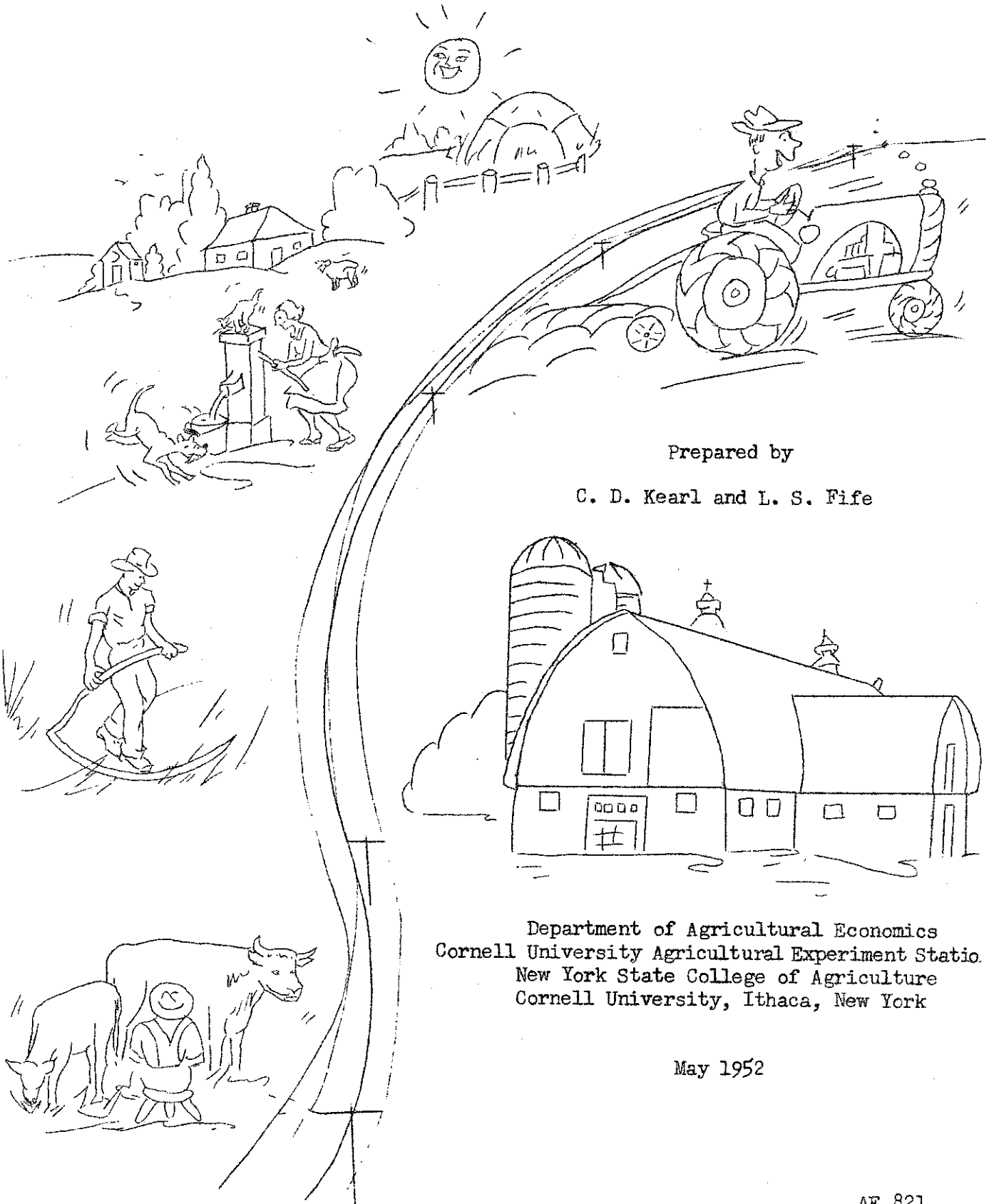


CHANGES AND FACTORS AFFECTING CHANGES  
IN OUTPUT EFFICIENCY ON NEW YORK FARMS



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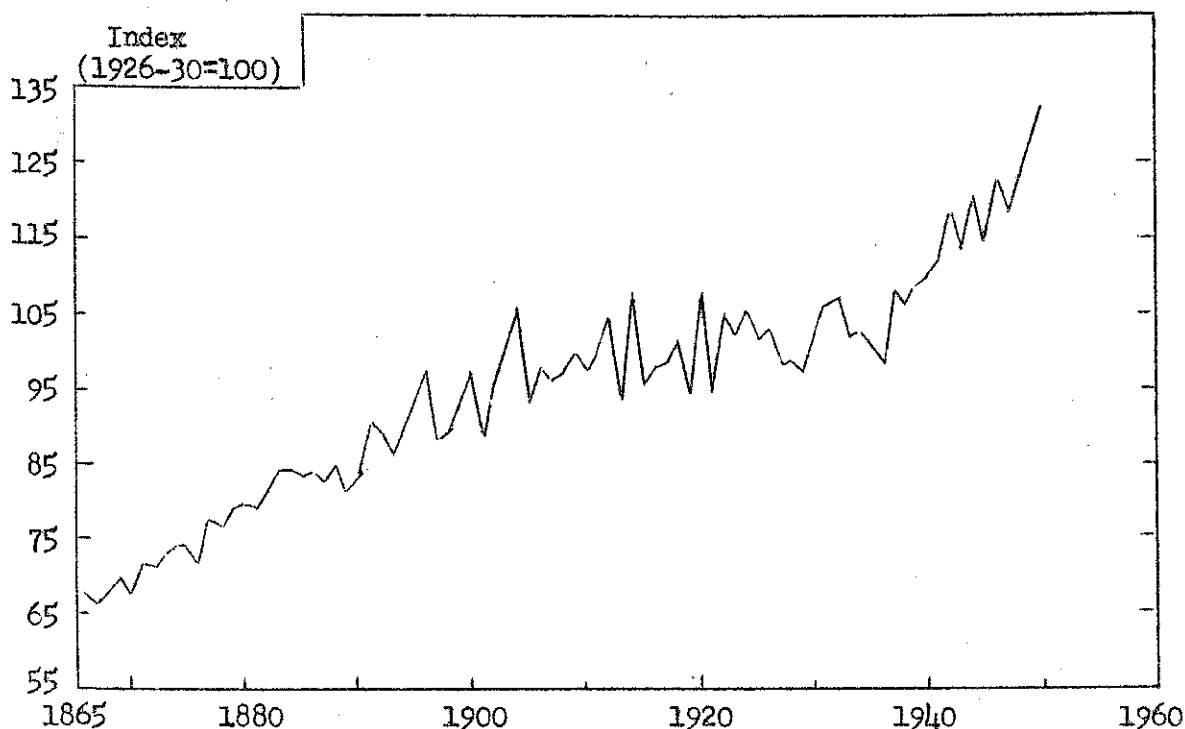
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May 1952

# CHANGES AND FACTORS AFFECTING CHANGES IN OUTPUT EFFICIENCY ON NEW YORK FARMS

Since 1865, the trend in total production on New York farms has been upward (Figure 1). It was rapid until World War I, slowed somewhat during the depression years, and during and since World War II has moved upward more rapidly than at any other time in our history.

Figure 1. INDEX OF PRODUCTION, NEW YORK STATE, 1865-1950

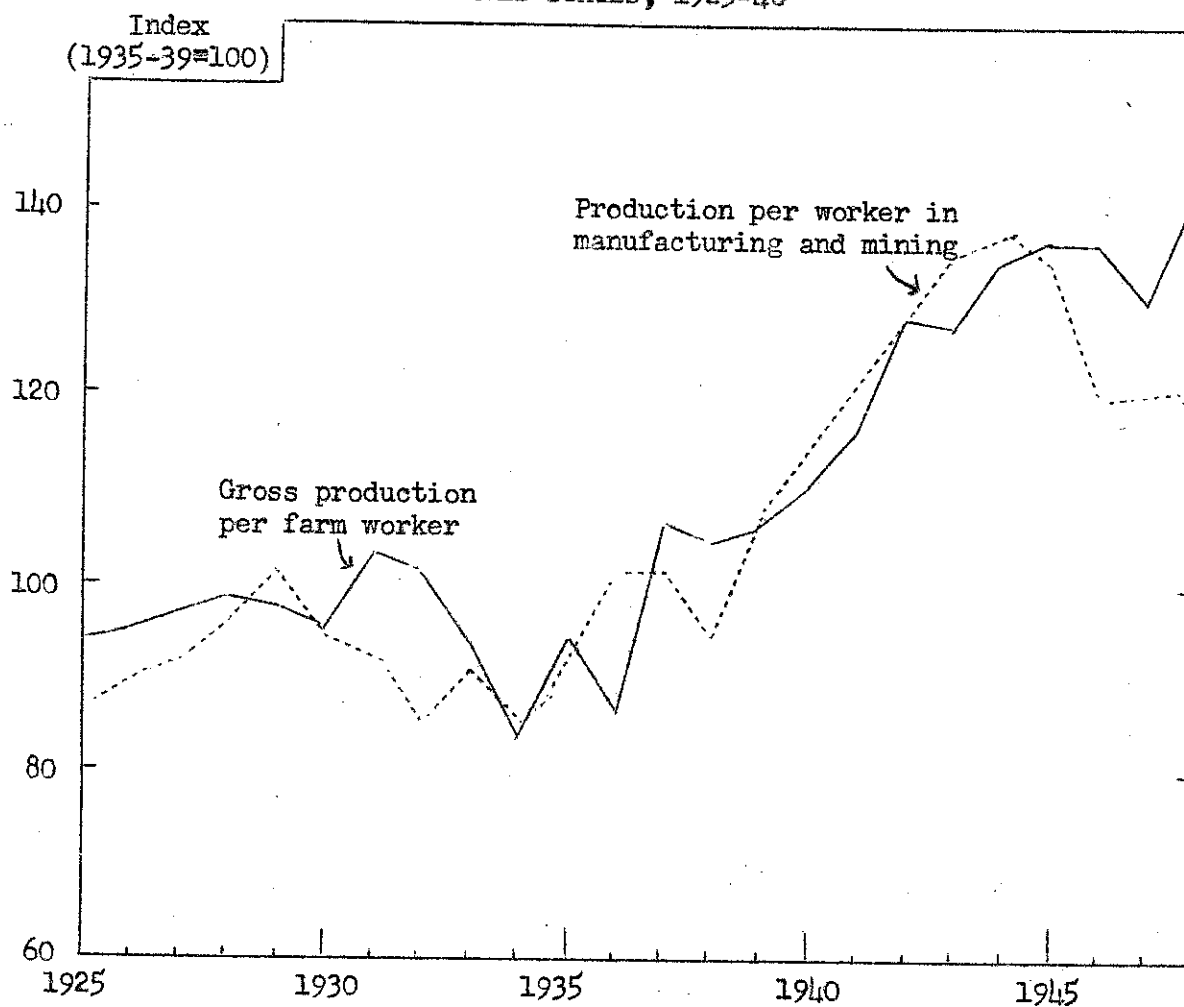


Source: A.E. 783, Agricultural Production in New York, M. C. Bond.

At the same time this change in production was taking place, New York farmers were becoming more efficient in the use of their labor. Although published data as to changes in efficiency of production are not available for New York State farms, comparisons of production per hour in manufacturing, mining, and agriculture for the United States indicate some of the changes which have occurred (Figure 2). Agriculture has at least kept pace with mining and manufacturing in output per worker. Although data are not available, it is likely that since World War II farm workers have increased their output faster than workers in most other industries.

Changes in efficiency on farms are the result of higher yields for crops and livestock, greater mechanization, enlargement and specialization of enterprises, and numerous other factors. Although increased labor efficiency has occurred for most enterprises, the increase has been greater for some than for others.

Figure 2. PRODUCTION PER WORKER IN MANUFACTURING AND MINING, AND AGRICULTURE  
UNITED STATES, 1925-48



Source: U.S.D.A. Misc. Pub. No. 707.

#### CHANGES IN MAN LABOR AND MECHANIZATION

New York Farm Cost Account records collected since 1914 show some of the changes in farming and their relation to the increased productivity on farms in the State.

##### Man Labor

The efficient use of labor is becoming more important as labor rates rise. The cost per hour of labor on New York Cost Account Farms increased from 25 cents in 1914 to 98 cents in 1950 (Figure 3). In 1939, the average cost was 30 cents. Since then, it has increased 226 per cent.

Figure 3. COST PER HOUR OF LABOR

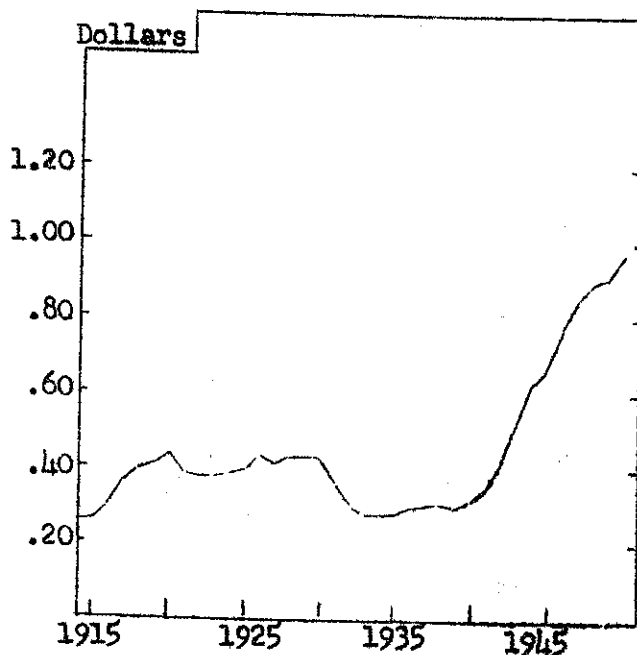
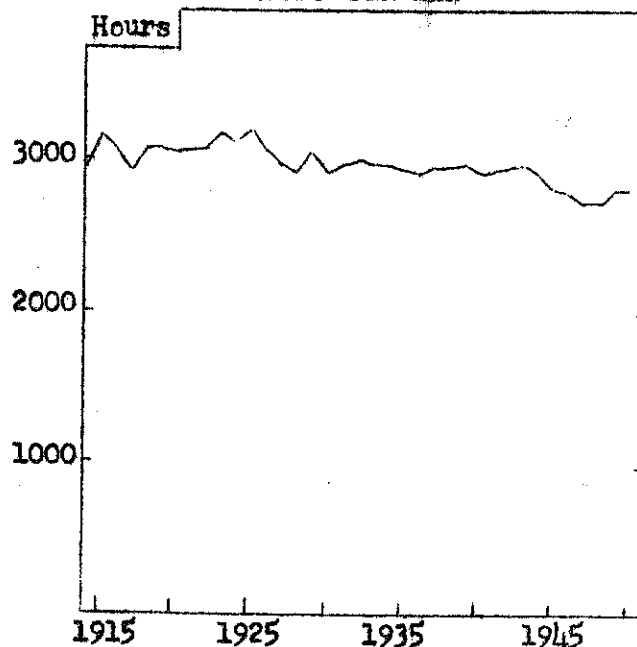


Figure 4. AVERAGE NUMBER OF HOURS WORKED PER MAN



A factor that increased the labor problem is the shorter work day for farmers and their help. The number of hours worked per man on Cost Account Farms has decreased by about 5 per cent in the last 20 years (Figure 4). The higher labor costs and shorter working days have been forced on farmers by the trends in labor costs and hours for industry.

One of the ways farmers have tried to meet the labor problem has been to mechanize.

### Equipment

#### Tractors

Very few tractors were found on farms prior to 1918. For instance, only 2 per cent of the Cost Account Farms had tractors in 1915 (Figure 5). After World War I the number increased rapidly with 50 per cent of the farms using tractors in 1925. Although a slight reduction occurred during the depression years, the general trend has been upward. Latest figures show that 98 per cent of the Cost Account Farms have tractors.

Tractors on these farms increased in number from practically none in 1915 to more than 2 per farm in the last two years (Figure 6).

Figure 5. PROPORTION OF FARMS WITH TRACTORS

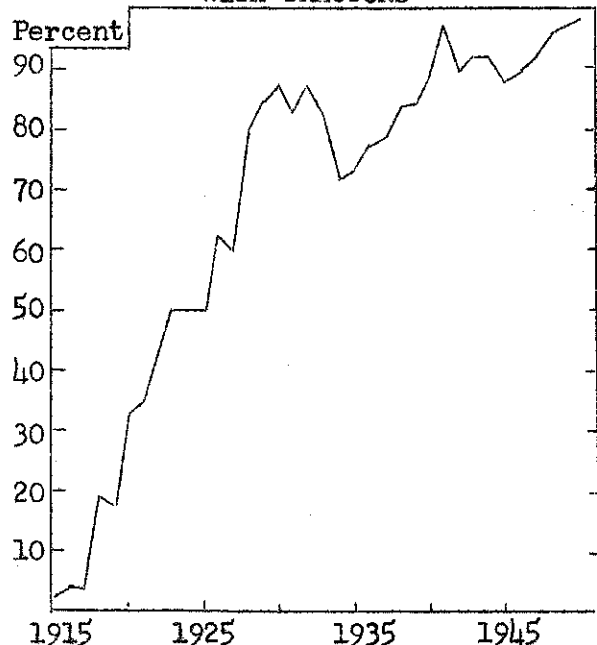
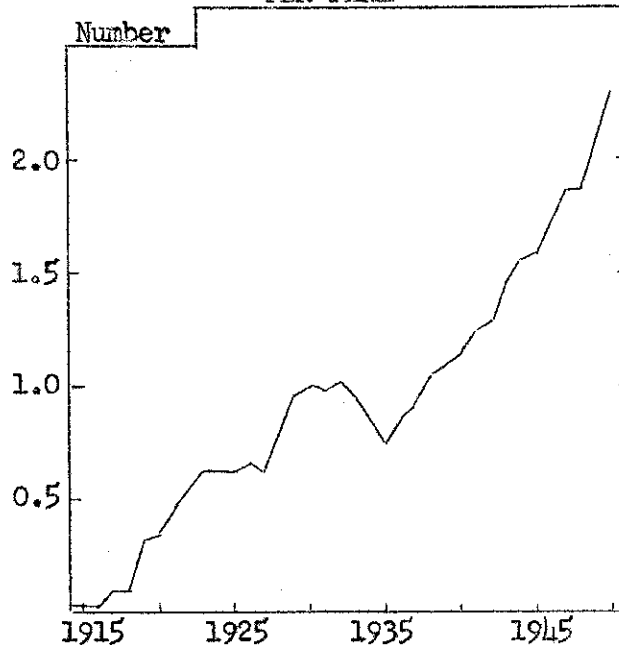
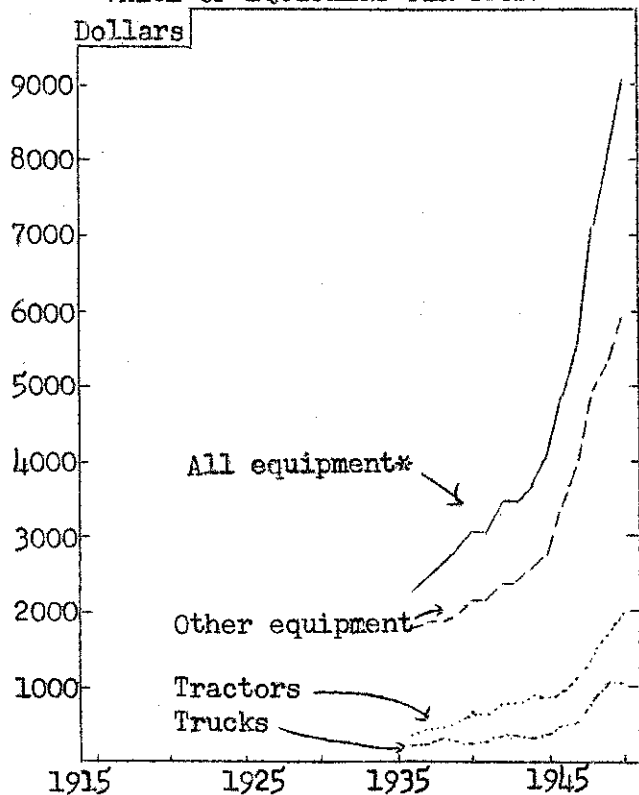


Figure 6. AVERAGE NUMBER OF TRACTORS PER FARM

Equipment investment and cost

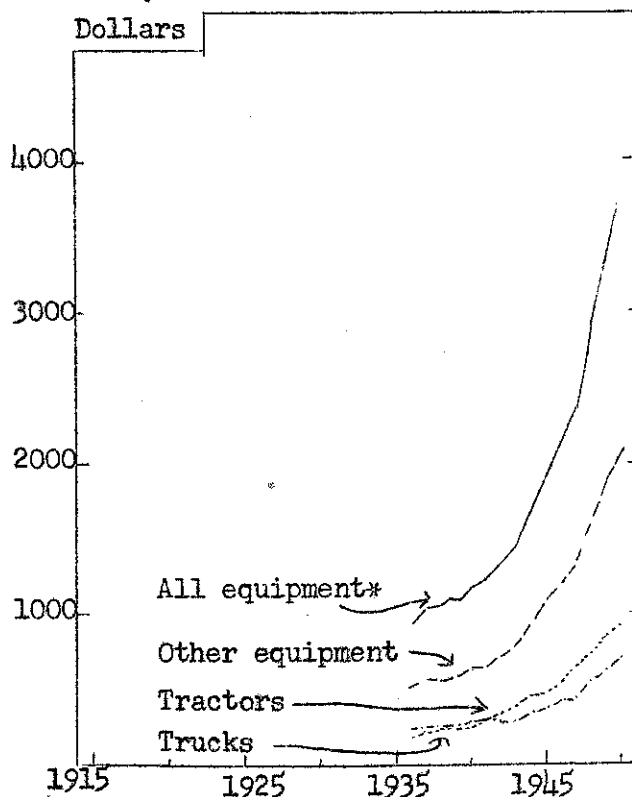
One measure of the degree of farm mechanization is the trend in machinery investment per farm. There has been a four-fold increase in the last 15 years.

Figure 7. AVERAGE BEGINNING INVENTORY VALUE OF EQUIPMENT PER FARM



\*Not including autos.

Figure 8. AVERAGE ANNUAL COST OF EQUIPMENT PER FARM



The beginning inventory value of equipment per farm averaged \$2,290 in 1936 but increased to \$9,049 by 1950 (Figure 7). Of this 1950 total value, 11 per cent was invested in trucks, 22 per cent in tractors, and 67 per cent in other equipment. The values do not include investment in autos.

The annual cost of equipment on the Cost Account Farms has increased from \$911 in 1936 to \$3,713 in 1950 (Figure 8). Again the increase is more than four-fold. Over the years the annual cost has amounted to about 40 per cent of the investment in equipment.

#### CHANGES IN OUTPUT PER MAN HOUR OF LABOR

The trend in output per hour of man labor has been upward for livestock and poultry products and crops, but little increased efficiency is evident for most fruits.

#### Livestock and Poultry Production

##### Milk

For the period 1914-18, an average of 43 pounds of milk was produced for each hour of labor spent on cows on New York Cost Account Farms (Figure 9). A moderate increase in the efficiency of milk production occurred up to 1937, but the most rapid change in efficiency of production occurred after 1937. By 1950, one hour of man labor produced 86 pounds of milk, double that produced in 1914.

Figure 9. POUNDS OF MILK PER HOUR OF LABOR

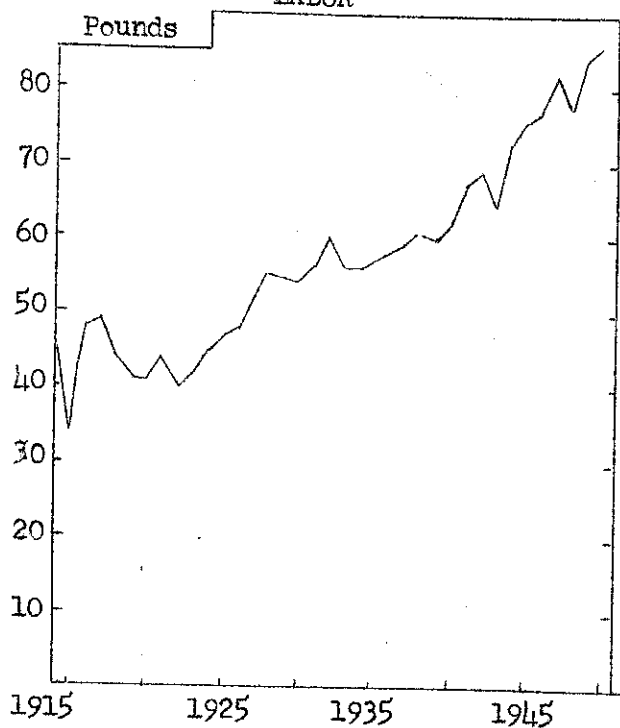
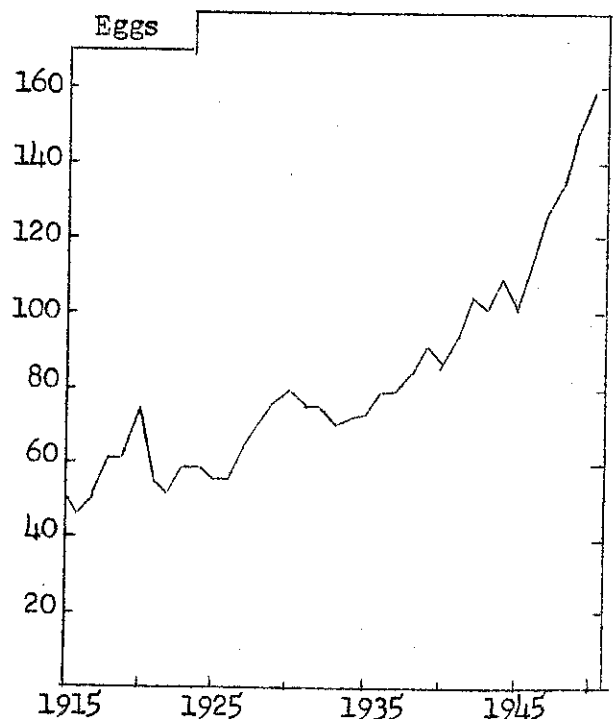


Figure 10. EGGS PER HOUR OF LABOR



This greater efficiency was due to a 43 per cent increase in the average milk production per cow and to a reduction of about 20 per cent of the hours of labor per cow.

### Eggs

Egg production per hen has more than doubled on the Cost Account Farms during the last 35 years. The production in 1950 was 190 eggs per hen. Farmers have been able to handle this increased production with very little change in the time required per hen. This has caused the output per hour of labor to increase from 50 to 150 eggs since 1915 (Figure 10).

### Crops

#### Roughage

Hay yields have increased by about one-half ton per acre on Cost Account Farms since 1914. Even with this increased yield, the number of man hours required per acre has decreased about 20 per cent. The combination of higher yields and reduced hours of labor per acre has resulted in an increase of about 220 per cent in the amount of hay produced per hour of labor (Figure 11). Very little change occurred during the 30's. The most rapid change was from 1940 to 1950.

Figure 11. TONS OF HAY PER HOUR OF LABOR

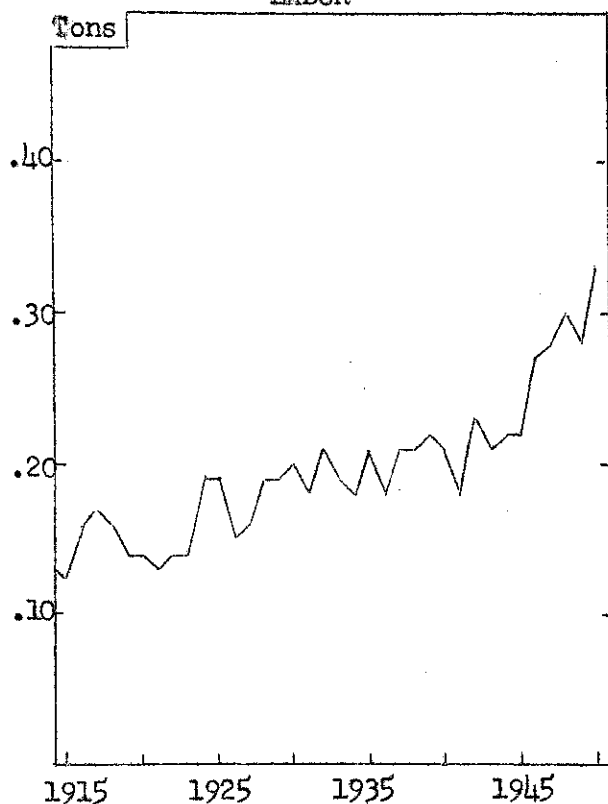
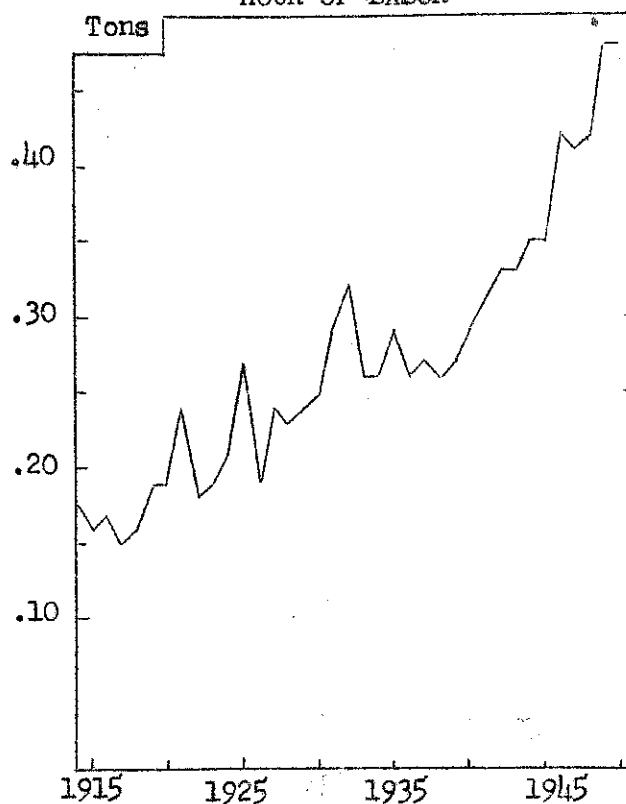


Figure 12. TONS OF CORN SILAGE PER HOUR OF LABOR



Corn silage yields have increased more than 50 per cent since 1914, while hours of labor per acre have decreased about 50 per cent. Again moderate increases in output per hour of labor occurred during the first 15 years of the Farm Cost Account history (Figure 12). Very little if any change in efficiency took place during the 30's, and the most rapid change occurred after 1940. Output per hour of labor has increased about 150 per cent over the entire period.

### Grain

Acre yields of most grains have changed only slightly on Cost Account Farms. Most of the increased output per hour of labor has been due to a reduction in the amount of labor required per acre.

Considerable year-to-year fluctuation has occurred in yields of wheat, oats, and barley which accounts for much of the annual variation in output per hour of labor.

Labor use per acre has been reduced more than 50 per cent for wheat even though a 20 per cent increase occurred in yields. This has resulted in an increase of 200 per cent in the output per hour of labor. Little change has occurred in oat yields, but man labor used per acre now is only half what it was on Cost Account Farms for the period 1914-18. The output per hour of labor has increased about 170 per cent (Figures 13 and 14).

Figure 13. BUSHELS OF WHEAT PER HOUR OF LABOR

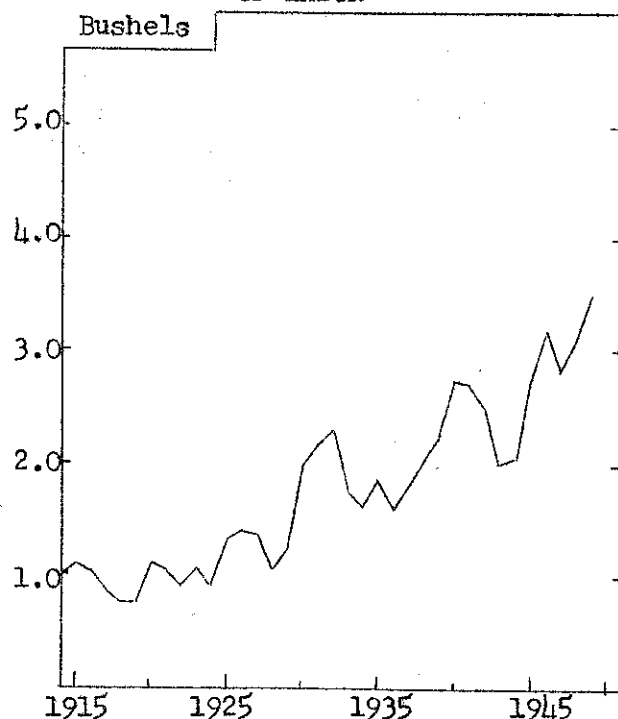
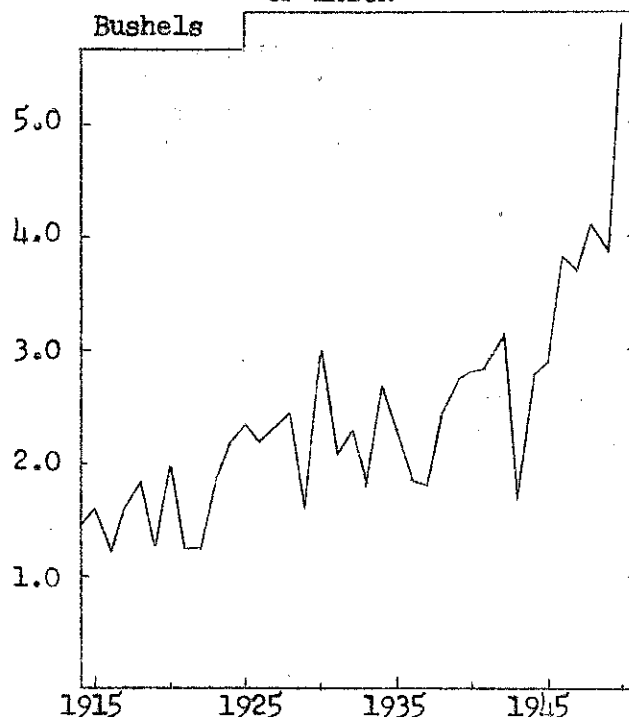


Figure 14. BUSHELS OF OATS PER HOUR OF LABOR



Barley yields have tended to decrease about 15 per cent over the years studied. Yet, only about one-third the time that was needed 35 years ago to produce an acre of barley is required now. Output per hour of labor has in-



creased about 150 per cent from the 1914-18 Cost Account average (Figure 15).

Figure 15. BUSHELS OF BARLEY PER HOUR OF LABOR

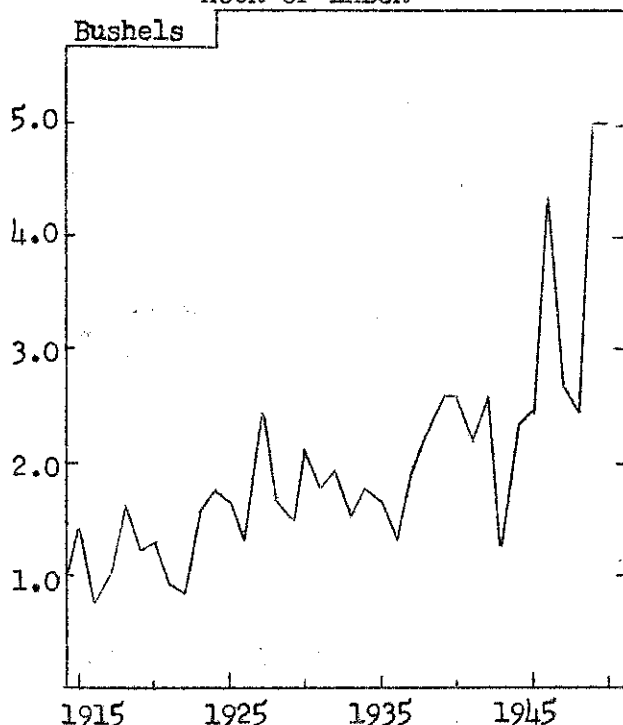
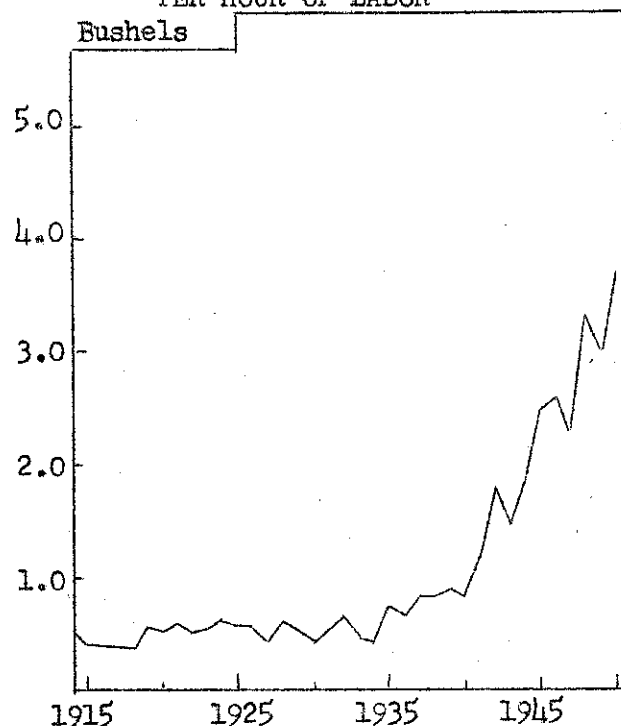


Figure 16. BUSHELS OF CORN FOR GRAIN PER HOUR OF LABOR



Yields of corn for grain have increased in recent years while the average amount of labor required per acre has been reduced. At present, about 75 per cent as much labor is required per acre as was used during the 1914-18 Cost Account period. Only slight changes occurred in efficiency of production before 1940. However, since then output per hour has increased more than 600 per cent (Figure 16).

#### Cash crops

Wide yearly variations in yield of potatoes, dry beans, cabbage, and canning factory tomatoes have caused output per hour to vary considerably from year-to-year.

Potato yields per acre have more than doubled while the amount of labor used per acre has changed little during the last 35 years. Output per man hour has increased more than 140 per cent (Figure 17).

Dry bean yields per acre have increased about 50 per cent, while labor requirements have decreased 25 per cent since the Farm Cost Account project was started. This has resulted in an increased output per hour of labor of more than 100 per cent (Figure 18).

Figure 17. BUSHEL OF POTATOES PER HOUR OF LABOR

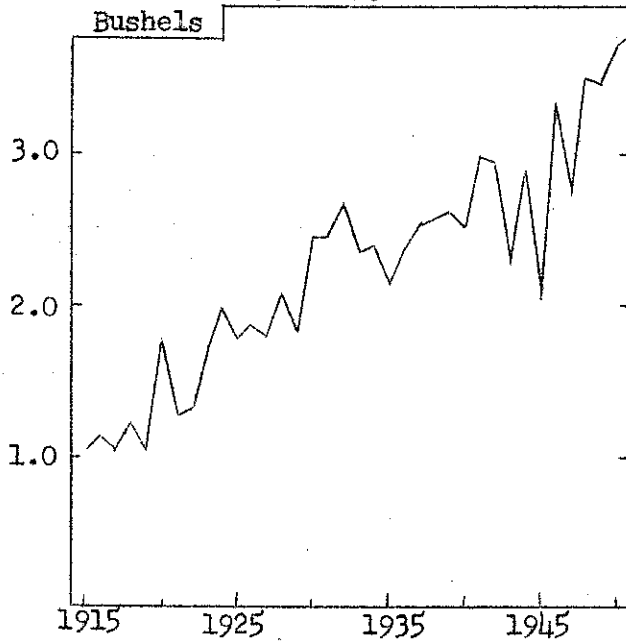
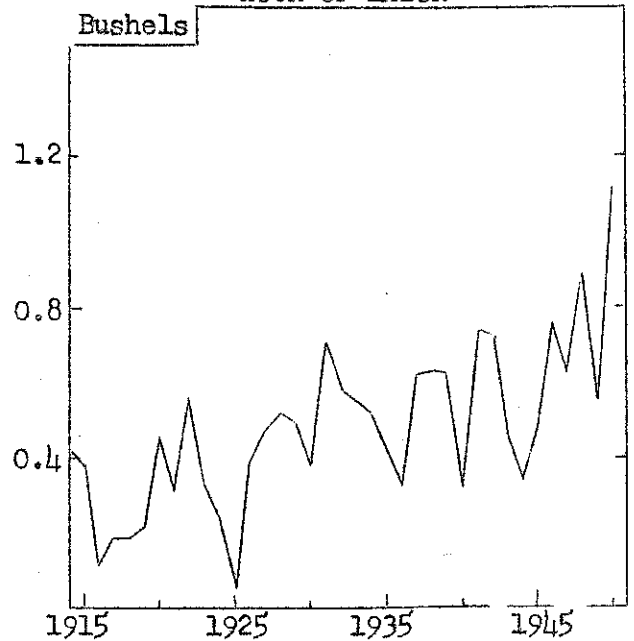


Figure 18. BUSHEL OF DRY BEANS PER HOUR OF LABOR



Cabbage yields have increased about one-half during the last 35 years (Figure 19). The amount of labor used has remained about constant. The trend in output per hour has been somewhat upward though it has fluctuated widely from year-to-year. Labor efficiency in the production of cabbage has not been improved to the extent that it has for many other crops. The efficiency in growing the crop has been improved. Harvesting, however, is still a hand operation and is done with little more efficiency than it was 35 years ago.

Figure 19. TONS OF CABBAGE PER HOUR OF LABOR

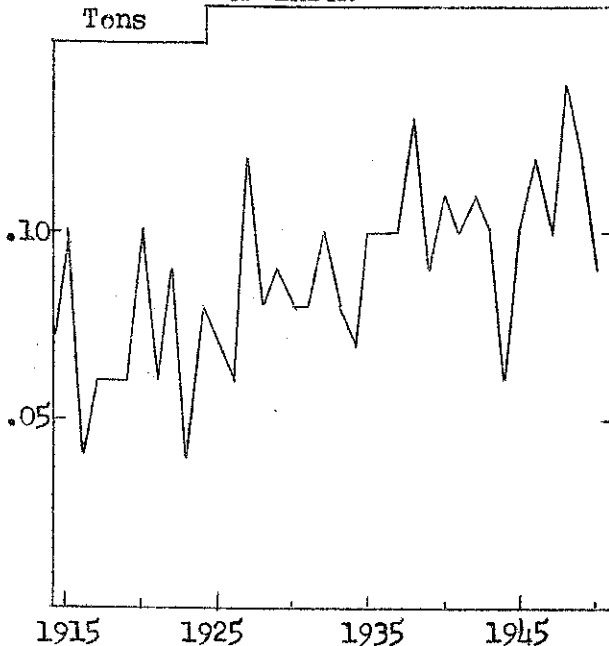
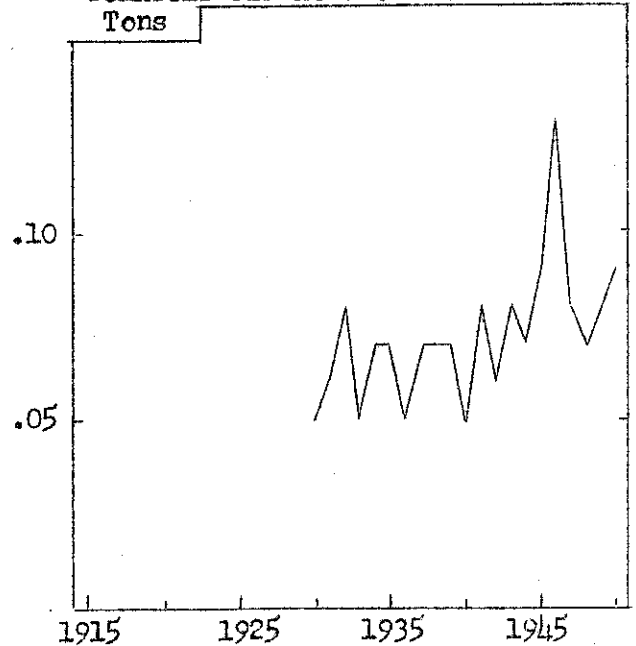


Figure 20. TONS OF CANNING-FACTORY TOMATOES PER HOUR OF LABOR



Canning-factory tomato yields have increased gradually from 7 to about 10 tons per acre since 1930. The amount of labor used per acre increased until the early 1940's when higher wage rates forced farmers to find ways to reduce the time spent on the crop. The average amount of labor used per acre was 114 hours for the period 1946-50.

The labor output per hour for 1946-50 period was about 50 per cent more than the 1930-33 average (Figure 20). This is a small increase compared to many of the other crops. Although labor efficiency in growing has been improved, the nature of the crop does not permit mechanization of harvesting.

### Fruit

With the exception of apples, the trend in output per hour of labor for most fruit has been downward on the Cost Account Farms since about 1940.

Apple yields have increased in recent years, but the amount of time spent on the crop is also high per acre with the result that output per hour is only about 50 per cent above that of the twenties (Figure 21).

Figure 21. BUSHELS OF APPLES PER HOUR OF LABOR

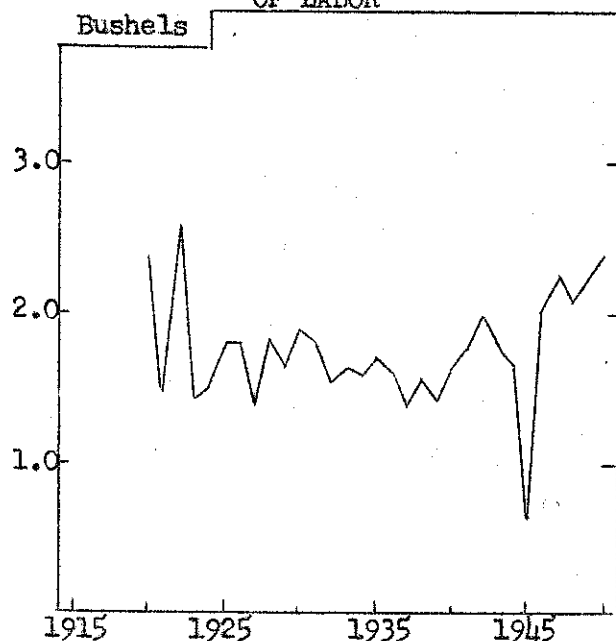
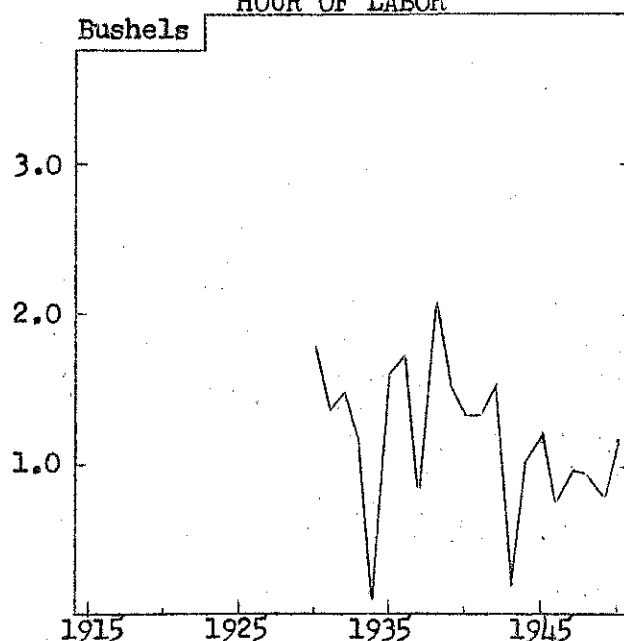


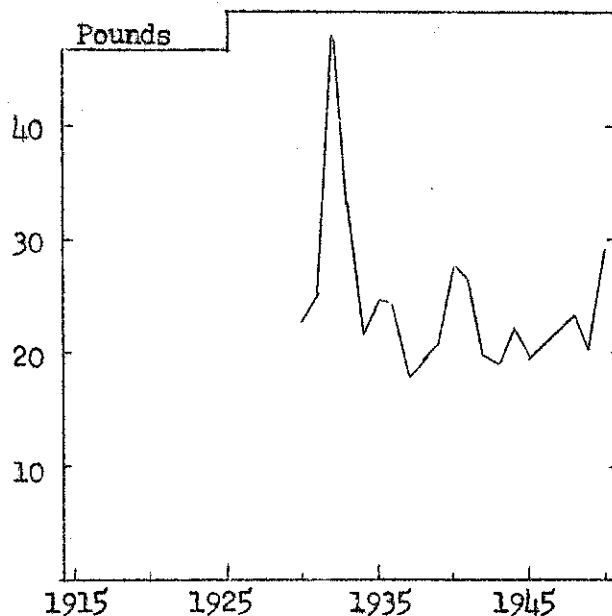
Figure 22. BUSHELS OF PEACHES PER HOUR OF LABOR



Peach yields on Cost Account Farms in recent years have been about 30 bushels per acre more than the 1930-33 averages. The number of hours of labor per acre has increased relatively causing reduced output per hour (Figure 22).

The cherry yields have not tended to increase in recent years, but the trend in the amount of labor used per acre has been somewhat upward. This has resulted in a slight reduction in labor output in producing cherries (Figure 23).

Figure 23. POUNDS OF CHERRIES PER HOUR OF LABOR



#### FACTORS AFFECTING PRODUCTION EFFICIENCY

##### Yield

The most important factor related to high production efficiency is yield per animal and per acre. The relationship is most apparent with crops requiring relatively few hours of labor per acre.

Oat accounts on 26 Cost Account Farms in 1949, when sorted on the basis of high and low yields, show that output efficiency, as measured by the number of bushels of oats produced per hour of labor on farms with high yields, is twice that for farms with low yields (Table 1). The same number of hours per acre was required to produce an acre of oats on the high yielding farms although twice as many oats were produced per acre. Furthermore, production costs did not increase in proportion to yields. The high yielding farms produced oats for \$1.19 less per bushel than those farms having low yields.

Table 1. RELATIONSHIP OF YIELDS OF LABOR PER ACRE AND PRODUCTION EFFICIENCY  
26 Oat Accounts, 1949

	Number of farms	Yield, bushels per acre	Hours per acre	Bushels produced per hour	Total cost per bushel
High yields	13	34	8	5.0	\$1.17
Low yields	13	18	8	2.6	2.36

When the corn for grain accounts were sorted by high and low yields, relationships similar to those for oats are shown (Table 2). Actually about 5 hours less time was required to grow and harvest grain corn on the farms having high yields per acre. A combination of high yields and fewer hours of labor per acre made it possible to produce 95 per cent more corn per hour of labor on the farms with low yields. The cost was \$1.20 per bushel less.

Table 2. RELATION OF YIELDS OF LABOR PER ACRE AND PRODUCTION EFFICIENCY  
19 Corn Grain Accounts, 1949

	Number of farms	Yield, bushels per acre	Hours per acre	Bushels produced per hour	Total cost per bushel
High yields	10	58	16	3.9	\$1.02
Low yields	9	30	21	2.0	2.22

When hay accounts on the Cost Account Farms were sorted by yields, it was found that 15 per cent more hay was produced per hour of labor on the high yielding farms than on the farms with low yields (Table 3). Although it required 3.4 more hours per acre to produce the higher yields, the total cost per ton was \$6, or 25 per cent, less than on the farms with low yields.

Table 3. RELATION OF HAY YIELDS TO HOUR PER ACRE AND PRODUCTION EFFICIENCY  
32 Hay Accounts, 1949

	Number of farms	Yield, tons per acre	Hours per acre	Tons produced per hour	Total cost per ton
High yields	16	2.5	8.8	.31	\$18
Low yields	16	1.3	5.4	.27	24

There was an average difference of 12 bushels per acre between the high and low yielding Cost Account Farms that grew wheat in 1949 (Table 4). It took the same amount of man labor, 10 hours, to grow and harvest the wheat on the high and the low yielding farms. Because of the higher yields, production per hour of labor was increased 35 per cent, and the total production cost of wheat was reduced \$0.41 per bushel.

Table 4. RELATION OF WHEAT YIELDS TO HOURS PER ACRE AND PRODUCTION EFFICIENCY  
23 Wheat Accounts, 1949

	Number of farms	Yield, bushels per acre	Hours per acre	Bushels produced per hour	Total cost per bushel
High yields	11	38	10	4.2	\$1.22
Low yields	12	26	10	3.1	1.63

For the apple accounts, when grouped by high and low yields, the same general relationship of yields to efficiency of production is evident. Nineteen more hours of labor were spent in growing each acre of apples on the high

yielding Cost Account Farms than on farms with low yields (Table 5). The high yielding farms averaged 220 more bushels of apples per acre than the average for the low yielding farms. These high yields resulted in 92 per cent greater output per hour and a unit cost of production which was 63 per cent less than Cost Account farms having low apple yields.

Table 5. RELATION OF APPLE YIELDS TO HOURS PER ACRE AND PRODUCTION EFFICIENCY  
16 Apple Accounts, 1949

	Number of farms	Yield, bushels per acre	Hours per acre to grow	Bushels produced per hour	Total cost per bushel
High yields	8	298	42	2.5	\$0.82
Low yields	8	78	23	1.3	2.20

#### Size of Enterprise

Highest production per hour of labor is usually found on farms growing large acreages of a given crop. On the Cost Account Farms in 1949, those farmers having 29 acres of oats per farm produced 0.5 bushels more per hour of labor than farmers growing only 12 acres (Table 6). One less hour of labor per acre was required for the farms with the large acreages and their yields were one bushel per acre higher. Unit costs of production were 4 per cent or \$0.09 per bushel less on large oat acreages than on the small.

Table 6. RELATION OF ACRES OF OATS PER FARM TO PRODUCTION EFFICIENCY  
26 Oat Accounts, 1949

	Number of farms	Acreage per farm	Bushels per acre	Hours of labor per acre	Bushels produced per hour	Total cost per bushel
Large acreage	13	29	27	7	4.0	\$1.72
Small acreage	13	12	26	8	3.5	\$1.81

On Cost Account Farms, 46 per cent more corn for grain was produced per hour of man labor on farms with large than on farms with small acreages (Table 7). This increased production efficiency on farms with the large acreages resulted from the 32 per cent higher yields and the 18 per cent fewer hours of man labor per acre. The higher yields, fewer hours and greater efficiency on the larger acreages resulted in unit costs which were 42 per cent less than on farms having small corn acreages.

Table 7. RELATION OF ACRES OF CORN PER FARM TO PRODUCTION EFFICIENCY  
19 Corn Grain Accounts, 1949

	Number of farms	Acreage per farm	Bushels per acre	Hours of labor per acre	Bushels produced per hour	Total cost per bushel
Large acreage	10	23	50	16	3.5	\$1.12
Small acreage	9	5	38	22	2.4	2.11

Greater output efficiency also accompanied larger acreages of hay on the Cost Account Farms in 1949 (Table 8). Although average acre yields of hay were lower on farms with the large acreages, the number of man hours required per acre was 37 per cent less. This smaller labor requirement more than offset the smaller yield with the result that the production per hour of man labor was 23 per cent greater on the farms with large hay acreages than those with small acreages. The higher yields on the small hay acreages were enough to offset the efficiency gained from size of enterprise and the total production costs per ton were the same for both groups of farms.

Table 8. RELATION OF ACRES OF HAY PER FARM TO PRODUCTION EFFICIENCY  
32 Hay Accounts, 1949

	Number of farms	Acreage per farm	Tons per acre	Hours of labor per acre	Tons produced per hour	Total cost per ton
Large acreage	16	62	1.7	5.5	.32	\$21
Small acreage	16	21	2.1	8.7	.26	21

Cost Account Farms having the large wheat acreage had average yields of 2 bushels less per acre than farms with smaller wheat acreages in 1949 (Table 9). In spite of the slightly smaller yields, the farms with large wheat acreages still had a labor production efficiency 12 per cent above farms with small acreages. This was due mainly to the 3 hours less labor used per acre on the farms with large wheat acreages. Production costs per bushel were 21 per cent less on these farms.

Table 9. RELATION OF ACRES OF WHEAT PER FARM TO PRODUCTION EFFICIENCY  
23 Wheat Accounts, 1949

	Number of farms	Acreage per farm	Bushels per acre	Hours of labor per acre	Bushels produced per hour	Total cost per bushel
Large acreage	11	38	30	8	3.9	\$1.26
Small acreage	12	14	32	11	3.4	1.59

There were 65 acres difference between the averages for the large and small apple accounts studied (Table 10). On the 8 Cost Account Farms with large apple acreages, yields were over 200 per cent greater, production efficiency was 53 per cent more, and unit costs were 21 per cent less although 17 more hours of labor were used per acre.

Table 10. RELATION OF ACRES OF APPLES\* PER FARM TO PRODUCTION EFFICIENCY  
16 Apple Accounts, 1949

	Number of farms	Acreage per farm	Bushels per acre	Hours labor per acre to grow	Bushels produced per hour	Total cost per bushel
Large acreage	8	83	282	41	2.3	\$1.10
Small acreage	8	18	93	24	1.5	1.91

\*Orchard of bearing age only.

### Amount of Labor Used

Although the number of hours of man labor required per acre is influenced by yields, size, and mechanization, there are still other factors which influence the efficiency of the use of man labor. Some of these are work methods, size and location of fields, building location and arrangement, and combination of enterprises. The number of hours of labor used per acre not only measures the effect by size, yields, and mechanization, but also the effect of some of the other factors.

When the oat accounts on the 26 Cost Account Farms in 1949 were sorted by the number of hours of labor per acre, farms which used large amounts of labor had higher yields, smaller acreages, and lower production per hour of labor than farms which had low labor use (Table 11). Oat yields did not increase proportional to the amount of labor used per acre. The average cost per bushel was lowest on the farms with the highest labor use. This is different than would normally be expected and is due to the unusually low yields in 1949. The results emphasize the importance of yields in affecting output efficiency.

Table 11. RELATION OF HOURS OF MAN LABOR PER ACRE TO PRODUCTION EFFICIENCY  
26 Oat Accounts, 1949

Amount of labor used	Number of farms	Man hours per acre	Acres of oats per farm	Bushels per acre	Bushels produced per hour	Total cost per bushel
Low	13	5.6	22	25	4.6	\$1.83
High	13	9.5	18	28	3.0	1.71

For the 19 corn grain accounts, there was a difference of 15.2 hours of labor between Cost Account Farms in the high and the low groups when sorted by the amount of labor used per acre (Table 12). The farms that used the most labor also had higher yields. Even though the acre yields were greater on the farms using the most labor per acre, their production per hour of labor was 27 per cent less than on Cost Account Farms where smaller amounts of labor were used. The cost per bushel of corn was about 16 per cent less on those Cost Account Farms where the least labor was used per acre.

Table 12. RELATION OF HOURS OF MAN LABOR PER ACRE TO PRODUCTION EFFICIENCY  
19 Corn Grain Accounts, 1949

Amount of labor used	Number of farms	Man hours per acre	Acres of corn per farm	Bushels per acre	Bushels produced per hour	Total cost per bushel
Low	9	10.8	19	40	3.6	\$1.44
High	10	26.0	10	48	2.4	1.72

The hay accounts in 1949, when grouped by hours of man labor per acre, showed that high labor use was associated with smaller acreages and larger yields than for farms where small amounts of labor were used. The hay production per hour of man labor was 50 per cent greater on farms having the low labor use per acre than on those with high labor use. The cost per ton was \$2 less (Table 13).



Table 13. RELATION OF HOURS OF MAN LABOR PER ACRE TO PRODUCTION EFFICIENCY  
32 Hay Accounts, 1949

Amount of labor used	Number of farms	Man hours per acre	Acres of hay per farm	Tons per acre	Tons produced per hour	Total cost per ton
Low	16	4.8	56	1.6	.35	\$20
High	16	9.4	27	2.2	.23	22

The farmers who used the most labor per acre of wheat had the smallest wheat acreages per farm and produced 36 per cent less grain per hour of labor (Table 14). There was little difference in yield per acre between this group and those who used less labor. Wheat was produced \$0.36 per bushel cheaper on the latter group of farms.

Table 14. RELATION OF HOURS OF LABOR PER ACRE TO PRODUCTION EFFICIENCY  
23 Wheat Accounts, 1949

Amount of labor used	Number of farms	Man hours per acre	Acres of wheat per farm	Bushels per acre	Bushels produced per hour	Total cost per bushel
Low	12	7.5	30	31	4.4	\$1.26
High	11	12.5	20	32	2.8	1.62

The increase in apple yields was more than proportional to the increase in labor requirements per acre on Cost Account Farms in 1949 (Table 15). Those farms using large amounts of labor per acre also had much larger acreages, higher yields, and greater production per hour of man labor than farms using small amounts of labor. In the low labor requirement group, the average cost per bushel was 7 per cent less than those Cost Account Farms where high amounts of labor were used per acre.

Table 15. RELATION OF HOURS OF LABOR PER ACRE FOR GROWING PRODUCTION EFFICIENCY  
16 Apple Accounts, 1949

Amount of labor used	Number of farms	Man hours of labor to grow	Acres of apples per farm	Bushels per acre	Bushels produced per hour	Total cost per bushel
Low	8	20	36	109	1.7	\$1.45
High	8	45	65	266	2.1	1.56

### Mechanization

The use of more and better power and machinery has been another factor causing increased production per hour of man labor. Although the degree of mechanization from a farm is difficult to measure, the relation of annual equipment costs to labor costs per acre on a crop will give an EQUIPMENT INDEX which will measure to some extent the degree of mechanization.

For example, when the 26 oat accounts were sorted by this index, the more highly mechanized farms spent 27 per cent less time per acre and produced 38

per cent more oats per hour of man labor than did the less mechanized farms (Table 16). There was no significant difference in the yields or in the acreage of oats grown per farm between the two groups. On the more highly mechanized Cost Account Farms, oats were produced for \$0.10 more per bushel than on the less mechanized oat enterprises. The higher unit costs for the farms with high EQUIPMENT INDEXES were caused by the low average and the great variability in yields in 1949. The low yields did not permit the farmers with highly mechanized enterprises to spread their costs enough to gain an advantage.

Table 16. RELATION OF MECHANIZATION TO PRODUCTION EFFICIENCY  
26 Oat Accounts, 1949

Degree of mechanization	Number of farms	Equipment index	Acres per farm	Bushels per acre	Hours per acre	Bushels produced per hour	Total cost per bushel
High	13	2.1	21	26	6.4	4.4	\$1.82
Low	13	1.1	20	27	8.8	3.2	1.72

The effect of the use of machinery on the amount of hay produced per hour of man labor is shown on New York Cost Account Farms when the hay accounts were grouped by the degree of mechanization. The more highly mechanized hay enterprises had larger hay acreages and high yields per acre. They produced 68 per cent more hay per hour of labor than did the less mechanized hay enterprises in 1949 (Table 17).

Table 17. RELATION OF MECHANIZATION TO PRODUCTION EFFICIENCY  
30 Hay Accounts, 1949

Degree of mechanization	Number of farms	Equipment index	Acres per farm	Tons per acre	Hours per acre	Tons produced per hour	Total cost per ton
High	15	1.9	48	2.0	5.5	.37	\$20
Low	15	0.7	38	1.8	8.1	.22	\$23

The amount of man labor used to produce hay on the highly mechanized enterprises was 32 per cent less than the labor used on the farms with lower EQUIPMENT INDEXES. The total production cost was \$3 less per ton on the Cost Account Farms whose hay enterprises were the most highly mechanized. This represents a reduction of 13 per cent in the cost per ton when compared to the costs of the farms whose hay enterprises were in the low group when sorted by degree of mechanization.

When wheat enterprises on Cost Account Farms were grouped by degree of mechanization, there was very little difference in the other related factors (Table 18). The acres of wheat per farm were about the same. There was only one bushel per acre difference in the yield and no difference in the amount of labor used per acre. The cost per bushel was the same, and the amount of wheat produced per hour of labor was about the same. The fact that the results were the same when the farms were sorted by high and low EQUIPMENT INDEXES indicates that either both groups are sufficiently mechanized in wheat production or those farms in the high group have extended their machinery purchases beyond the

point of diminishing returns.

Table 18. RELATION OF MECHANIZATION TO PRODUCTION EFFICIENCY  
23 Wheat Accounts, 1949

Degree of mechanization	Number of farms	Equipment index	Acres per farm	Bushels per acre	Hours per acre	Bushels produced per hour	Total cost per bushel
High	11	2.1	26	31	10	3.6	\$1.43
Low	12	1.1	25	32	10	3.7	1.43

On the more highly mechanized corn for grain enterprises of the 1949 New York Cost Account Farms, only about 13 hours of man labor were spent per acre compared to 25 hours per acre on those farms using less machinery (Table 19). Highly mechanized farms had twice as many acres of corn grain as the less mechanized farms.

Table 19. RELATION OF MECHANIZATION TO LABOR PRODUCTION EFFICIENCY  
19 Corn For Grain Enterprises, 1949

Degree of mechanization	Number of farms	Equipment index	Acres per farm	Bushels per acre	Hours per acre	Bushels produced per hour	Total cost per bushel
High	10	1.4	20	44	13	3.6	\$1.44
Low	9	0.6	8	45	25	2.3	1.75

Although acre yield of corn for grain averaged one bushel less on the more highly mechanized enterprises, the man labor used per acre was reduced enough so that output per hour of man labor was 23 per cent greater compared to those enterprises where less machinery was used. Corn for grain was produced \$0.31 per bushel cheaper on the farms with high EQUIPMENT INDEXES than on those with lower INDEXES.

The effect of mechanization upon output efficiency is most noticeable during transition periods. In 1946, there were 6 Cost Account farmers who picked their corn by hand and 15 who used machines. The latter produced 3.3 bushels per hour of labor compared to 1.5 for the former (Table 20). There was little difference in the size of enterprise or yield per acre for the two groups of farms.

Table 20. RELATION OF MECHANIZATION TO OUTPUT EFFICIENCY  
21 Corn For Grain Enterprises, 1946

Method of harvest	Number of farms	Acres per farm	Bushels per acre	Hours per acre	Bushels produced per hour	Total cost per bushel
Machine picked	15	16	39	12	3.3	\$0.97
Hand picked	6	13	38	25	1.5	1.59

## SUMMARY

1. In recent years farmers have more than kept pace with manufacturing and mining in increasing the efficiency of production of labor.
2. Farm wages are three times as high as in 1939. Farmers have tried to offset higher labor costs by purchasing machinery to take the place of labor.
3. Annual equipment costs per farm, a measure of the degree of mechanization, have increased more than four-fold since 1939 and amount to about 40 per cent of the inventory value of the equipment.
4. Output per hour of labor has increased more than 100 per cent for milk, eggs, and hay. About two and one-half times the amount of grain and potatoes are being produced per hour of labor now compared to 35 years ago. Cabbage and tomatoes have shown smaller increases in output per hour of labor than most other crops.
5. Apple output per hour of labor has increased while output efficiency of other fruits, such as cherries, peaches, and pears has decreased.
6. Yields are the most important factor affecting output efficiency. High yields will generally result in high output per man hour and low cost per unit, but low yields very seldom will.
7. Size of enterprise and other factors also are important in their effect on labor output efficiency.
8. Mechanization is another factor affecting output per hour of labor. The effect of mechanization upon output efficiency is most noticeable during transitional periods when some farmers are using a particular labor saving machine and others are not.