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THE ECONOMICS OF PRODUCING CORN GRAIN IN NEW YORK STATE

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IN

NEW YORK STATE

Of 4.3 million acres of cropland harvested in New York State in 1970, 279 thousand, or about 6 percent, were in corn grain (Table 1). Hay, corn silage, and oats each occupied more land. By far the largest cropland acreage was in hay.

Table 1. CROP ACRES HARVESTED
New York State, 1970

Crop	Acres (000)
Hay	2,652
Corn silage	543
Oats	358
Corn grain	279
Wheat	153
Other small grains	29
Other crops	291
Total	4,305

Much of the corn harvested for grain in New York is in a sense a by-product for the dairy farm. A farmer, in order to assure himself of enough silage to fill his silos and feed his cows through the winter, will plant extra corn acreage and plan to harvest some as grain. In an adverse year he has enough silage, and in a favorable year he has corn left for grain. This accounts for some of the variability from year to year in acreage and total corn production.

In a few areas of the State farmers grow corn grain as a cash crop.

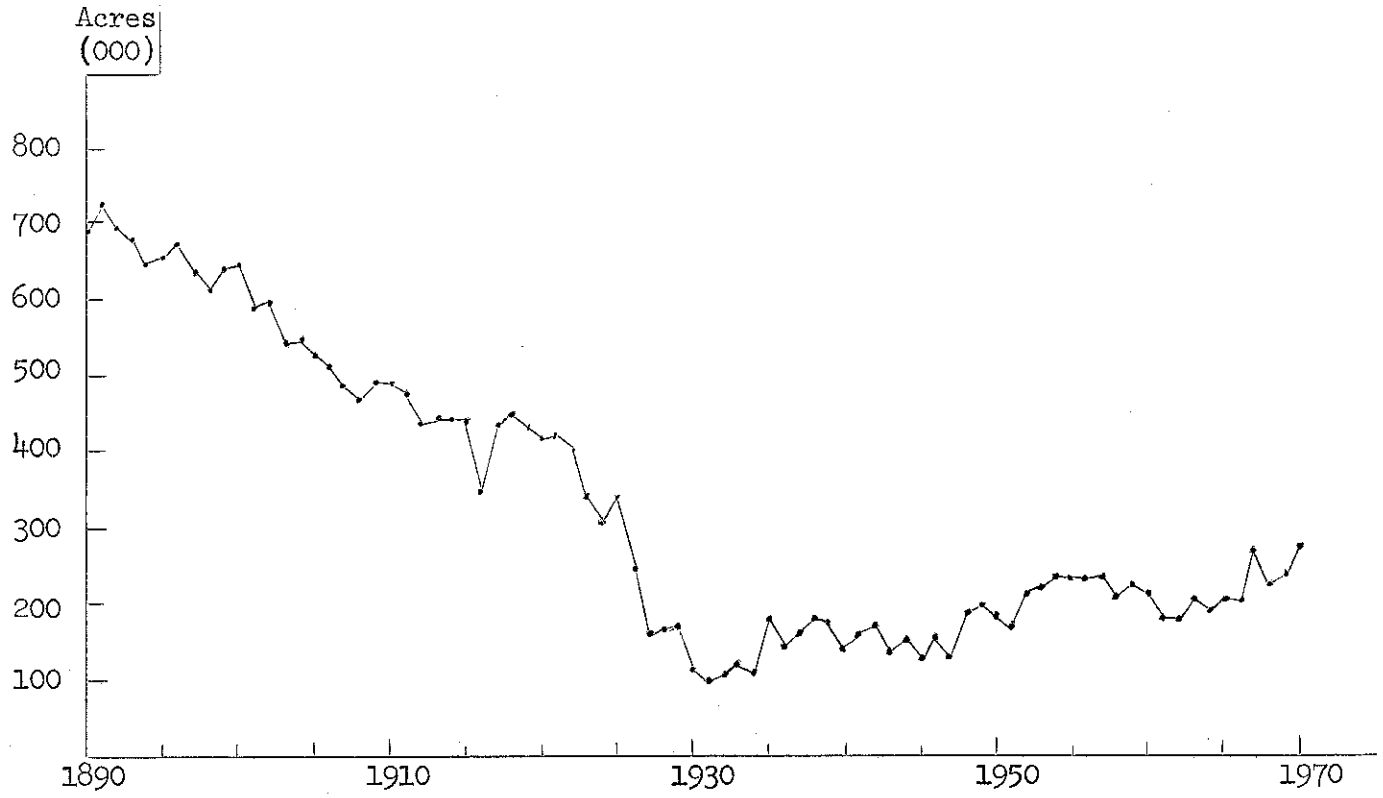
TRENDS IN PRODUCTION

The following graphs show the trends in acreage, yield and total production of corn grain in New York State from 1890 to date.

Acreage

The acreage devoted to the crop in New York is about one-third as great today as it was 80 years ago (Figure 1). Following a decline for the forty years up to 1930, there has been an increase in acreage. Although, by corn-belt acreages (Iowa 9,990,000, Illinois 10,066,000, Indiana 5,027,000) the New York acreage of 279,000 in 1970 was small, it has trebled in the last forty years.

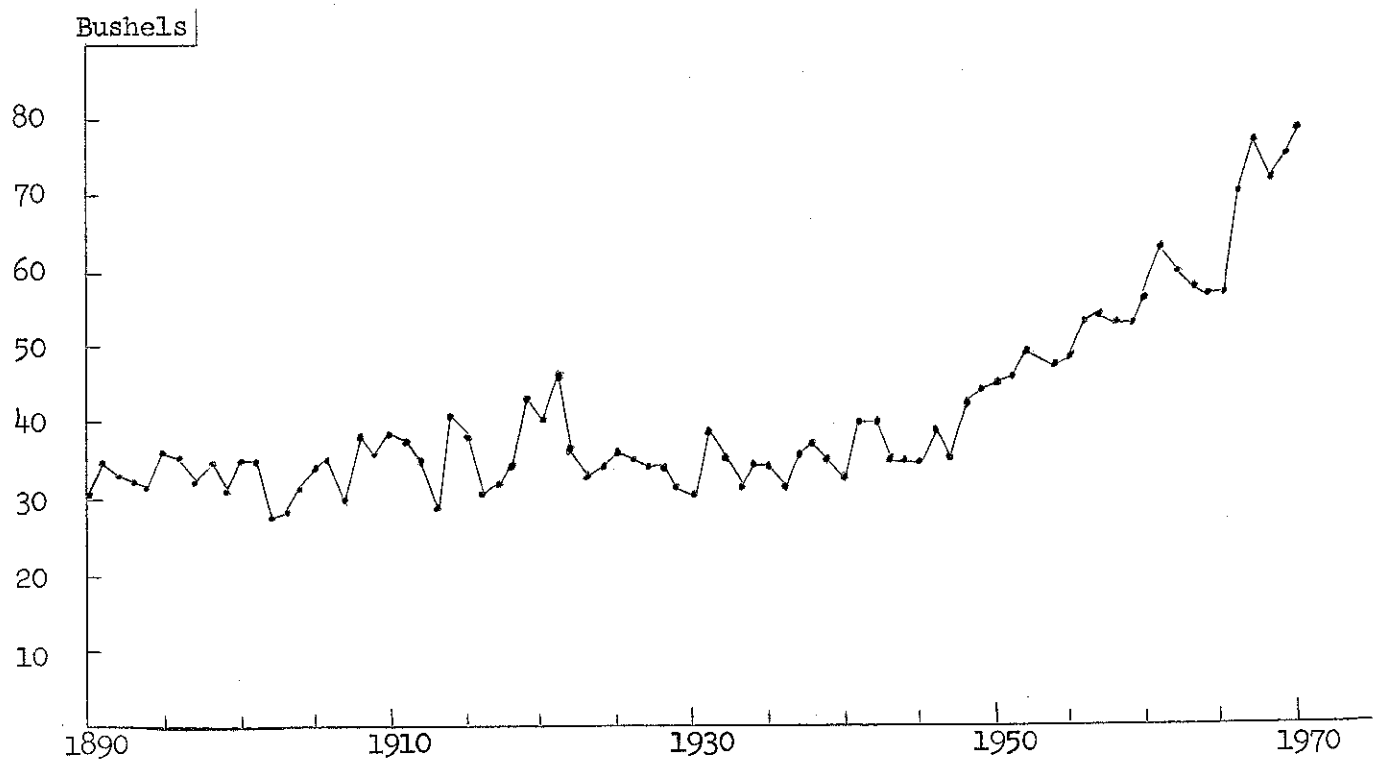
Figure 1. ACRES OF CORN FOR GRAIN HARVESTED
New York, 1890-1970



Yield

Again, by corn-belt standards, New York yields of corn grain are not outstanding, they were stable at about 35 bushels per acre for many, many years (Figure 2). Although hybrid corn varieties were available before World War II, it was not until the end of the War that these and the increased use of fertilizer had an impact on New York corn yields. More recently the use of herbicides with reduced cultivation and other favorable practices have been adopted and corn grain yields have about doubled. Better production practices and a favorable year resulted in the 79 bushels per acre yield in 1970.

Figure 2. YIELD OF CORN FOR GRAIN PER ACRE
New York, 1890-1970



The doubling of yields, however, has not helped the New York competitive situation. The corn-belt states likewise have had a doubling of yields and, since they started from a higher level, the absolute differences were greater in 1969. Thus, New York farmers were relatively worse off than they were 45 years earlier (Table 2). The yields in 1970 favored New York farmers but this relationship was due to disease problems in the corn-belt and will not likely last.

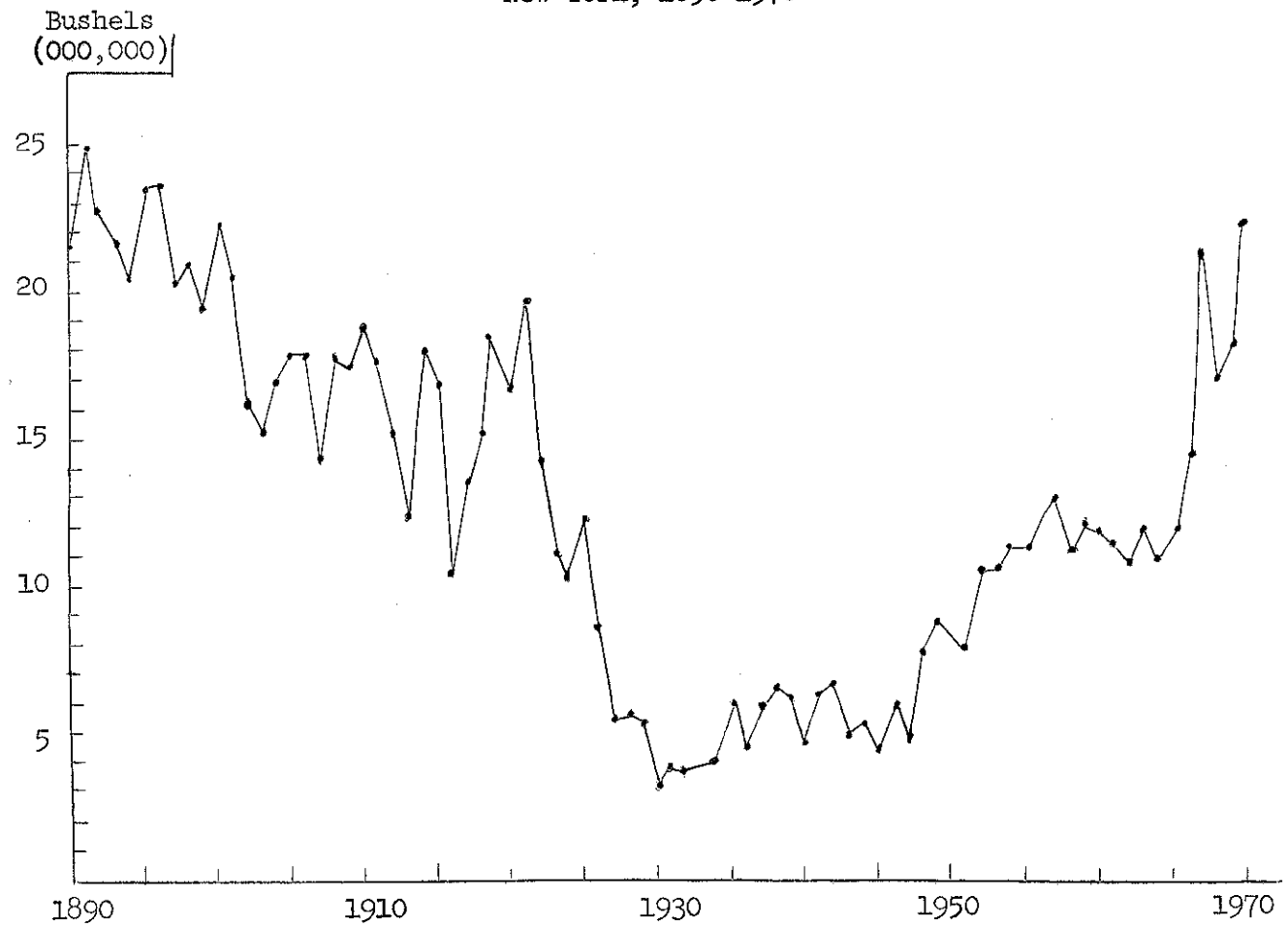
Table 2. CHANGES IN CORN GRAIN YIELDS IN NEW YORK AND ILLINOIS 1925, 1950, 1960, 1969

Year	Average Yield		Difference
	New York	Illinois	
1925	36	41	5
1950	45	51	6
1960	54	68	14
1969	75	98	23
1970	79	74	- 5
Increase 1925 to 1969	39	57	18

Grain Production

The rapid reduction in acreage without a compensating increase in yields caused a decrease in corn production from 1890 to 1930 (Figure 3). The higher yields coupled with increased acreage have resulted in total corn grain production in the State which now almost approximates that of 80 years ago.

Figure 3. BUSHELS OF CORN FOR GRAIN PRODUCED
New York, 1890-1970



COMPARISON WITH CORN BELT STATES

That New York State is not a "corn grain" state is reflected in the number of acres devoted to the crop, the crop yields per acre and the total production. The farmers in the seven states --- Ohio, Indiana, Illinois, Minnesota, Iowa, Missouri and Nebraska --- grow about 70 percent of the acreage of the United States (Table 3). The New York acreage is only four-tenths of one percent of the total.

Table 3. CORN GRAIN ACREAGE AND YIELDS
Selected States
1958-70

State	Acres Harvested			Yield per Acre		
	1958-62	1969	1970	1958-62	1969	1970
		(000)			-bushels-	
Ohio	3,019	2,740	3,014	68.1	85.0	77.0
Indiana	4,593	4,742	5,027	69.9	96.0	74.0
Illinois	8,895	9,698	10,066	72.8	98.0	74.0
Minnesota	5,261	4,139	4,594	56.9	85.0	85.0
Iowa	10,768	9,514	9,990	69.4	98.0	86.0
Missouri	3,424	2,603	2,837	55.8	70.0	61.0
Nebraska	5,768	4,620	4,897	52.6	93.0	75.0
New York	203	247	279	57.9	75.0	79.0
United States	64,469	54,598	57,359	57.3	83.9	71.7

Adapted from: Crop Production, 1970 Annual Summary, USDA, Statistical Reporting Service, Crop Reporting Board, December 18, 1970, CR-PR2-1 (70).

In most years farmers in Illinois and Iowa, the two leading corn states, produce about 50 times as much corn as do New York farmers (Table 4). Even the annual variation in production of corn in these states exceeds the total New York corn grain crop by several times. Under these circumstances the production conditions in corn-belt states have much more effect on the supply and price of corn in the New York State than does the whole crop grown in the state.

Table 4. CORN GRAIN PRODUCTION
Selected States
1958-70

State	Production		
	1958-62	1969	1970
	- 1,000,000 bushels -		
Ohio	204	233	232
Indiana	320	455	372
Illinois	644	950	745
Minnesota	297	352	390
Iowa	743	932	859
Missouri	190	182	173
Nebraska	301	430	367
New York	12	19	22
United States	3,670	4,583	4,110

Adapted from: Crop Production, 1970 Annual Summary, USDA, Statistical Reporting Service, Crop Reporting Board, December 18, 1970, CR-PR2-1 (70).

The corn yields of the corn-belt states generally are much above those of New York. This was the case in 1969. In 1970 the corn blight "hit" the southern states and extended up into the corn-belt. Yields were bad in all of the states except those in the northern part of the country. The corn-belt states generally had yields below the more northerly states. This advantage will only persist until seed from resistant varieties is widely available.

Although "cost of production" data are not generally available, such information as can be found indicates that costs per acre in the corn-belt probably are not too different from those in New York except where yields are very low (Table 5). Although prices in the corn-belt are 15 to 20 cents lower than in New York, yields are enough higher so that profits are more likely in most mid-west states than in New York.

Table 5. COSTS IN GROWING CORN GRAIN
New York and Illinois, 1960, 1965, 1967

Item	New York*			Illinois**		
	1960	1965	1967	1960	1965	1967
Number of farms	20	8	15	39	35	NA
Acres per farm	42	111	76	178	236	NA
Yield per acre	60	45	80	98	115	NA
Per acre						
Returns	$71	$59	$93	$98	$137	NA
Cost	76	89	94	77	102	NA
Profit	-$ 5	-$30	-$ 1	$21	$ 35	NA
Per bushel						
Returns	$1.20	$1.28	$1.16	$1.00	$1.19	NA
Cost	1.28	1.94	1.17	0.79	0.89	NA
Profit	-$0.08	-$0.66	-$0.01	$0.21	$0.30	NA

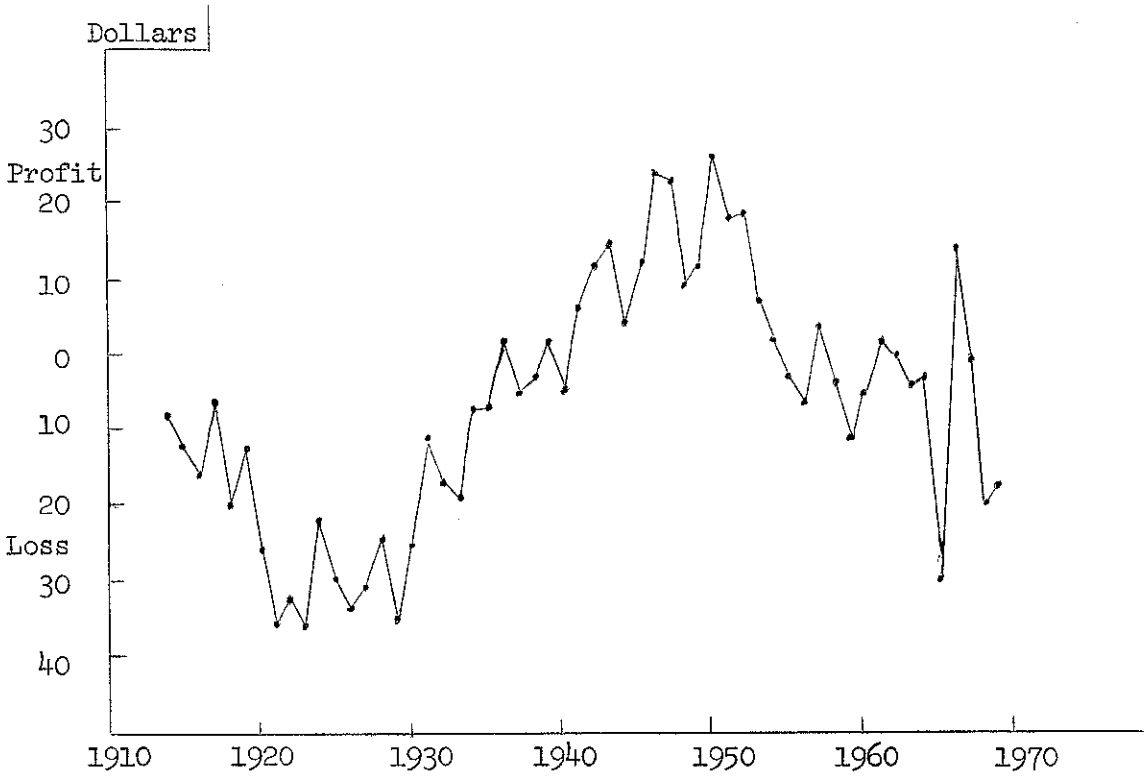
* From New York Farm Cost Account Reports.

** From Detailed Cost Report for Central Illinois, 1960 and 1967 Department of Agricultural Economics, University of Illinois.

NEW YORK COSTS AND PROFITS

Before 1941 corn grain was quite unprofitable on Cost Account Farms in New York State. On the average, it was a losing enterprise on the Cost Account Farms in every year between 1914 and 1941 except 1936 and 1939. Those years showed a profit of only $2 per acre (Figure 4). From 1929 until 1950 there was a trend of improved profits, but since 1950 the trend has been downward. In each of the war and post war years from 1941 until 1954 the enterprise showed a profit on the Cost Account Farms. Since 1954 the crop has been profitable in only three years.

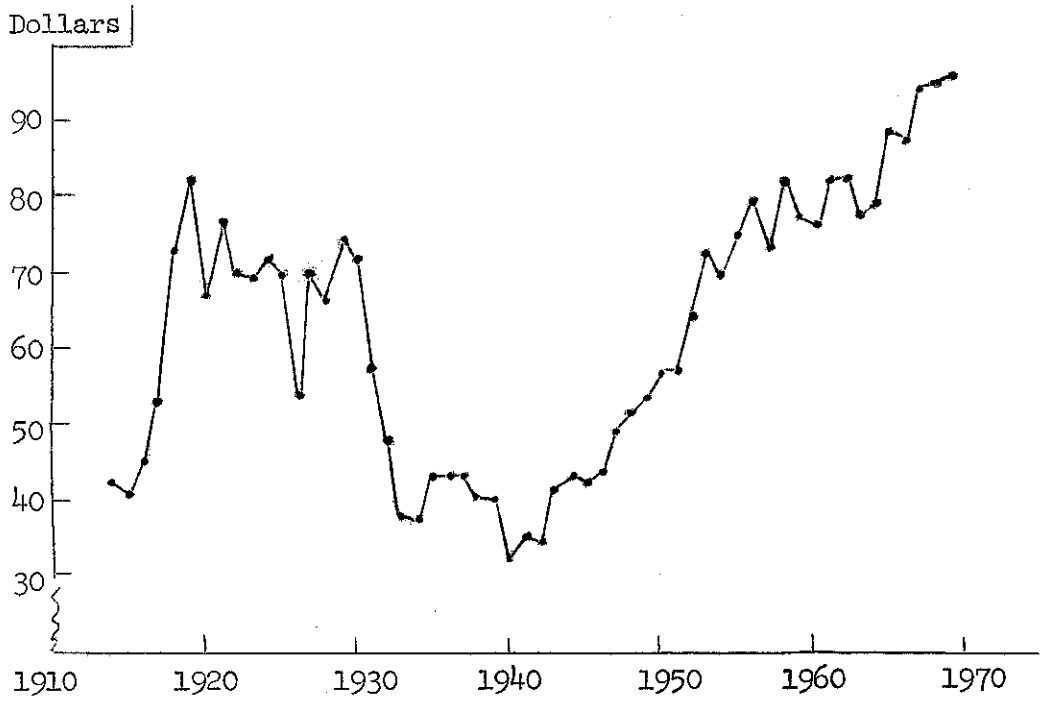
Figure 4. PROFIT PER ACRE OF CORN FOR GRAIN
New York Cost Account Farms, 1914-1970



Cost Per Acre

Costs of production for corn grain were high during World War I and decreased rapidly during the 1930's (Figure 5). Since 1940 there has been a continuing and rapid increase in costs. In 1969 the average cost per acre of Corn Grain was $96.

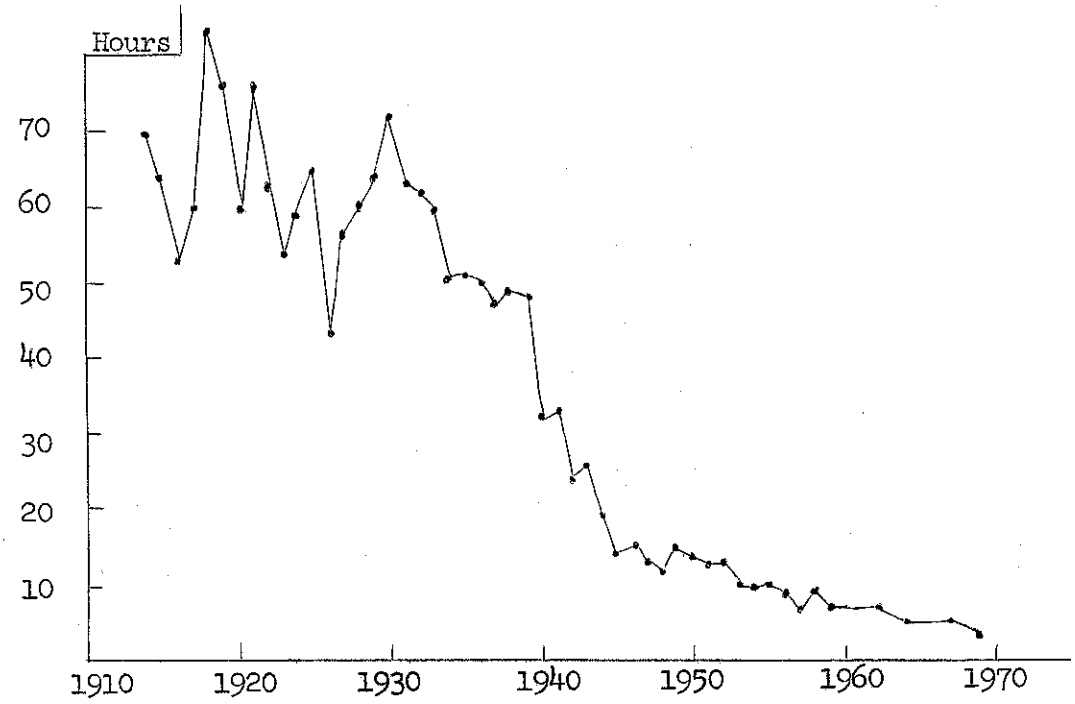
Figure 5. COST OF PRODUCING AN ACRE OF CORN FOR GRAIN
New York Cost Account Farms



One of the reasons for the decrease in costs in the 1930's was a decrease in the labor requirements in producing the crop. The decline from about 70 hours per acre came with mechanization, especially the adoption of the corn picker (Figure 6). In recent years, since most jobs connected with the enterprise are now done with machines, the rate of improvement in labor efficiency has slowed. At present about 3 hours are spent per acre of corn grain. Obviously, with little labor there will not be much opportunity for reduction in the future.

Figure 6.

HOURS OF MAN LABOR
PER ACRE OF CORN FOR GRAIN
New York Cost Account Farms



The increase in the cost of producing corn since 1940 has been a creeping increase of all costs (Table 6). Some items have gone up more than others. Some of the increase has been due to the use of larger quantities; more has been caused by changes in prices. The substitution of equipment and power for labor was not without cost, and these costs have increased. Commercial corn production called for better cribs and storage; these cost more than the old storage facilities. Drying also has become common and is costly.

Table 6. CHANGE IN COST OF PRODUCING CORN GRAIN
New York Cost Account Farms

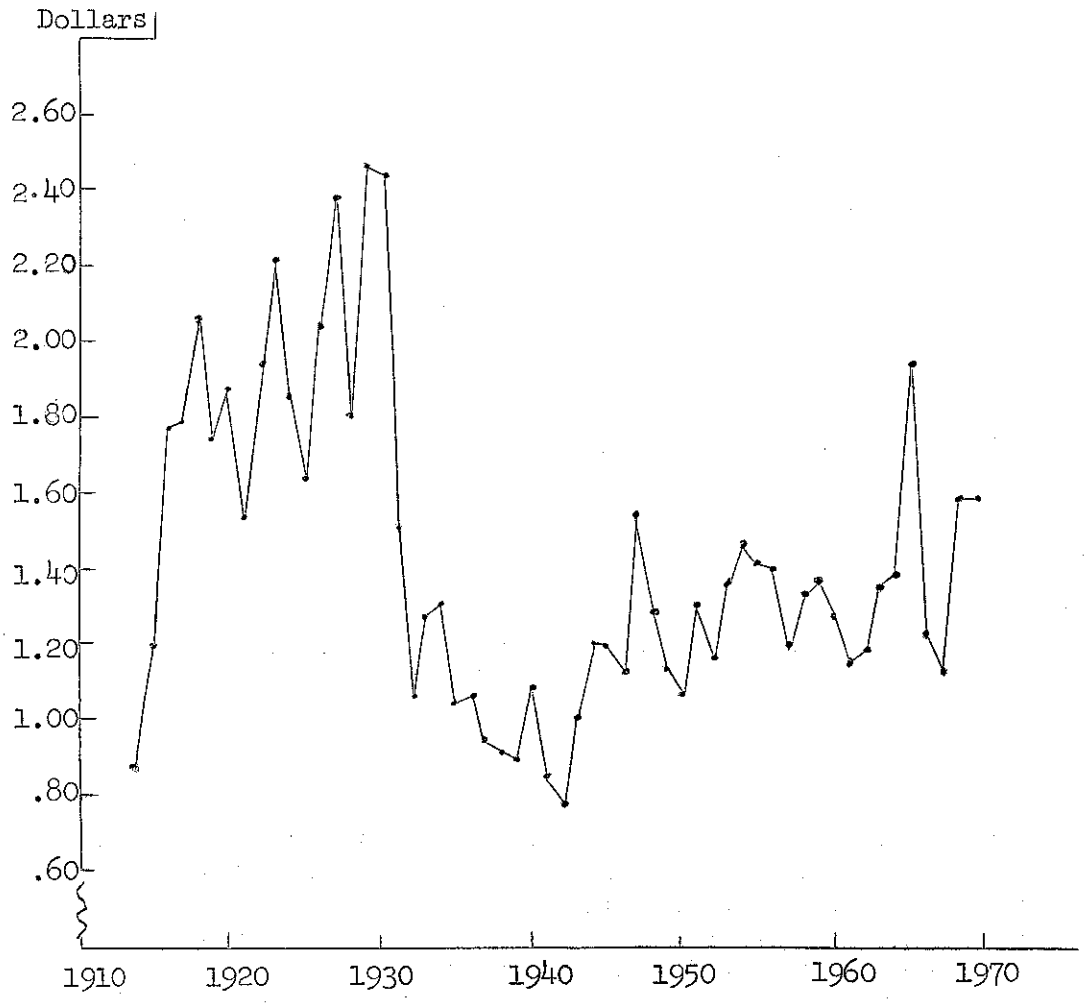
Item of Cost	1940	1963	1969
Land	$ 3.72	$ 8.12	$12.89
Labor	8.95	11.80	7.43
Power	4.43	5.48	6.04
Equipment	3.03	9.30	17.00
Fertilizer and manure	6.66	23.33	26.81
Seed	2.44	2.60	4.25
Spray materials	----	----	6.74
Storage	0.74	2.19	10.15
Other	2.03	12.98	4.76
Total	$32.00	$75.80	$96.07

Land costs are up markedly due to higher land values, taxes, and interest rate. Although wages have increased more than most other prices the reduction in the amount of labor has held this cost down. The same is true for tractor hours as farmers have shifted to using larger machines and combine harvesting. The equipment costs have mounted rapidly with the use of the bigger and better equipment. The fertilizer cost has remained fairly stable in recent years with manure being replaced by commercial fertilizer. A new cost which the corn grower now has is insect, disease and herbicide spray materials and application costs.

Cost Per Bushel

Yield changes were minor and with the decrease of cost per acre in the early 1930's came a decrease in the cost per bushel. From 1940 to 1954 yields went up and in part compensated for the increased acre cost. The compensation, however, was only in part. The cost per acre of corn increased more rapidly than the bushels of corn produced per acre, and, thus, there was an increase in cost per bushel (Figure 7). More recently, yield increases have about equaled per acre cost increases and the trend in per bushel costs has leveled. The current level is around $1.30 per bushel of corn.

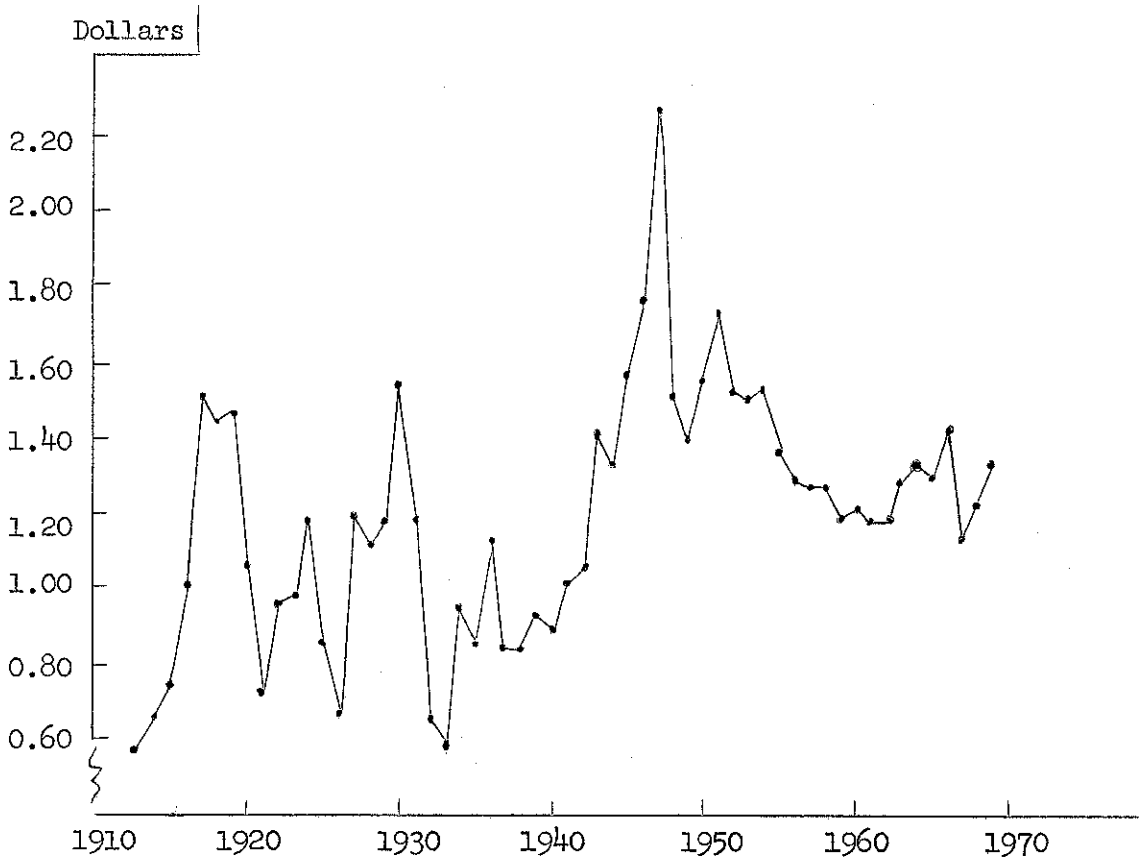
Figure 7. COST OF PRODUCING A BUSHEL OF CORN FOR GRAIN
New York Cost Account Farms



Value of Corn Per Bushel

In the years immediately before World War II corn grain on the Cost Account Farms was valued at about 90 cents per bushel (Figure 8). Prior to that there was considerable variation. During and after World War II, the price went up and average values reached more than $2.20 per bushel. The price has since fallen to about $1.25 per bushel.

VALUE OF CORN PER BUSHEL
New York Cost Account Farms



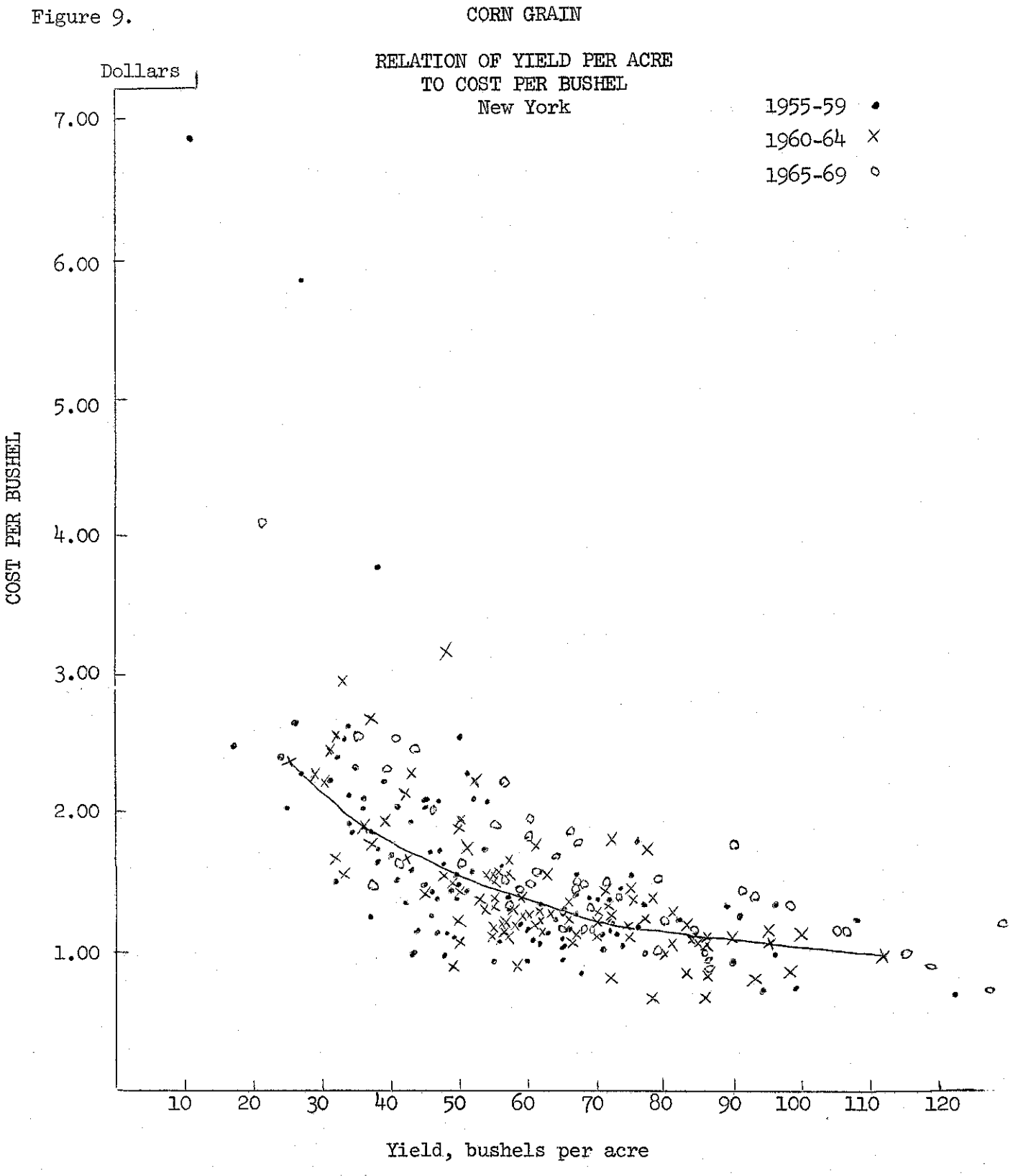
Since New York is a grain deficit state, dairy and poultry men can expect to pay for corn, domestic or imported from the corn-belt, the corn-belt average price plus the freight and handling charges to get it from the Midwest to New York Farms. The profitableness of the crop in this State then is dependent not only on the costs of growing and harvesting an acre of corn in the State and the yields therefrom, but also, the prices for which corn-belt farms are willing to grow the crop and the freight rates.

Relation of Yield to Cost Per Bushel

The amount of grain harvested per acre has a strong impact on the cost per bushel and, consequently, the profitableness of the crop. The corn was distinctly unprofitable on the Cost Account Farms in 1969, but part of the reason was the relatively low yields on the farms in the study. The average was 61 bushels compared with 75 for the State as a whole.

When the data for each individual farm is plotted, there is, in general, a curvilinear relationship of decreased cost per bushel with increased yield per acre (Figure 9).

Figure 9.



It is interesting to note that the cost and yield changes have been such during the last 15 years that instead of the entire curve shifting to the right as one might expect, the mass of the observations has shifted down and to the right with each period.

It is also interesting to note that in all periods and with all levels of production there is wide variation in cost around the "average".

Corn Grain Break Even Yields

If we assume, first, that the costs on these farms, at the yield level at which they were producing are fairly representative of costs for production; secondly, that the regression line fairly represents the average at each point on the line; and thirdly, that a normal price for corn grain in New York State is $1.25 per bushel. Then the normal break-even yield for corn in this State is about 72 bushels per acre. For individual farms this will vary depending on the costs for each farm. Some farmers with yields as low as 40 bushels may break-even on the crop. At the same time, some farmers with yields of over 90 bushels per acre can not break-even at $1.25 per bushel.

Changes in the price of corn obviously change the break-even point. At a price of $1.35 it takes, on the average, about 60 bushels of corn to break-even. Ninety bushels are required at $1.05 and if the price of corn drops to under $1.00 an average of about 100 bushels per acre are needed.

CORN GRAIN AS A FEED

In considering feed crops for livestock the factors which have a real bearing on a farmer's crop planning decisions are (1) the amount of nutrients that can be produced on the land which is available and (2) the cost of the nutrients.

There are several ways of measuring the nutrient value of livestock feed. A common measurement is the total digestable nutrients. A second way is to use a "net energy" rating. This probably is the better of the two for comparative purposes.

Historically, with average Cost Account Farm yields, corn grain produces more TDN per acre than most other grains and is about as productive as hay. It is not as productive as corn silage. When production per acre is measured in terms of net energy (M Cal), corn grain is still not as productive as corn silage but is more so than hay or other grains.

If cost of nutrients is measured in terms of cost per ton of TDN, the cheapest feeds are hay and corn silage. Nutrients from corn grain cost more. If net energy is used as a basis of measuring feed value, the lowest cost feed is corn silage. Hay and corn grain are a little higher. The corn grain nutrient cost is about 7 percent above that for corn silage. These observations are for average Cost Account Farm conditions.

Obviously, the yield of corn has an influence on the cost of nutrients. Extimates taken from Figure 9 indicate that the cost of nutrients are about 60 percent higher with a yield of 40 bushels per acre than with a yield of 80 bushels (Table 6).

Table 6. RELATION OF CORN GRAIN YIELDS AND COSTS OF NUTRIENTS

Bushels per Acre	Tons per Acre	Cost per Bushel	NET ENERGY*		TDN**	
			Units Per Acre	Cost Per 2000 Units	Tons Per Acre	Cost Per Ton
40	1.12	$1.75	0.90	$77.78	0.90	$77.78
50	1.40	1.55	1.12	69.20	1.12	69.20
60	1.68	1.35	1.35	60.00	1.35	60.00
70	1.96	1.20	1.57	53.50	1.57	53.50
80	2.24	1.10	1.79	49.16	1.79	49.16
90	2.52	1.05	2.02	46.78	2.02	46.78
100	2.80	1.00	2.24	44.64	2.24	44.64

* 80.1 Conversion factor
** 80.0 Conversion factor

Although New York yields of corn grain have not been high enough, even with a fairly sizable price advantage over the corn-belt, to make the crop profitable and a good cash crop, the amount of nutrients produced per acre compares favorably with other common forage and grain crops in New York, except corn silage. The cost of nutrients, especially if measured in terms of net energy, is low enough to be competitive with other feed crops in the State. The combination of fairly high nutrients production per acre and competitive nutrients cost places corn grain amoung the better feed crops for livestock in New York State. Farmers generally are not justified in the deliberate planting of corn solely for grain except where physical conditions are such that exceptional yields can be obtained and where there are no better alternatives for the use of the land.