UNITED STATES DEPARTMENT OF AGRICULTURE
Economic Research Service

# ORGANIZATION AND USE OF RESOURCES IN FARMING

Talk by W. B. Sundquist
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## Changes in the Size and Number of Farms

Farm numbers in the United States reached their peak in the North fairly early in this century and in the South about the time of the depression some two decades or more later. Though well underway in the decade of the 40's, the decline in farm numbers has accelerated substantially since 1950. The post-1950 decline in farm numbers has been proportionately more rapid in the South where the rate of decline has been particularly high among negro families and sharecroppers. (Graph titled "Number of Farms and Acres Per Farm in the U.S.")

Available data on farm size and numbers, including those from the 1964 Census of Agriculture, show a continuation of the rapid movement toward fewer and larger farms. Preliminary Census estimates now available for most states indicate that total 1964 Census farm numbers will be in the range of 3.2 million or down about 40 percent from 1949. Between 1949 and 1964 average acreage per Census farm increased from less than 220 acres to about 350 acres. This average, of course, covers a wide range in type, size and operational intensity of farm firms. Growth in the size of many farm businesses has been even greater than the average acreage change would indicate since a number of farms have remained at or near their 1949 acreage size, much land has been farmed more intensively, and a number of specialized farms with a minimal land base have come into being.

In looking at the current organization and use of resources in farming and in projecting future developments it is helpful to get some picture of the number of farm units by type. (Table titled, "Estimated Commercial Farm Numbers by Census Classification and Type, 1964.")

Of the approximately 2.1 million Census defined commercial farms in 1964, 160,000 were cotton farms, 170,000 tobacco, 400,000 cash grain, 34,000 field crop, 60,000 fruit, 25,000 vegetable, 365,000 dairy, 80,000 poultry, 580,000 livestock, and 240,000 general and miscellaneous farms of which about 7 out of 8 were general farms.

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The assistance of Donald D. Durost in providing some of the statistical materials contained herein is appreciated.

Total farm numbers, even by type, fail however to capture an adequate picture of the current and rapidly changing organization and operation of our national agricultural production plant. For example, much of the really functional change in farming in recent years has occurred in the form of geographical concentration, production intensification and enterprise specialization of our farm production units. These changes have been accompanied by a rapid increase in the use of production inputs (both goods and services) purchased off of the farm. In fact, the availability in larger quantities of such inputs and the technology they represent has had an accelerator effect on changes in the size and number of farms. A corollary functional change of substantial importance has occurred in the growth and changes in technology of firms engaged in supplying farm inputs--both goods and services--and in those participating in the marketing and processing of farm products. A functional change of particular importance to this program has been the increase in productivity of farm labor by about 150 percent between 1950 and 1965.

In 1964, more than four-fifths of all farm products going to market were produced on the less than 900,000 Census farms with gross farm income of $10,000 or more. The 30,000 farms having sales of $100,000 or more, on the other hand, had marketings in excess of the million farms with the lowest marketings per farm. It is primarily to the group of nearly 900,000 farms grossing over $10,000 that the Agribusiness Complex is aiming to sell farm production inputs and to which it will gear its processing and marketing operations. It is also this group of farmers who will be producing most of the farm products in the future and who will be competing with industry for hired labor to man the production process in farming.

## Interregional and Intraregional Production Changes Accompanying Specialization

Despite some contentions to the contrary, changes in the base of cropland farmed were quite proportional between major agricultural regions over the 1950 to 1965 period. (Table titled "U.S. Cropland Used For Crops, 1950 and 1965.) All regions showed some absolute decline in cropland used. A decline of approximately 10 percent in the cropland used for crops during this period is largely tied to participation in Government programs. As the situation requires returning idle land to production beginning with the 1967 crop, however, significant differences will be apparent by regions. Much of the land retirement in the Northeast and Appalachia, particularly, but also in the Lake States, will probably be of a permanent nature. Most of the retired cropland in the Corn Belt, Plains, and Delta Areas is, on the other hand, probably only temporarily retired.

It is within agricultural regions primarily and to a much lesser extent between regions that the really functional changes are occurring in agriculture. (Table titled, "Percentage of U.S. Production by Regions of Selected Commodities, 1950 and 1965.") Let me exemplify:

(1) The proportion of total U.S. production of cotton appears to have remained relatively constant between regions with only a slight increase in the proportion of total acreage located in the Southern Plains and Pacific Regions. These regional production data which suggest little locational change in cotton production, however, mask the fact that cotton production has been moving toward a concentration on the level land in the Delta, and on the irrigated lands of the West and Southwest. Within the Delta agricultural region, acreage has, in many cases, shifted from small hill farms to substantially larger tracts on the Delta proper. These shifts are largely induced by and further facilitate the profitable intensive use of chemicals, fertilizer, and mechanization in production. They are also partially induced by the desire to reduce labor requirements and when implemented they facilitate even further reductions in labor requirements.

(2) Corn production displayed some regional concentration between 1950 and 1965. Whereas the Corn Belt produced 47.5 percent of the corn acreage in 1950, it produced an estimated 62.7 percent in 1965. One has to proceed even further, however, in a locational breakout to see that corn production is concentrated even more within the level land areas of the Corn Belt which lend themselves well to an intensive row crop rotation, intensified use of chemicals and fertilizers, and intensive mechanization of corn production including use of multi-row planting equipment and picker shellers. While the Corn Belt farmers applied about 4 pounds of nitrogen on an acre of corn in 1950 they applied about 70 pounds in 1965. The rapid increase in use of chemicals for weed control is an even more recent development than that for fertilizer. Though total numbers are not yet large, two increasing phenomena in the Corn Belt are the farm operator specializing solely in corn production and the custom operator who is contracting with landowners to undertake the complete job of producing corn for a set per-acre price and employing specialized corn production equipment and technology to do it profitably.

(3) The major regional shift in wheat production between 1950 and 1965 took place via modest proportional shifts out of several regions into the Southern Plains. The latter region increased its proportion of U.S. wheat production by more than 1½ times during this period. Mechanization of wheat production was well along by 1950, but major increases in use of fertilizer and chemicals, combined with larger acreages per farm occurred during the 1950 to 1965 period. The quantity of plant nutrients applied per acre of wheat land harvested doubled in the 10-year period from 1955 to 1965 and future increases may be even more rapid now that fertilizing is a general practice.

(4) In livestock production the 29.4 percent share of the Corn Belt in 1950 had declined to 23.8 percent in 1965. The Northeast and Lake States regions reduced their percentage of livestock production during this period despite substantial increases in their share of total dairy production. Though not easily measured, there appears to be a substantial increase in livestock operations, particularly cattle feeding, which have only a minimal

land base and which are specialized in livestock production only. Many fewer farmers are now keeping livestock but keeping larger enterprises than was the case even three, four, or five years ago. For example, in the 5-year period between 1959 and 1964, the three Corn Belt States of Illinois, Indiana, and Iowa had a reduction in hog numbers of about 10 percent and a reduction in hog producers of almost 30 percent. An increased number of steers and bulls in 1964 over 1959 of 11 percent were kept in the same states on about 13 percent fewer farms in 1964 than in 1959. The drop in numbers of farms keeping dairy cows and the increase in average herd size is occurring even more rapidly than for other classes of livestock in several major regions.

(5) Location of fresh vegetable production changed only modestly between 1950 and 1965 with a slight proportional shifting out of the Northeast and into the Pacific Region. A much more substantial shift occurred in the proportion of vegetables produced for processing which shifted heavily from the Northeast to the irrigated areas of the Pacific Region, particularly California. By 1965 about 40 percent of the vegetables for processing were produced in the Pacific Region and approximately one-half of that percentage in the Northeast.

(6) Finally, production of eggs shifted proportionally from the Northern to the Southern and Pacific Regions between 1950 and 1965 while broiler production shifted to the Southeast and Delta Regions. Accompanying these regional shifts were substantial shifts from traditional supplementary farm poultry enterprises to larger, more specialized enterprises, many of which are operated independently of a feed producing land base and which, therefore, use purchased feed inputs entirely.

Similar changes in location, intensification and specialization of agricultural production could be cited for most other major farm products. It might, however, be more interesting to discuss briefly the several economic forces bringing these changes about. First, some shift from North to South of labor-intensive agricultural production occurred because of improved employment opportunities and wage rates generally available for labor in the North. Second, comparative advantage has been at work in several ways. Mechanization and intensification of crop production has been particularly profitable on the productive level areas of the Corn Belt, the Mississippi Delta, the Plains wheat area, and the irrigated West. Thus crop production has intensified in these areas and moved out of areas with less productive soils and with less potential for mechanization. (Graph titled, "Crop Production Per Acre, Past and Prospective Trends.") I included this chart to show how crop production per acre has in each succeeding decade since 1930 exceeded the yields which would have been projected on the basis of achievements in the preceding decade. It is not only the development of new technology but the rearrangement locationally and organizationally to utilize this technology coupled with increased outside economic activity and employment opportunities that have had important impacts on agriculture, including the Agribusiness Complex.

Increased specialization in crop production has generally been more profitable than livestock production on those farms with an initial land base. Resources effectively used in crop production probably yielded higher returns than those in livestock production even in 1950. Since 1950 the increase in productivity per acre of cropland has almost doubled the rate of increase in productivity per breeding unit of livestock. Our analyses consistently show higher returns to resources in crop production than in livestock production in farming areas where land is adapted to crop production. In order to exploit the enlarged capacity of modern crop production equipment farmers have cost and profit incentives to produce crop enterprises of a size that often make them competitive with livestock both for capital and labor. Thus, some of the traditional crop-livestock farm organizations that once provided good economic combinations no longer do. In many types of farming the costs of diversification have increased very substantially. (Chart titled "Farmland Purchased for Farm Enlargement.) Much of the farm land recently purchased, over 60 percent in the western Cotton and Corn Belt farming areas and almost 80 percent in the wheat areas, has been for farm enlargement on farms specializing in crop production.

Faced with the alternative of off-farm employment and improved earnings in crop production many farmers have dropped livestock enterprises, particularly those with high labor requirements. It seems increasingly likely in view of these developments that, aside from range-type livestock, the most rapid proportional growth in livestock production will be via livestock enterprises which are largely non-land based and of a size that exploit economies of mechanization and automation of the livestock enterprises. Thus, there are indications that the separation of crop and livestock enterprises will push even further their concentration, specialization, and reliance on purchased inputs. Thus, farmers will be increasingly aware of, and their net income situation will be increasingly affected by, price and employment conditions in the non-farm sector of our economy.

## Changes in Resource Use Between 1950 and 1965

(Graph titled, "Major Input Groups As a Percentage of Total Inputs.") This chart shows some of the major changes in the mix of farm inputs that have occurred over the past 15 years. Farm labor has declined from 40 percent to 21 percent of total inputs. Real estate has been a consistent proportion of 15 percent when based on 1947-49 price weights. The market value of real estate assets has, of course, increased tremendously over this period. Although power and machinery show only a small increase, tractor and equipment size has increased substantially. Because of the increased capacity per machine, the number of some machines has declined substantially. An important implication of these developments is the one that we need to improve our procedures for building quality and capacity into our machinery indexes. The proportion of total inputs represented by feed, seed, and livestock, reflects increased specialization and less reliance on farm-produced inputs. This

category does not include the value of interfarm transactions which could be a very substantial item. Fertilizer and lime have shown major increases between 1950 and 1965 as have several items in the "other category", principally pesticides, interest, and real estate taxes.

In order to service the substantial land transactions that have occurred at continually higher prices and to finance a much enlarged package of purchased farm inputs, an increased volume of operator capital and credit financing has been required. Production assets used in agriculture totaled $95 billion in 1950 and $186.5 billion, or about double, in 1965. During this same period farm debt increased from $12.4 billion to $37.5 billion as farmers proceeded to update their production plant in line with modern technology. Indications are that this increase in use of credit has, for the most part, gone for sound constructive uses.

The story of the rapid growth and changing structure of the Agribusiness Complex providing input supplies and services to agriculture is an interesting but involved one which time does not permit the discussion of here. Increased services are both those related to use of specific inputs in some cases and of a more general management service type in others. ERS is in the process of developing an active program of research in this field. The farm supply industry is increasingly important to the production process in agriculture and will be the source of much of the future change in the organization and use of resources in farming.

## Implications For Farm Labor

I would like to close with a brief summary of the implications of the above discussion to farm labor since this is the focus of the program that follows. (Graph titled, "Farm Employment.") As commercial agriculture has moved toward greater specialization on the farm and as off-farm firms have supplied a larger proportion of production inputs, the reduction in farm operator and family labor has been proportionately greater than that of hired labor. This trend will continue despite institutional changes, such as minimum wage legislation which will make hired labor a generally more expensive input. The reason for this is a simple one. As farm numbers decline the decline is proportionately higher among small farms which hire little, and in many cases no farm labor. At the same time much of the demand for hired labor in an increasingly specialized agriculture will be for labor with improved training and skills. Though the specific magnitudes of change will differ by size and type of farm, the rapid trend will be toward an agriculture which provides the agricultural worker (whether operator or hired) with a better set of machinery, equipment and working conditions, and which requires that he be at least as productive as his counterpart in other lines of modern-day economic activity.

Estimated Commercial Farm Numbers
by Census Classification and Type, 1964

| Farm type | Number (thousand) | Farm type | Number (thousand) |
|---|---|---|---|
| Cotton | 160 | Dairy | 365 |
| Tobacco | 170 | Poultry | 80 |
| Cash grain | 400 | Livestock | 580 |
| Field crops | 34 | General | 210 |
| Fruit | 60 | Miscellaneous | 30 |
| Vegetable | 25 | All types | 2,114 |

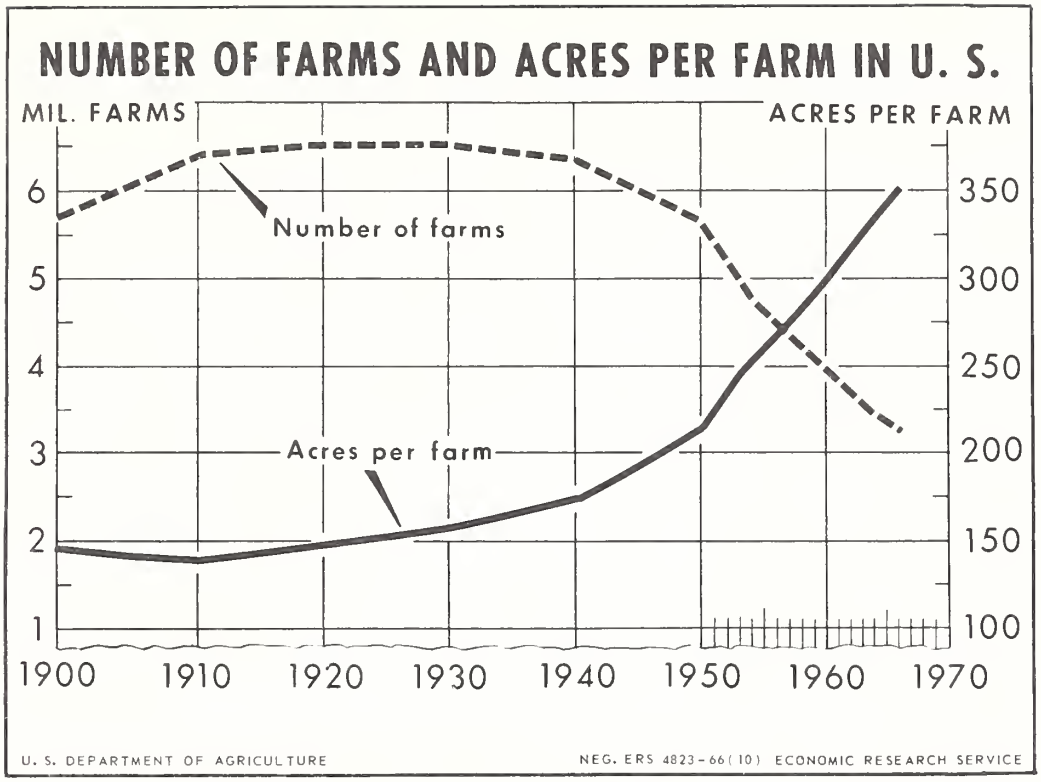
U.S. cropland used for crops, 1950 and 1965

| Region | Cropland | | Change in percent of U.S. totals |
|---|---|---|---|
| | 1950 | 1965 | |
| | Million acres | Million acres | Percent |
| Northeast | 17.1 | 14.3 | 0.2 |
| Lake States | 37.5 | 34.4 | -.4 |
| Corn Belt | 77.2 | 74.3 | -1.8 |
| Northern Plains | 93.3 | 83.5 | -.2 |
| Appalachian | 21.1 | 15.4 | 1.0 |
| Southeast | 18.7 | 12.1 | 1.4 |
| Delta States | 15.3 | 13.5 | .1 |
| Southern Plains | 41.7 | 33.4 | 1.1 |
| Mountain | 35.2 | 34.0 | 0.9 |
| Pacific | 20.2 | 19.7 | -.5 |

Percentage of U.S. production, by regions, of selected commodities, 1950 and 1965

| Region | Cotton | | Corn | | Wheat | | Livestock | |
|---|---|---|---|---|---|---|---|---|
| | 1950 | 1965 | 1950 | 1965 | 1950 | 1965 | 1950 | 1965 |
| | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. |
| Northeast | --- | --- | 4.4 | 2.9 | 3.8 | 2.1 | 13.0 | 11.4 |
| Lake States | --- | --- | 12.2 | 11.9 | 4.6 | 3.8 | 13.4 | 11.9 |
| Corn Belt | 2.5 | 2.6 | 47.5 | 62.7 | 13.3 | 12.7 | 29.4 | 23.8 |
| Northern Plains | --- | --- | 15.1 | 10.1 | 41.6 | 38.9 | 9.7 | 10.6 |
| Appalachian | 6.0 | 5.8 | 9.0 | 6.3 | 2.0 | 1.5 | 7.7 | 7.7 |
| Southeast | 14.8 | 12.9 | 4.9 | 4.1 | .3 | .4 | 4.2 | 7.1 |
| Delta States | 28.5 | 26.9 | 3.3 | .8 | 1/ | 1.1 | 3.3 | 4.8 |
| Southern Plains | 31.8 | 33.7 | 2.7 | .5 | 6.0 | 15.5 | 7.1 | 7.5 |
| Mountain | 6.6 | 6.8 | .7 | .4 | 17.9 | 14.3 | 5.5 | 6.8 |
| Pacific | 9.8 | 11.3 | .2 | .3 | 10.5 | 9.7 | 6.7 | 8.4 |

1/ Less than 0.05 percent.


NUMBER OF FARMS AND ACRES PER FARM IN U. S.
MIL. FARMS
ACRES PER FARM
6
5
4
3
2
1
350
300
250
200
150
100
Number of farms
Acres per farm
1900
1910
1920
1930
1940
1950
1960
1970
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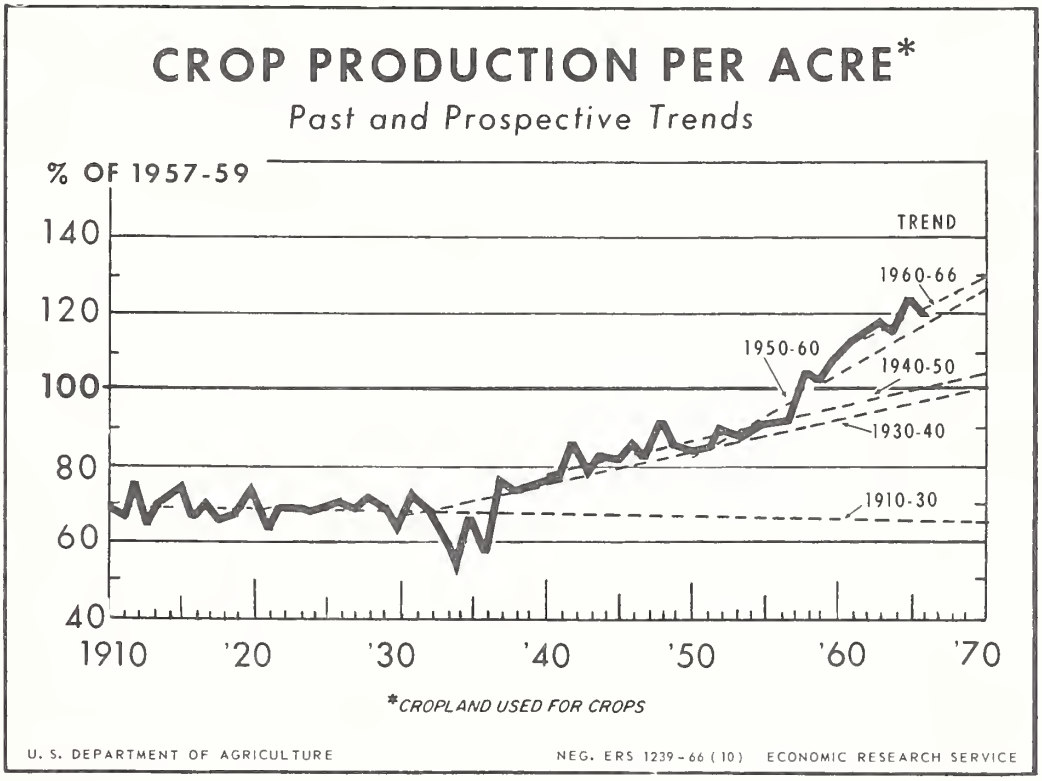
CROP PRODUCTION PER ACRE*
Past and Prospective Trends
% OF 1957-59
140
120
100
80
60
40
TREND
1960-66
1950-60
1940-50
1930-40
1910-30
1910
'20
'30
'40
'50
'60
'70
*CROPLAND USED FOR CROPS
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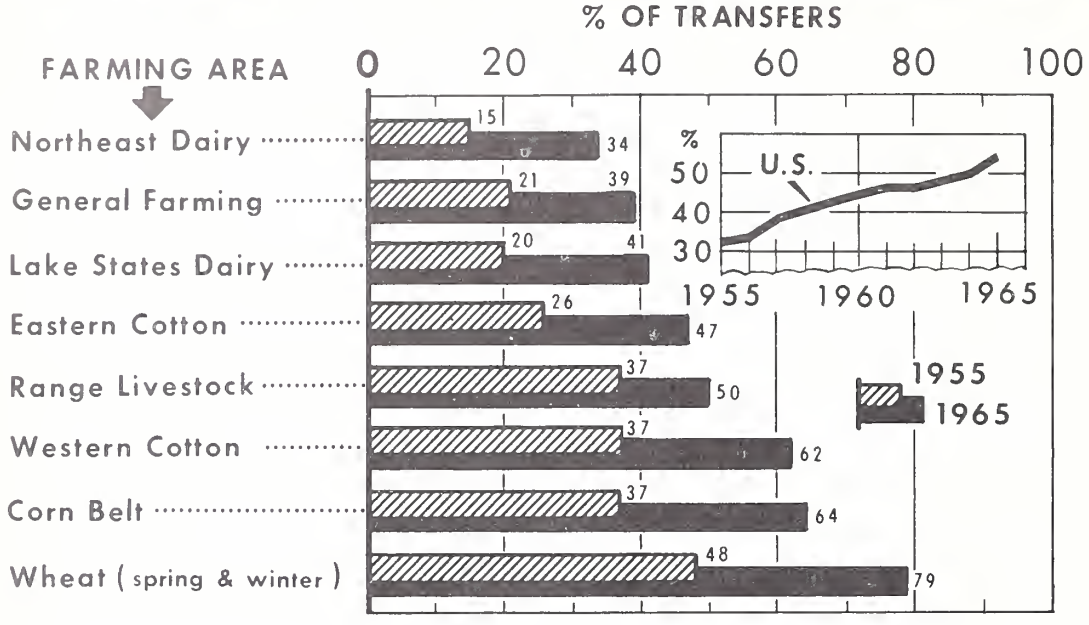
# FARMLAND PURCHASES FOR FARM ENLARGEMENT




YEAR ENDING MARCH 1.

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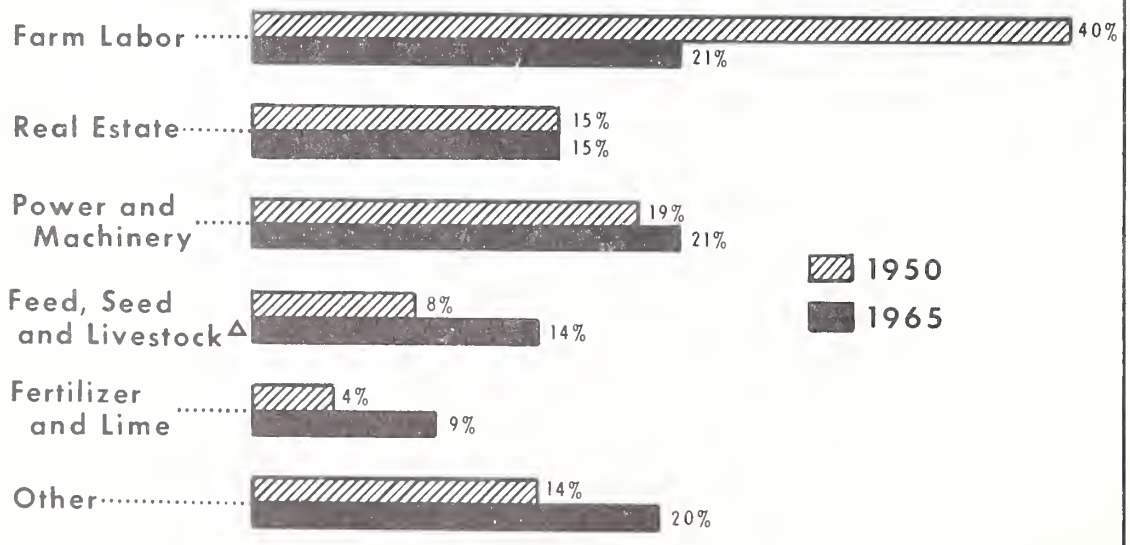
# MAJOR INPUT GROUPS AS PERCENTAGE OF TOTAL INPUTS*




* BASED ON 1947-49 PRICE WEIGHTS. △ EXCLUDES VALUE OF INTERFARM SALES.

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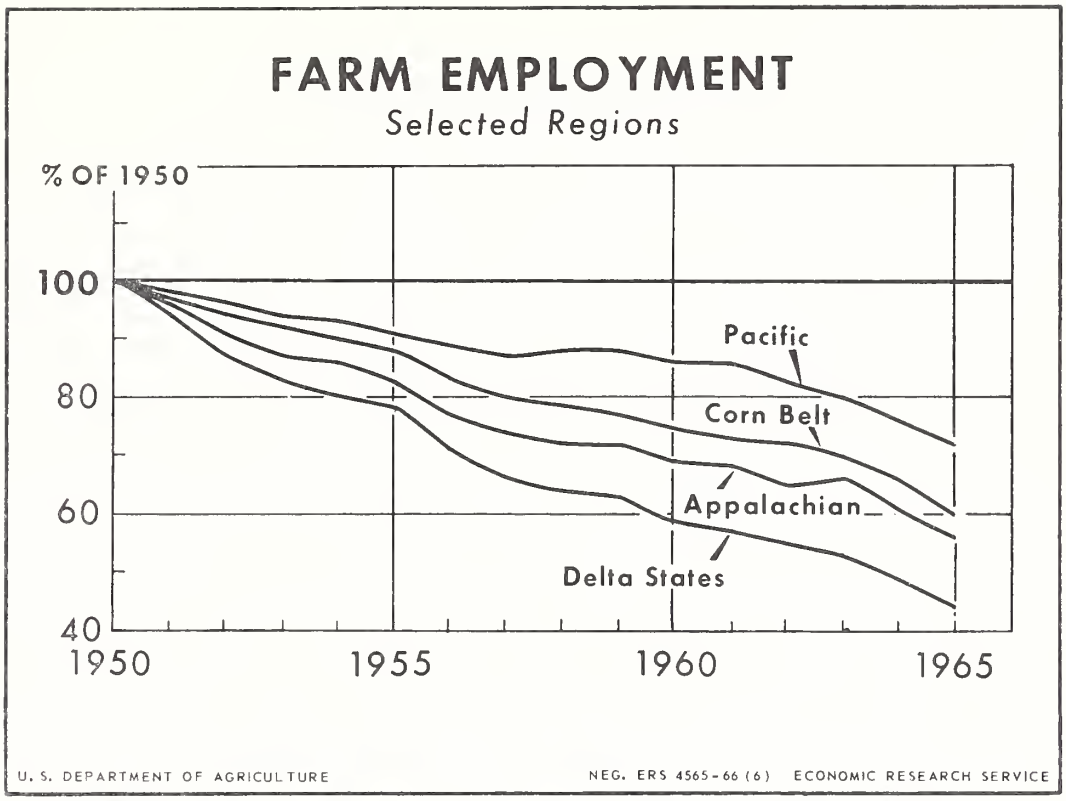
FARM EMPLOYMENT
Selected Regions
% OF 1950
100
80
60
40
1950
1955
1960
1965
Pacific
Corn Belt
Appalachian
Delta States
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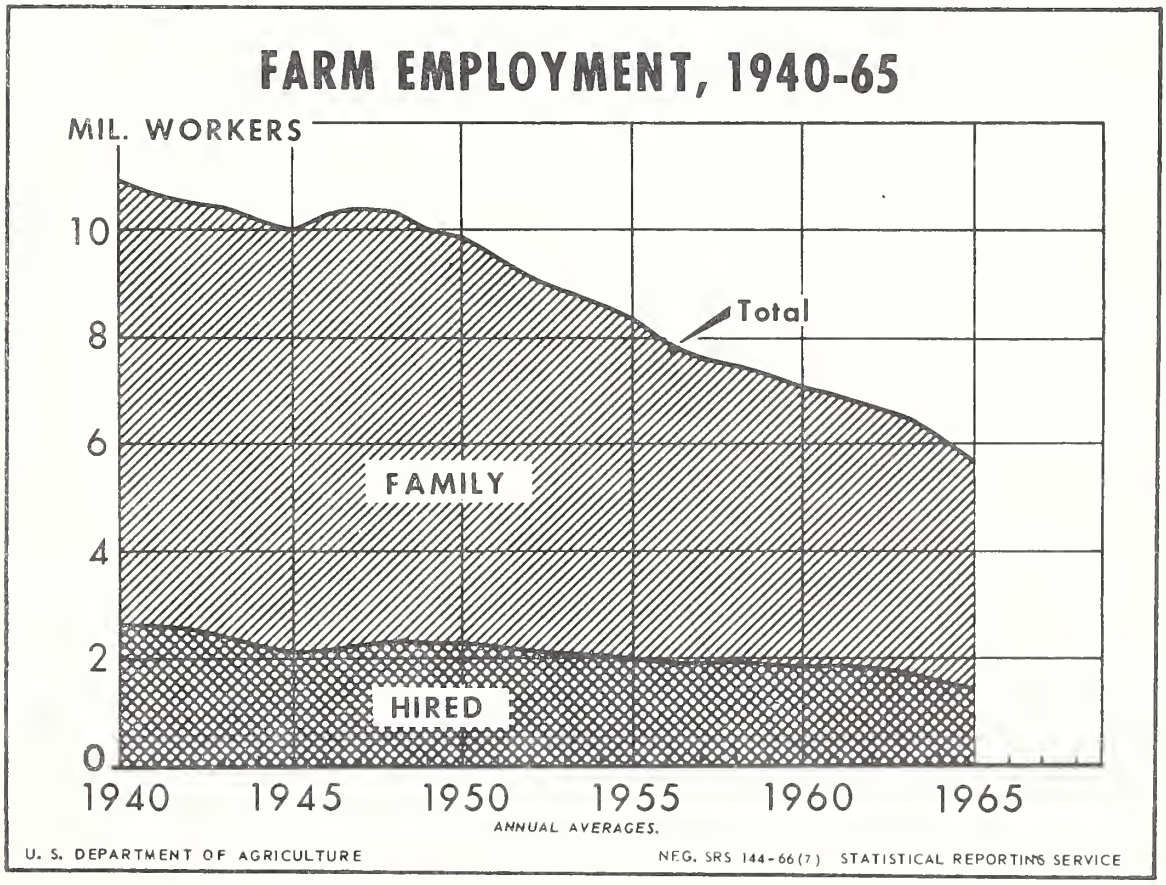
FARM EMPLOYMENT, 1940-65
MIL. WORKERS
10
8
6
4
2
0
1940
1945
1950
1955
1960
1965
Total
FAMILY
HIRED
ANNUAL AVERAGES.
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