27	[19]	.69	11	109
		Grouped by cost per bushel			
12	24	29	[1.09]	17	-41
25	32	26	[.66]	15	154
16	36	23	[.51]	15	176
		Grouped by hours per acre			
10	31	31	.89	[23]	19
15	31	26	.73	[15]	110
27	30	21	.65	[9]	155
		Grouped by profit on the enterprise			
21	35	24	.56	13	[253]
18	34	26	.61	18	[76]
14	23	28	1.09	16	[-48]

Table 17. Costs and returns from an acre of corn for grain
185.7 acres on 23 farms yielding 42 bushels per acre
Cost-account farms, 1939

Items	Cost per acre		Per cent of total	
	dollars		per cent	
Costs before harvest:				
Use of land	4.18		10.4	
2.6 tons of manure at $1.91 per ton	4.96		12.3	
123 pounds of fertilizer at $27.64 per ton	1.70		4.2	
7 quarts of seed at $9.46 per bushel	2.07		5.1	
16.2 hours of labor at 29 cents per hour	4.66		11.6	
12.8 hours of horse work at 20 cents per hour	2.55		6.3	
3.8 hours of tractor work at 43 cents per hour	1.63		4.1	
Other equipment	1.81		4.5	
Interest	.17		.4	
All other	1.40		3.5	
Total growing		25.13		62.4
Costs of harvesting:				
30.3 hours of labor	8.71		21.6	
7.7 hours of horse work	1.89		4.7	
0.5 hour of tractor work	.22		.5	
Husking	.61		1.5	
1.8 pounds of twine	.15		.4	
All other	.98		2.5	
Total harvesting		12.56		31.2
Storing and selling:				
Use of buildings	.93		2.3	
Interest	.38		.9	
2.1 hours of labor	.58		1.4	
All other	.71		1.8	
Total storing and selling		2.60		6.4
Total cost per acre		40.29		100.0
Returns from 42 bushels of grain at 93 cents per bushel	38.94		93.2	
Value of stover	2.82		6.8	
Total returns per acre		41.76		100.0
Gain per acre		1.47		

Averages from 23 accounts:	
Grain per farm	8 acres
Yield per acre	42 bushels
Cost per acre	$40
Cost per bushel	$.89
Returns per bushel	$.93
Profit per bushel	$.04
Hours of labor per acre	48 hours
Minutes of labor per bushel	70 minutes
Return per hour of labor	$.32
Profit on the enterprise	$12

Table 18. CORN FOR GRAIN

Averages, weighted by farms, for the high third, middle third, and low third. The box indicates the factor on which the sort was made. For example, the top line shows averages for farms with the largest acreage of corn while the third line from the top shows averages for the farms with the smallest acreage of corn. In each arrangement, there are 8 farms in the first group, 8 in the second, and 7 in the third.

Grain per farm	Yield per acre	Cost per acre	Cost per bushel	Labor per acre	Profit on enter-prise
acres	bushels	$	$	hours	$
Grouped by acres of corn					
[15]	42	41	.99	49	108
[6]	38	40	1.06	46	-46
[3]	43	50	1.47	68	-32
Grouped by yield per acre					
10	[60]	47	.74	58	74
8	[38]	40	1.01	56	-16
5	[22]	43	1.81	45	-27
Grouped by cost per acre					
5	49	[57]	1.50	77	- 3
8	32	[41]	1.21	45	-55
12	40	[30]	.71	37	105
Grouped by cost per bushel					
6	25	48	[1.86]	57	-14
8	40	40	[.90]	52	-44
10	58	41	[.66]	51	105
Grouped by hours per acre					
6	45	55	1.35	[79]	-18
7	36	42	1.32	[48]	- 3
12	40	32	.75	[30]	63
Grouped by profit on the enterprise					
13	52	46	.95	62	[146]
4	35	38	1.16	48	[-25]
6	34	46	1.40	50	[-99]

Table 19. Costs and returns from an acre of corn silage
614.8 acres on 46 farms yielding 8.1 tons per acre
Cost-account farms, 1939

Items	Cost per acre		Per cent of total	
	dollars		per cent	
Costs before harvest:				
Use of land	3.19		8.5	
4.8 tons of manure at $1.73 per ton	8.30		22.0	
85 pounds of fertilizer at $28.47 per ton	1.21		3.2	
9.9 quarts of seed at $2.81 per bushel	.87		2.3	
11.8 hours of labor at 28 cents per hour	3.33		8.8	
14.2 hours of horse work at 17 cents per hour	2.44		6.5	
3.7 hours of tractor work at 54 cents per hour	2.00		5.3	
Other equipment	1.55		4.1	
Interest	.18		.5	
All other	.49		1.3	
Total growing		23.56		62.5
Costs of harvesting:				
17.6 hours of labor	5.00		13.2	
12.2 hours of horse work	2.24		5.9	
2.0 hours of tractor work	1.03		2.7	
Silo filling	.41		1.1	
2.7 pounds of twine	.22		.6	
All other	2.28		6.1	
Total harvesting		11.18		29.6
Storing:				
Use of silo	2.61		6.9	
All other	.39		1.0	
Total storing		3.00		7.9
Total cost per acre		37.74		100.0
Cost of 8.1 tons of silage at $4.33 per ton	35.28		93.5	
Value of ear corn	2.46		6.5	
Total per acre		37.74		100.0

Averages from 46 accounts:

Silage per farm	13 acres
Yield per acre	8 tons
Hours to grow an acre	12 hours
Hours to grow and store a ton	3.6 hours
Cost per acre, manure	$8
Cost per acre, total	$38
Cost to harvest a ton	$1.37
Cost per ton, total	$4.33

Table 20. CORN SILAGE

Averages, weighted by farms, for the high third, middle third, and low third. The box indicates the factor on which the sort was made. For example, the top line shows averages for farms with the largest acreage of corn silage, while the third line from the top shows averages for the farms with the smallest acreage of corn silage. In each arrangement, there are 15 farms in the first group, 15 in the second, and 16 in the third.

Silage per farm	Yield per acre	Labor		Cost per acre		Cost to harvest a ton	Cost per ton
		grow an acre	grow and store a ton	manure	total		
acres	tons	hours	hours	$	$	$	$
			Grouped by acres of silage				
22	7	12	3.8	9	36	1.44	4.75
12	9	11	3.8	8	41	1.41	4.81
7	9	16	4.5	8	47	1.97	5.58
			Grouped by yield per acre				
12	11	13	3.3	8	43	1.31	3.30
14	8	12	3.6	9	38	1.19	4.49
14	6	13	5.1	9	42	2.29	7.24
			Grouped by labor to grow an acre				
10	9	20	5.1	8	51	1.97	5.78
12	9	12	3.8	9	39	1.48	4.70
17	7	7	3.2	8	34	1.40	4.71
			Grouped by labor per ton				
11	7	18	5.8	8	47	2.30	7.07
14	9	12	3.8	9	40	1.48	4.25
15	9	9	2.6	9	37	1.10	3.92
			Grouped by cost of manure per acre				
12	8	14	4.6	13	48	2.01	6.28
16	8	12	3.6	8	39	1.40	4.75
12	8	12	3.9	5	36	1.44	4.20
			Grouped by total cost per acre				
10	10	17	4.4	10	55	2.01	5.83
12	8	13	4.0	8	40	1.57	4.99
19	7	10	3.7	7	30	1.28	4.40
			Grouped by cost per ton to harvest				
11	7	13	4.9	9	47	2.51	6.80
12	8	16	4.5	8	42	1.44	4.83
17	9	11	2.8	8	35	.94	3.64
			Grouped by cost per ton				
12	6	15	5.4	9	47	2.40	7.77
13	9	12	3.3	9	40	1.32	4.42
15	10	13	3.4	8	37	1.16	3.11

Table 21. Costs and returns from an acre of alfalfa
860.3 acres on 40 farms yielding 1.7 tons per acre
Cost-account farms, 1939

Items	Cost per acre		Per cent of total	
	dollars		per cent	
Costs before harvest:				
Use of land	3.20		17.2	
1.2 tons of manure at $1.72 per ton	2.06		11.1	
Share of seeding cost	2.97		15.9	
Interest	.25		1.3	
All other	.21		1.1	
Total growing		8.69		46.6
Costs of harvesting:				
8.7 hours of labor	2.60		13.9	
6.7 hours of horse work	1.28		6.9	
0.9 hour of tractor work	.47		2.5	
All other	1.73		9.3	
Total harvesting		6.08		32.6
Storing and selling:				
Use of buildings	3.06		16.3	
Interest	.51		2.7	
0.4 hour of labor	.16		.9	
All other	.16		.9	
Total storing and selling		3.89		20.8
Total cost per acre		18.66		100.0
Returns from 1.7 tons of hay at $13.75 per ton	23.97		98.4	
Value of aftermath	.39		1.6	
Total returns per acre		24.36		100.0
Gain per acre		5.70		

Averages from 40 accounts:	
Hay per farm	22 acres
Yield per acre	1.7 tons
Cost per acre	$19
Cost per ton	$10.48
Returns per ton	$13.75
Profit per ton	$3.27
Hours of labor per acre	9 hours
Hours of labor per ton	5.2 hours
Return per hour of labor	$.93
Profit on the enterprise	$123

Table 22. ALFALFA

Averages, weighted by farms, for the high third, middle third, and low third. The box indicates the factor on which the sort was made. For example, the top line shows averages for farms with the largest acreage of alfalfa while the third line from the top shows averages for the farms with the smallest acreage of alfalfa. In each arrangement, there are 13 farms in the first group, 13 in the second, and 14 in the third.

Hay per farm	Yield per acre	Cost per acre	Cost per ton	Labor per acre	Profit on enterprise
acres	tons	$	$	hours	$
Grouped by acres of alfalfa					
[43]	1.7	16	10	9	305
[17]	1.7	20	13	8	74
[6]	1.9	28	16	10	- 2
Grouped by yield per acre					
25	[2.6]	25	9	11	301
15	[1.8]	23	13	10	71
25	[1.0]	17	17	7	5
Grouped by cost per acre					
13	2.2	[31]	15	12	52
24	1.7	[20]	13	9	154
27	1.4	[14]	12	7	159
Grouped by cost per ton					
13	1.4	26	[20]	9	-33
23	1.8	22	[12]	9	93
28	2.0	16	[8]	9	294
Grouped by hours per acre					
26	2.3	27	12	[14]	198
19	1.8	19	12	[9]	154
20	1.3	19	16	[5]	24
Grouped by profit on the enterprise					
34	2.1	18	9	10	[386]
19	1.7	20	12	8	[45]
13	1.5	26	18	10	[-49]

Table 23. Costs and returns from an acre of hay other than alfalfa
2142.5 acres, 66 accounts, yielding 1.3 tons per acre
Cost-account farms, 1939

Items	Cost per acre		Per cent of total	
	dollars		per cent	
Costs before harvest:				
Use of land	3.29		19.6	
2.2 tons of manure at $1.78 per ton	3.92		23.4	
Share of seeding cost	2.12		12.6	
Interest	.27		1.6	
All other	.25		1.5	
Total growing		9.85		58.7
Costs of harvesting:				
6.3 hours of labor	1.89		11.3	
4.8 hours of horse work	.95		5.6	
0.6 hour of tractor work	.27		1.6	
All other	1.17		7.0	
Total harvesting		4.28		25.5
Storing and selling:				
Use of buildings	2.14		12.8	
Interest	.36		2.1	
0.1 hour of labor	.04		.2	
All other	.12		.7	
Total storing and selling		2.66		15.8
Total cost per acre		16.79		100.0
Returns from 1.3 tons of hay at $12.02 per ton	15.59		97.9	
Value of aftermath	.33		2.1	
Total returns per acre		15.92		100.0
Gain per acre		- .87		

Averages from 66 accounts:

Hay per farm	32 acres
Yield per acre	1.3 tons
Cost per acre	$17
Cost per ton	$12.70
Returns per ton	$12.02
Profit per ton	$-.68
Hours of labor per acre	6 hours
Hours of labor per ton	4.9 hours
Return per hour of labor	$.16
Profit on the enterprise	$-28

Table 24. HAY OTHER THAN ALFALFA

Averages, weighted by farms, for the high third, middle third, and low third. The box indicates the factor on which the sort was made. For example, the top line shows averages for farms with the largest acreage of hay other than alfalfa while the third line from the top shows the averages for the farms with the smallest acreage of hay other than alfalfa. In each arrangement, there are 22 farms in the first group, 22 in the second, and 22 in the third.

Hay per farm	Yield per acre	Cost per acre	Cost per ton	Labor per acre	Profit on enterprise
acres	tons	$	$	hours	$
Grouped by acres of hay other than alfalfa					
[59]	1.3	15	13	6	- 3
[26]	1.2	17	14	7	-30
[12]	1.5	24	18	8	-52
Grouped by yield per acre					
30	[2.1]	24	12	10	43
31	[1.2]	19	15	7	1
37	[.7]	13	18	5	-129
Grouped by cost per acre					
26	1.7	[28]	19	10	-173
34	1.5	[17]	13	7	82
38	.9	[11]	12	5	6
Grouped by cost per ton					
25	1.1	24	[23]	8	-212
34	1.5	19	[13]	7	-22
38	1.5	14	[9]	7	149
Grouped by hours per acre					
27	1.8	24	13	[11]	-28
32	1.3	19	15	[6]	35
38	.9	14	17.	[4]	-92
Grouped by profit on the enterprise					
39	1.6	16	10	6	[211]
23	1.3	18	14	7	[-30]
36	1.2	22	20	8	[-266]

Two-thirds of the alfalfa fields were mowed twice. Only four fields were mowed 3 times. The other fields were mowed only once. The yield of second-cutting hay was only about one-third the yield of first-cutting on the fields mowed twice.

Table 25. Number of cuttings
110 fields of alfalfa hay
Cost-account farms, 1939

	Mowed once	Mowed twice	Mowed three or more times	All fields
Number of fields of hay	41	65	4	110
Number of fields of hay pastured	9	8	1	18
Acres	265.2	564.8	30.3	860.3
Yield per acre (tons):				
first cutting	1.2	1.4	2.8	1.4
second cutting	-	.5	1.0	.3
third cutting	-	-	.6	.0
All cuttings	1.2	1.9	4.4	1.7

Grass Silage

The small number of records of costs of grass silage on cost-account farms are supplemented by results of studies in New Jersey and Ohio.*

The problem of how to divide joint costs in distinguishing between costs of hay and the cost of material ensiled from the same field cannot be solved by precedent nor by any clear-cut rule of logic. If the first cutting is put in the silo and the second and third cutting is cured and put in the hay mow, how much of the seeding charge, costs of interest and taxes on the land, and the charge for manure used during the year should be allocated to the silage account and how much to the hay account? A lack of uniformity in accounting methods results in differences in the reported cost of producing grass silage. The New Jersey and the New York costs of "growing" represent a share of the joint costs, approximately in proportion to the tonnage, on a dry weight basis, of the crop used for silage and for hay. The Ohio cost is

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* References:

1. A Survey of Practices and Costs of Producing Grass Silage on 50 New Jersey Farms. By John W. Carncross, Allen G. Waller, and Emil Rauchenstein. N. J. (Rutgers) Agr. Exp. Sta. Bul. 684. 1940.

2. The Bimonthly Bulletin. Ohio Agr. Exp. Sta. publication No. 205. July-August, 1940.

3. A Study of Legume-Grass Silage on Ohio Farms. By F. L. Morison. Ohio Agr. Exp. Sta. Mimeo. Bul. No. 127. 1940.

4. Grass Silage - Its Place in Agriculture. By C. B. Bender and E. S. Savage. N. J. (Rutgers) Agr. Exp. Sta. Circular 386. 1939.

5. Legume and Grass Silage. By C. B. Bender, Frank Hamlin, A. R. Merrill, F. B. Morrision, and R. H. Olmstead. N. Y. (Cornell) Ext. Bul. 391. 1938.

6. Ensiling Green Crops with Molasses. By C. B. Bender and H. H. Tucker. N. J. (Rutgers) Ext. Bul. 198. 1938.

the total cost of establishing a seeding in wheat or oats, divided by two years, or average length of the stand, plus $6 per acre for interest and taxes on the land for the year. The value of the crop cut for hay, estimated at $5 per ton of cured hay, was subtracted from this total.

These differences in accounting explain much of the differences in the cost per ton in the field. The New York and New Jersey costs average about $2.20 per ton. If a person is mowing pasture growth in a period of excess growth he may want to ignore the growing costs.

The cost of harvesting the crop is much more comparable. The average cost on 5 New York farms of mowing the grass and getting it into the silo, including cost of preservative, was $2.81 per ton, or $1.44 more than the cost of getting a ton of corn from the field to the silo. Comparable costs on a larger number of farms in New Jersey and in Ohio were somewhat lower.

No charge was made for the use of the silo, nor for interest on the money tied up in silage from harvest until it was fed, in either the New Jersey or the Ohio study. The cost of storing was 54 cents per ton in New York.

Four different cost-account farmers ensiled annual crops other than corn. The results are given to show that costs may vary from $2.83 per ton, where a volunteer crop of sudan grass was ensiled, to $15.20 per ton where only one ton of green stuff was cut per acre of oats.

Soybean silage cost about $6 per ton in New Jersey and $4 in Ohio.

Costs of corn silage from the three studies are compared in table 28. Costs and yields were about the same in New York and New Jersey. Yields were somewhat higher and costs considerably lower in Ohio.

Table 26. Cost of silage cut from meadows

	New York	New Jersey		Ohio
	Mostly alfalfa	Alfalfa	Mixed grass	Alfalfa
Farms	5	22	22	66
Acres per farm	10.6	18.9	14.8	-
Yield per acre, green	6.3	5.2	4.2	5.0
Cost per ton				
Growing	$2.24	$1.59	$2.80	$.50
Harvesting:				
Man labor	$ .71	$ .38	$ .61	$ .58
Power	.63	.40	.62	.49
Equipment	.84	.32	.49	.52
Preservative	.63	.40	.42	.60
Total harvesting	2.81	1.50	2.14	2.19
Cost of growing and harvesting per ton	$5.05	$3.09	$4.94	$2.69
Storing:				
Use of silo	$ .48	-	-	-
Interest and insurance	.06	-	-	-
Total storing	.54			
Cost per ton of silage	$5.59			

The average cost per acre of alfalfa on the 40 farms where this crop was cured for hay was $8.69 per acre before the hay was cut (table 21). The yield was 1.7 tons of dry hay. Assuming a drying ratio of 3 to 1, about 5.1 tons of green grass was produced per acre, at a cost of $1.70 per ton of standing grass. The cost on the 5 farms producing alfalfa silage was 54 cents per ton higher than the average on the 40 farms, or $2.24. If the growing cost on the 40 farms is substituted for the cost on these 5 farms, the cost of grass silage would be $5.05 per ton, or about as much more than corn silage as the cost of the preservative.

Table 27. Cost of silage from annual crops other than corn

	New York				New Jersey	Ohio	
	Soy beans	Oats	Millet	Volunteer sudan grass	Soy beans	Soy beans	Cereals
Number of farms	1	1	1	1	15	19	10
Acres per farm	2.6	5.0	6.0	12.0	13.9	6.7	6.8
Yield per acre	14.6	1.0	5.7	5.0	5.5	7.5	4.9
Cost per ton							
Growing	$2.05	$10.40	$4.21	$ .55	$4.10	$1.77	-
Harvesting:							
Man labor	$ .29	$3.00	$1.35	$ .88	$ .58	$ .62	$ .55
Power	.16	1.00	1.88	.35	.41	.48	.53
Equipment	.02	.80	.91	.53	.39	.46	.51
Preservative	---	---	.50	---	.93	.58	.54
All else	---	---	---	---	---	---	.04
Total harvesting	.47	4.80	4.64	1.76	2.31	2.14	2.17
Cost of growing and harvesting per ton	$2.52	$15.20	$8.85	$2.31	$6.41	$3.91	
Storing:							
Use of silo	$ .21	---	---	$ .52			
Interest and insurance	.03	---	$ .12	---			
Total storing	.24		.12	.52			
Cost per ton of silage	$2.76	$15.20	$8.97	$2.83			

Table 28. Cost of corn silage compared with other states

	New York	New Jersey	Ohio
Number of farms	46	43	60
Acres per farm	13.4	-	-
Yield per acre	8.1	8.0	9.0
Cost per ton			
Growing	$2.89	$3.51	$1.96
Harvesting:			
Man labor	$ .61	$ .64	$ .50
Power	.41	.48	.31
Equipment	.27	.35	.34
All else	.08	---	.03
Total harvesting	1.37	1.47	1.18
Cost of growing and harvesting per ton	$4.26	$4.98	$3.14
Storing:			
Use of silo	$ .32		
Interest and insurance	.07		
Total storing	.39		
Total cost	$4.65		
Value of ear corn	.32		
Cost per ton of silage	$4.33		

Cost of Producing Digestible Nutrients

Pasture is by far the most economical source of feed on most New York farms. The cost of maintaining an acre of permanent pasture and fence for 1939 was $2.42, compared with $5.32 for an acre of rotated pasture, or $3.10 per acre for all pasture. Survey records indicate that about 600 pounds of total digestible nutrients are obtained per acre of pasture, making a cost of about 50 cents per hundred pounds of digestible nutrients obtained from pasture.* Of course, pastures vary in the amount of feed produced as well as in cost.

The cost of producing grain and of silage was much lower in 1939 than in the preceding twenty-five-year period (table 29). Although the cost of producing hay had not declined as much as other feeds, alfalfa was still the cheapest barn feed. High yields of alfalfa on soils where this crop can be grown to advantage result in relatively low costs per ton. The cost of feed in the form of alfalfa was about double the cost of pasture feed.

Although silage yields on these farms were low as compared with the average of the State (figure 1), corn silage proved to be a relatively cheap feed in 1939. Digestible nutrients in the form of silage cost about the same as in the form of mixed hay. Wheat was the cheapest source of total digestible nutrients from grain, while oats was the most expensive.

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* Love, H. M. Unpublished thesis.

Table 29. Cost of producing digestible nutrients* on cost-account farms 1914-1938 compared with 1939

	Unit	Cost per unit		Cost per 100 pounds total digestible nutrients	
		25-year average	1939	25-year average	1939
Oats	bushel	$ .83	$ .53	$3.63	$2.32
Barley	bushel	1.19	.71	3.15	1.88
Wheat	bushel	1.37	.67	2.73	1.34
Corn for grain	bushel	1.61	.89	3.44	1.92
Corn silage	ton	6.72	4.33	1.80	1.16
Alfalfa	ton	12.31	10.48	1.22	1.04
Other hay	ton	12.79	12.70	1.28	1.26

* The per cent digestible nutrients are taken from "Feeds and Feeding" by F. B. Morrison. (Twentieth edition, 1938)

Costs of Binding and Combining

In recent years the combined harvester-thresher has been increasing in importance. Not much evidence is available from cost accounts to afford a direct comparison of this method with the usual method of binding the grain and hauling the bundles to a stationary thresher. However, it is apparent that if a combine can be operated or hired at a cost of $3 per acre or less, and if some satisfactory method of handling the straw can be worked out, important savings can be made where yields are high.

Custom rates for combining vary from $2 to $4 per acre with $3 a common rate. Some operators make a flat charge per acre and an additional charge dependent upon the yield per acre.

Straw from the combine is treated in many different ways among which are the following:

(1) left on field and plowed under;

(2) raked with side-delivery rake, loaded with hay loader, hauled to barn, chopped, blown into hay mow;

(3) raked and baled in field with windrow baler;

(4) raked and baled in field with stationary baler, straw moved to baler with sweep rake.

In some sections of the State, the usual rate for windrow baling is 10 cents per bale. The weight of straw baled with a windrow baler varies from about 75 to 100 pounds. At this rate, the cost of baling would be between $2 and $3 per ton.

As a basis for discussion, the cost of harvesting oats and barley with a binder on one farm is shown in table 30. The cost from standing grain to barn was $6.06 per acre. This sum paid all the cost of getting 28 bushels of grain from the standing grain into the grain bin and one-half ton of straw into the stack in the barnyard. Another farmer who hires his grain combined estimated that he could get the same yield of grain into the grain bin and the straw chopped and blown into the barn for $5.17, or 89 cents per acre less than the binder method. If one has a binder, and the man and horse power are not urgently needed for other work, one might be justified in binding, if the yield is only about 28 bushels per acre. But if one has no use for the straw, the saving by using the combine would be considerable.

Assuming a yield of double his actual yield, or 56 bushels per acre, and estimating the probable costs involved in the two methods, it is apparent that important savings can be effected by combining.

Other factors influence a farmer's decision on the best method of harvesting his grain. If the grain is lodged badly, the combine may do a better job of picking it up than the binder. Grain cured in the shock is likely to store with less spoilage than is grain harvested by a combine. The difficulty of hiring the grain combined at the best time from the standpoint of maturity is often a factor.

Table 30. Cost per acre of OATS AND BARLEY from grain to barn on one cost-account farm

	Actual yield	Assumed yield
Bushels per acre	28	56
	Cost per acre	
Binder method		
Twine	$ .24	$ .35
Binding	1.13	1.30
Shocking	.51	.75
Hauling bundles to thresher	2.00	3.00
Threshing at 5 cents	1.40	2.80
Meals, tractor, and extra labor	.45	.55
Move grain from thresher to grain bin	.33	.66
Total	6.06	9.41
Estimated cost if hired combine is used at $3 per acre		
Combining	$3.00	$3.00
Haul and store grain	.42	.82
Handling straw*	1.75	2.35
Total	5.17	6.17
Saving - combine over binder method	$ .89	$3.24

* Handling straw

Rake with side-delivery rake, 1 man and tractor, 25 minutes per acre.

Load 1 ton from 2 acres on wagon, 50 minutes for 2 men, tractor, and hay loader per load.

Haul straw to barn, 10 minutes for 2 men and tractor.

Chop straw and blow into barn, 35 minutes for 2 men and tractor and ensilage cutter.

Take empty wagon back to field, 10 minutes for 2 men and tractor.

Average per acre:	
2.2 man hours	$ .65
1.2 tractor hours	.59
Side-delivery rake	.27
Hay loader	.12
Ensilage cutter	.12
Cost of ½ ton from 1 acre	$1.75

Cost of Producing Certified Seed

Some of the grain was sold as certified seed. Costs of producing certified seed were higher than costs of feed grains. Although the difference in cost between certified seed and of feed grains has not been measured, some idea of the difference can be obtained from the following list of extra expenses incurred by producers of certified grain.

1. Extra cost of the original seed.

2. The cost of certification includes an entrance fee of $5 when an applicant becomes a member of the New York Seed Improvement Co-operative Association, Inc., and an annual fee to cover costs of certification. The annual fee is based on the number of times the inspector visits the farm, the number of different fields, and the acreage inspected. The minimum fee is $15 per farm. For example, a farmer with two fields and a total of 20 acres of oats to certify would pay $4 for the farm, $2 for each field, and $1 per acre, or a total of $28. One-half of the total, or at least $15, is paid at the time of application, and is not refunded in whole or in part even though the crop is not certified. The balance is paid if and when the crop is certified. Any surplus is prorated back to the members.

3. Cost of roguing fields to keep free from other grains and weeds.

4. Extra care at harvest to make sure that grain is at proper stage of maturity for maximum germination.

5. Cost of cleaning and grading. The grains must meet high standards of purity. Good equipment is needed for this purpose.

6. Only the heaviest grain is sold as certified seed. Screenings and light kernels are used for feed.

7. Sometimes part of these costs are incurred but the inspector will not certify the field.

8. Sometimes the certified grain is produced but no market can be found as seed.

9. Sales of certified seed are often made in smaller amounts than sales of feed grains. The extra cost for labor to wait on customers is often at a time when other farm work is pressing.

10. Advertising expense.

Significance of a Gain or Loss in an Account

The cost of transporting such bulky products as hay and silage from one farm to another, or from one section to another, is a large proportion of their value. Hence it is common practice to raise most of the roughage on the farms where it is fed. On cost-account farms, hay is charged to the animals and credited to the hay account at what it would sell for, at the farm. A hay account that shows a gain indicates that hay would have been a profitable crop if it had been raised for sale. The transfer at farm prices tends to favor the account using a marketable product. Purchased hay costs more than the selling price of hay by the cost of hauling to and from market, and of marketing. One might continue to produce hay for one's own herd even though the cost of production is higher than the price at which he could sell the hay.

Many of the costs of production on a farm are "sunk costs". The investment in land, buildings, and machinery has been made. Interest and depreciation will be as much, or almost as much, if the resources remain idle as if they are used. Hence it may be good business to use them at a loss rather than to let them remain idle and incur a larger loss.

Many of the costs of production are indirect, for example, much of the haying is done by the regular labor force rather than by men hired especially for this work. The full cost of production is not apparent until these crops have been apportioned their share of such general overhead costs as the wages of the regular men, taxes, and the cost of building and equipment maintenance. Some of these costs must be apportioned arbitrarily. Allowance must be made for the method of accounting before drawing up a farm management program.

There are many intangibles which cannot be measured in dollars and cents with any degree of precision, but which must be left to judgment. For example, it is well known that it costs more to plow an alfalfa sod than to

plow after corn. But the bacteria living on the roots of the alfalfa increase the nitrogen of the soil while the corn crop depletes the soil nitrogen. Alfalfa roots penetrate deeply and improve the physical condition of the soil more than the corn roots. The alfalfa plants prevent soil erosion while the cultivated rows of corn, especially if they are on a steep grade, speed up the process of erosion. None of these differences is recognized in the usual methods of farm accounting because as yet no precise measurements have been developed to measure them in terms of dollars and cents. Such differences must be left to the judgment of the individual. The best that any system of accounts for any business can do is to present a clear-cut picture of what happened. The interpretation of the accounts will depend upon conditions, which change from day to day; upon the farm, which is different from other farms; and upon the farmer.