Agribusiness

Authors	Clifton B. Luttrell

Working Paper Number	1967-002B
Revision Date	August 1967
Citable Link	https://doi.org/10.20955/wp.1967.002
Suggested Citation	Luttrell, C.B., 1967; Agribusiness, Federal Reserve Bank of St. Louis Working Paper 1967-002. URL https://doi.org/10.20955/wp.1967.002

Working Paper No. 2
Agribusiness

Chapter on Agribusiness Prepared for American Institute of Banking Textbook Agricultural Credit

Clifton B. Luttrell
August 1, 1967

REVISED EDITION 1969 (?)

CHAPTER IX

AGRIBUSINESS

The purposes of this chapter:

1. To define the concept of agribusiness and outline the relationships between the agricultural and non-agricultural sectors.

2. To provide some measures of the relative size and other characteristics of the component parts of agribusiness.

3. To discuss some economic forces which affect growth of the sectors.

4. To analyze the implications of agribusiness growth for credit demand.

Major changes have occurred in recent years throughout the nation's food and fiber industries. Science and new technology have reshaped much of the farming, food processing, and marketing functions. Economic forces embodied in this continuing process have an important impact on the resources - labor, capital, and management - used in all stages of food and fiber production. Major imbalances have occurred in the farm labor market. There was a sharp decline in demand for labor in this sector. Offsetting increases occurred, however, in other sectors as major production operations were moved from the farm to urban locations. Major ties continued to link the industries into an over-all group despite the increased specialization of resource use. In view of this interdependency, it is useful to use one term, agribusiness, to describe all the related functions.

The Agribusiness Concept

Agribusiness viewed in its historical setting encompasses all functions relative to the production and distribution of farm commodities which were performed by farmers prior to the mid-1800's,[1/] plus many new functions that have been

---

1/ See Davis, John H., and Goldberg, Ray A., A Concept of Agribusiness, Harvard University, Boston, 1957, for a more detailed discussion of agribusiness in the United States.

developed since that time. Farming communities in this early period produced essentially all supplies used for farm production purposes, including draft animals for power, feed for both draft animals and other livestock, tools, fertilizer, and seed. With these inputs the farmer worked through the spring, summer, and autumn months planting, cultivating, harvesting, and storing his crops. The winter was spent threshing the grain, making shoes for the family, and slaughtering, curing and pickling meats. Almost every item of clothing was made from raw materials obtained from the farmer's own crops or livestock. The women did the spinning, weaving, dyeing, and making of clothes. Often household manufacture created a marketable surplus of commodities.

Successful farming in this period required numerous skills. The farmer, when necessary, was carpenter, wheelwright, harness maker, blacksmith, sheep shearer, butcher, etc., in addition to producer of crops and livestock products. Virtually all operations relative to food and fiber, including the production of tools and supplies, and the growing, processing, storing and marketing of farm products came within his sphere

of activity. All these functions fell within the scope of agriculture.

It is helpful to look at all operations once performed on the farm regardless of their current setting. Knowledge of these operations is important from the standpoint of over-all production efficiency, their impact on local economic activity, and from the viewpoint of cost and availability of farm products flowing to the ultimate consumer.

The agribusiness concept is also useful for analyzing the response of agriculture to changing supply and demand conditions. For example, prices of farm commodities must now reflect costs of many purchased supplies for production purposes in addition to the unpaid labor inputs of the operator and his family. In contrast, during the early 1800's, the operator's and unpaid family labor were the dominant resources used in farm production. At that time major fluctuations in farm prices and income were reflected in highly variable returns to labor and land, with little year-to-year adjustment in production. Today, a cost-price squeeze tends to force the less efficient farmers out of business and lower the volume of supplies purchased by other farmers for production. Output thus tends to decline, resulting in upward pressure on prices. A

wider-than-average cost-price differential provides incentive for major increases in production, thus forcing prices down.

The Development of Agribusiness

The development of agriculture from its all-inclusive earlier setting into modern agribusiness can be viewed from three points of reference: (1) growth of the off-farm supply industry and the corresponding reduction of farm-produced supplies, (2) growth of the food-fiber processing and marketing industries and the decline of on-the-farm processing, and (3) the response of farming to growth of the off-farm operations.

Development of Farm Supply Industries

The supply side of agribusiness began to take shape as a major industry about the mid-1800's. By 1830 Cyrus McCormick had developed the reaper which alleviated one of the more burdensome farm operations, the mowing of wheat manually with the scythe. In the 1850's John Deere was producing numerous steel plows at his Moline, Illinois plant. Seed drills, cultivators, rakes, mowers, threshing machines and fencing materials produced in off-farm factories were in common use by 1860.

With the introduction of the gasoline tractor in the early 1900's, a new phase in the farm supply industry began. By the 1920's, it became apparent that the tractor would replace

the draft horse as the chief source of farm power. Other sources of power, including automobiles, trucks, gasoline engines and electricity came into use during this period.

In addition to developments in mechanization during the early 1900's, science was attacking other farm production problems on a wide front. Plant and animal breeding, mutations and hybridization were changing the characteristics of plants and animals. Insecticides, fungicides, chemicals for weed control, and commercial fertilizers enabled producers to greatly increase output per acre and generally reduce the labor required on the farm per unit of output.

Each new advance generally occurred in a non-farm setting. Factories rather than the farms became the chief suppliers of fertilizer, other chemicals, power and machinery. The momentum of the farm supply industries increased as each success provided incentive for additional investment in research. The task of improvement and invention became easier as a ready market for new products developed. Educational efforts by agriculturally-trained specialists encouraged farmers to adopt new devices and products. Convinced of the value of previously used products, the farmer became less hesitant to try the next product offered. Each successive advance was thus ushered in more readily than the last.

Processing and Marketing

The development of off-farm processing and marketing activities in the food and fiber industry accompanied the technological revolution in the supply sector. As the more efficient commercial processing and marketing facilities replaced on-the-farm marketing, farming operations ended with harvesting.

Leading the way from household to commercial processing were the shoe and textile industries. By 1810 the boot and shoe industry had been established on a commercial basis. In the early 1800's numerous cotton factories were in operation. With the invention of the sewing machine in the 1840's, textile manufacturing was given further impetus, and by 1860 the industry was almost completely mechanized. The mechanized apparel industry was soon followed by commercial food processing. Meal and flour milling, although given little attention in the early 1800's, had developed into major industries by 1850. Commercial meat-packing developed rapidly in the mid-1800's. The value of animals slaughtered commercially

almost doubled from 1850 to 1860. The development of liquor, tobacco and snuff manufacturing was simultaneous with food manufacturing growth. Preserving fresh fruits and vegetables in glass containers was undertaken commercially in the early 1800's. After 1870 refrigerated plants and freight cars further stimulated the processing of fruits, vegetables and livestock products. Centralization of packing plants in the later 1800's led to major livestock by-product manufacture. Large nation-wide multi-plant firms were packing a sizable portion of the nation's meat products by the turn of the century.

New methods of marketing paralleled developments in food and fiber processing. The early decades following the movement of processing from farm to factory were marked by the development of the wholesaler and his warehouse of heterogeneous products as a go-between for the manufacturer and retailer.

In the early 1900's a revolution in food retailing was well under way with the development of multi-unit firms and a tendency to eliminate the wholesale merchant. By the 1950's large regional or national chain stores with self-service food counters, modern refrigeration facilities, and thousands of attractively packaged food items were within shopping distance of almost every housewife.

Soon after the turn of the century, most food-fiber processing and marketing operations had been taken over by nonfarm establishments. Growth in this sector continued at a high rate for a number of years as a result of a rise in population and an increase in food consumption per person. By the 1950's, however, food consumption per capita measured by caloric intake reached a plateau and the rate of growth in volume of food consumed tended to decline to the rate of population growth.[2/] In addition, the textile industry, which had heretofore almost exclusively used raw materials from the farm, began to use synthetic fibers in the 1930's and 1940's, thus creating competition for farm products from this source, competition which became more severe in the second half of the century. Nevertheless, the processing and marketing sector of agribusiness has continued to grow at substantially higher rates than population.

New forces came into play in the twentieth century that were to provide relief from necessities of life by the mass of American people. The benefits of the industrial revolution of the 1800's and the continuing advances of science and technology in the first half of the 1900's had spread major benefits in real

---

2/ Coppock, John O., North Atlantic Policy - The Agricultural Gap, The Twentieth Century Fund, New York, 1963, p. 104.

income to almost the entire spectrum of the population. Former goals of providing adequate food, clothing and housing for the family were achieved. Practically all could now secure these minimum necessities. Thus relieved, consumers could purchase leisure time, items of taste, additional health services, dietary foods and beverages at all stages of preparation. Diets shifted from bulky vegetables to the more tasty animal products with their generally higher protein content. During the past 20 years total animal protein consumption rose by about one-third. Recently, however, per capita consumption of animal proteins has apparently leveled off. Dairy product consumption per capita, once thought to rise consistently with incomes, has declined in recent years. Nevertheless, the increase in purchases for convenience has more than offset these negative forces and the processing and marketing sector of agribusiness continues to expand.

Convenience foods - those that have been partially prepared for cooking before retailing - have been marketed to some extent for years. Partially-cooked canned goods could be purchased in glass containers in the early 1800's. But the number, variety, and the different stages of preparation ranging from raw products to completely cooked dinners

makes it necessary for each shopper to carefully weigh the additional leisure or convenience in each item against the additional cost of a particular stage of preparation. This great diversity of products at the various time-saving levels of preparation and the rising demand for leisure or convenience by the housewife is a force which continues to provide impetus to the processing and marketing sector of agribusiness.

Response of Agriculture

With the shedding of many functions performed by agriculture in former years, the industry became highly specialized. More purchased and fewer home-produced inputs were used for production purposes, and there was little or no processing relative to products sold. The industry now includes only that small number of livestock and crop producing functions performed on the farm after a large portion of all inputs has been purchased and prior to any processing or marketing. Production for home use has become relatively insignificant, and most farm operations are now fully oriented toward supplying the commercial market.

While most agribusiness functions fall neatly into one of the three sectors, production of farm equipment and supplies, farming, or processing and marketing, a number

of rapidly growing functions cannot be readily classified in any group. Included in this gray area are such operations as contract broiler raising, dairy parlors, contract beef cattle feeding, hybrid seed production, and some vegetable producing operations. Many of these operations more closely resemble manufacturing than farming. Furthermore, numerous firms overlap into more than one area.

Size and Structure

On the basis of consumer expenditures for goods and services, agribusiness occupies a major position in the nation's economy, accounting for almost 30 per cent of total national income in 1967. Estimated consumer purchases of agribusiness products totaled $141 billion, while net exports of farm products totaled another $2 billion. In comparison, personal consumption expenditures for all goods and services totaled $492 billion during the year.

As indicated in Exhibit 9-1, food and beverages accounted for $109 billion of agribusiness output, or about three-fourths of the total. Wool and cotton clothing items totaling $16 billion were the next largest group in value of

output, while tobacco products and shoes totaled $9.2 billion and $6.3 billion, respectively.

Exports and imports of food and other processed farm commodities are assumed to be offsetting items and are excluded from the accounting process.

Value Added by Sectors

In the production, processing, and distribution of the $143 billion of agribusiness products ($141 billion consumer purchases plus $2 billion net exports), by far the greater portion of value added occurs after products leave the farm. On the basis of value added, the following transactions indicate the relative importance of the three sectors in the over-all production process.

At the farm input side, purchases of manufactured products totaling $15.5 billion are the largest single cost item, accounting for about 44 per cent of the total. Included are such items as fertilizer, lime, part of the repair and operation of capital equipment, and numerous miscellaneous materials such as insecticides, pesticides, cleansing agents and weed control chemicals.

Farm-produced inputs totaling $8.4 billion were the second largest farm production expense item, accounting for about 24 per cent of the total. Such inputs, which are outputs from other farms, include seed, feeder and breeding livestock, and a large volume of livestock feed. Some of the purchased feed represents nonfarm processing costs which have been excluded from this analysis. Hired labor plus other labor services included as an input totaled $4.8 billion or 14 per cent of the total, while such other expense items as interest, taxes, and rent to nonfarm landlords of $6.5 billion accounted for the remaining 18 per cent of farm production expenses.

Farm production as used in this analysis includes products sold to other farmers, sales to the food and fiber industry, products used by the household, and Government payments to farmers. Government payments are in reality transfer payments; however, for farm income accounting it is convenient to include them with farm sales. Similarly, sales to other farmers do not represent output for the industry.

Sales of farm products to the food and fiber industry plus exports totaled $34 billion in 1967 and accounted for about 70 per cent of realized gross farm income. The

food and fiber industry purchased about $27.5 billion of American farm products plus $4.4 billion of imported farm products. The imports, however, were more than offset by $6.8 billion of farm exports. Thus the domestic industry used $31.9 billion of domestic and foreign grown farm products during the year.

Value added within the processing and marketing function accounted for over 70 per cent of the total value added by agribusiness in 1967. The supply industry was next in value added, accounting for 16 per cent, while value added at the farm accounted for only 11 per cent (Exhibit 9-2).

Inputs to the farm sector provided by the supply industries plus other expenses, primarily overhead, totaled $23.7 billion. Farm produced inputs and sales to other farmers are offsetting items of the supply and farming sectors, while hired labor and farm family labor are considered farm added items rather than purchases from the nonfarm sector.

Value added in agriculture of $16.9 billion constitutes returns to labor and management plus returns to operator-owned capital. Such returns are calculated by subtracting from the value of farm output the value of nonfarm inputs. Output of the industry includes sales of $34.3 billion to the

nonfarm sector, part of which is exported, plus $6.3 billion of non-money income which includes items consumed by the farm family and farm associated Government payments.

Processing and marketing of the end products of agriculture added $106.8 billion to the value of farm products between the farm and the ultimate consumer. These industries purchased $32 billion worth of raw farm products ($34 billion marketed by farmers less $2 billion net exports) and sold the products after processing, packaging, transporting, and in the case of meals in eating places, after food preparation and serving. Imports of raw farm products are more than offset by exports in calculating the volume of raw farm commodities purchased by this sector. Similarly, the dollar value of farm output flowing into the processing and marketing sector is reduced by the volume of farm sales to other farmers and other farm income items not represented in marketings.

Structure of the Sectors

Agribusiness industries represent wide variations in structure, ranging from the 3 million relatively small farms, many of which produce highly homogeneous products, to the few multi-plant farm machinery and chemical firms which manufacture highly differentiated products.

Farming is still the largest single industry in the nation in both number of people employed and number of decision-making units. Most farms are small relative to nonfarm firms, and the major portion of all farm labor - about four-fifths - consists of farm operators and unpaid family help.

Large numbers of farms produce essentially identical commodities. There is little opportunity for selling such commodities at different prices, and advertising the products of an individual farm is of little use. Thus agriculture is almost perfectly competitive. For example, the 1964 Census of Agriculture showed 545,000 farms producing whole milk for sale, 800,000 producing hogs, 2,000,000 producing cattle, 740,000 producing wheat, 324,000 producing cotton, and 331,000 producing tobacco.

Nevertheless, farming in recent years has begun to take on some of the characteristics of nonfarm industries. Production is becoming concentrated in fewer and larger firms. From 1950 to 1964 the total number of farms declined 41 per cent; however, the number of commercial farms (farms with farm product sales of $2,500 and over) declined only 13 per

cent. Of the commercial farms, general farms which produce a variety of products declined 40 per cent, cotton farms, 33 per cent and vegetable farms, 29 per cent (Exhibit 9-3). Part of the decline was offset by increases in the number of cash grain and miscellaneous farms.

Evidence of the trend toward larger farms is the increase in the number selling $10,000 or more of farm products. The total number of farms in this size group increased 79 per cent from 1950 to 1964. All types in this group showed major gains. For example, three types - grain, other field crops, and dairy farms - more than doubled in number during this period, and no type in this category declined, despite the general downward trend in number of all commercial farms.

Differences in the cost structures of farm and nonfarm firms are disappearing. Farm expenses in 1945 totaled only 51 per cent of gross farm income, well below that of most nonfarm businesses. By 1967 farm expenses had increased to 72 per cent of gross farm income. As expenses for purchased inputs increase, farmers are likely to respond to price changes faster than heretofore and in a similar manner to nonfarm response.

Favorable prices will provide incentive for larger variable expenditures and unfavorable prices for reduced variable expenditures. In the past, most farm inputs, including land, machinery, and operator's labor, were of the relatively fixed type and response to product price changes was relatively small.

Increasingly, farm products are being produced on a contract basis. This involves production in response to a known price or margin rather than price responding to a variable output after resources are committed.

While concentration in agriculture has increased sharply in recent years, concentration in the nonfarm sector of agribusiness has probably remained about the same or declined slightly. Examples of declining concentration are indicated by trends in some important industries. The four largest grocery chains did only 20 per cent of the nation's retail grocery business in 1963, the smallest per cent in any census period since 1948. Sales by the eight largest beef and veal processing firms declined from 30 per cent in 1947 to 28 per cent in 1964. Sales by the eight largest pork processing firms declined from 51 per cent in

1947 to 48 per cent in 1964.[3] From these data and other studies by the Commission on Food Marketing, Professor Folz concluded that, "... the food industry presents, if not an ideal model of a perfectly competitive system, the best example of healthy and workable imperfect competition that we are likely to find."[4]

Location of Farm Supply and Processing and Marketing Industries

As one operation after another left the once self-sufficient farm households, some were taken over by specialists in the smaller towns and cities located near the farming communities. Most operations, however, moved completely out of the farming community into the larger metropolitan centers. Small selling and/or purchasing units were located near the farming community as a link between the farmer and the agribusiness industry. In addition, the servicing industries such as repair shops, financial agencies, etc. developed near the farming communities.

3/ Folz, William E., "The Food Marketing Commission and Market Structure and Performance," Journal of Farm Economics, May, 1967.

4/ op. cit.

Supply Industries Concentrated in Larger Cities

Typical of those industries locating in the larger cities were the meat packing, farm machinery, and the agricultural chemical industries. By 1830 Cincinnati had become the nation's leading meat-packing center. Its packers shipped large quantities of pork down the Mississippi River to southern planters and for shipment abroad. St. Louis followed Cincinnati as a major meat-packing community, but in the 1860's meat packing in Chicago exceeded that in each of the other areas. Following the 1860's Kansas City, Omaha, St. Joseph, Fort Worth, St. Paul and Sioux City also developed into major meat-packing centers. Specialization and division of labor were probably major factors in determining meat packing locations with the added incentive of locating near major consumer markets.

Meat packing has been cited as a prime example of the benefits of division of labor and specialization. The carcass is surveyed and mapped out in detail. Workers are classified into numerous specialties including trimmers, cutters, eviscerators, graders, inspectors, etc. In total, more than 2,000 different specialists are required in the larger packing plants, with rates of pay varying according to the skill required

for the job. Following the advent of refrigeration and the marketing of dressed carcasses the industry grew at a faster rate. The number of animals slaughtered per plant rose and larger numbers of men were required for the job. Such large-scale production can utilize by-products which in turn require further specialization and ready access to by-product markets. Plants were thus located in the larger metropolitan areas of Chicago, St. Louis, and Cincinnati where large crews could be readily obtained in an era before the automobile and modern highways were available to most people.

Farm machinery manufacturing likewise calls for a setting of mass production and specialization. Supplies of technical parts must be readily available in large quantities. Similarly, ready access to steel and other vital raw materials is necessary. Research requiring a group of highly trained technicians is necessary under generally competitive conditions to create new and improved products and to discover ways of reducing the cost of old products. The assembling of such a team of managerial talent, research technicians, and work force, plus the transportation facilities for steady inflows of raw materials and outflows of finished products called for an

urban setting prior to development of our modern transportation system. Most other manufacturers of farm inputs similarly called for facilities not readily obtainable in small towns or rural areas.

Much of the food industry tended to locate near the consuming public. Restaurants located in the large population centers. Warehouses and food and fiber processing plants were concentrated in the larger cities, since it generally cost less to ship raw farm products than finished materials. Textile firms tended to locate in New England and other Northern and Eastern communities where technical skills prevailed, while the shoe industry located near the meat packing centers where large quantities of hides were readily obtainable.

Although most of the large nonfarm agribusinesses were originally located in the larger cities, some dispersal has occurred in recent years. From 1920 to 1960 meat packing declined sharply in Chicago, St. Louis, and Kansas City, areas that were formerly major meat packing centers. The decline can probably be traced to the introduction of efficient motor trucks, extension of hard surfaced roads, and other cost factors which eliminated the locational advantage of large rail terminals.

Other factors offer partial explanations for the decline. The relative advantage of locating in cities which have major supporting industries and large product markets has probably declined with improvement of transportation facilities. Markets for by-products can now be reached with relative ease from all points. Smaller communities have developed adequate public utility systems and other facilities that contribute to desirable living conditions for personnel.

Agribusiness Growth

Factors which determine the aggregate size and growth of agribusiness in the nation are interwoven in the tastes and preferences of consumers and the economies of production. Great efficiencies have occurred in food production; fewer resources are thus used than would otherwise be the case. Output has expanded as efficiency has risen. Relative prices, however, tended to decline with the gain in output as the additional quantities were marketed. Labor in agriculture moved to other sectors of the economy where returns were greater. The result was little change in total labor used in all sectors, a decline in value of food products marketed relative to other prices, and some shrinkage in the value of agribusiness production relative to Gross National Product.

This relative shrinkage of agribusiness is indicated by the decline in the percentage of consumer expenditures for these products. Consumers spent $492 billion on goods and services in 1967.[5/] Of this, only $141 billion or 29 per cent was spent on food and clothing derived from farm products (Exhibit 9-1). Almost two-thirds of all consumer expenditures was for purposes other than food and clothing, such as housing, recreation, household operations, medical care and education. In 1945, 49 per cent of all consumer expenditures was spent on farm-derived food and clothing, while less than half was spent for purposes other than food and clothing. The relative growth rates of agribusiness sales and total personal consumption expenditures are shown in Exhibit 9-4. Why this great change in the way consumers spend their incomes, and why have consumer expenditures for agribusiness products not kept pace with other consumer expenditures? The answers probably lie in developments in agribusiness and the nature of its output. Four specific characteristics of agribusiness which have contributed to its relative decline are:

1. The farming sector is highly competitive, having over 3 million independent producing firms, or more producers than any other sector of the nation's economy.

5/ U. S. Department of Commerce, Survey of Current Business, July 1968.

2. As indicated earlier, technological change has been spectacularly fast in agriculture, bringing about great efficiencies in production of food and fiber (Exhibit 9-5).

3. Demand for farm products is relatively inelastic, i.e., an increase in output generally results in a reduction in revenue. Although total demand has grown somewhat in recent decades, production efficiencies have grown much faster, thereby reducing prices of output relative to other prices and reducing returns to labor. Incentive for labor resources to seek nonfarm employment has greatly reduced the labor force in the industry.

4. As a result of lower food costs relative to incomes, consumers have had a larger share of their incomes available for spending on nonfood items.

Factors Affecting Input Growth

The size of the purchased input sector of agribusiness is determined by the marginal productivity of its products to the farm. The use of purchased inputs such as machine power, chemical fertilizer, weed controls, and feed supplements adds to net returns of individual farmers or their use would be discontinued. The farm operator must make judgments as to the cost and productivity of each input and decide what factors of production and the amount of each to use. He will purchase additional quantities of each factor as long as all costs, including interest on investment and risks, can be recovered through increased returns.

Over the last few decades new technology has shown where the addition of many new productive factors to the farm was profitable. These findings have greatly enlarged the input sector of agribusiness. Technology will doubtless continue to point the way to other profitable inputs which will result in further gains in the supply sector of agribusiness in addition to those from normal growth in demand for farm products.

Factors Affecting Processing and Marketing Growth

Factors contributing to the size of the processing and marketing sector of agribusiness include both supply and demand for food plus consumer choice as to the state of food preparation. As indicated earlier, consumers have a choice of purchasing relatively unprocessed and ungraded products at lower prices or paying someone else to perform various stages of food preparation. The greater the amount of preparation prior to reaching the ultimate consumer, the larger will be the processing and marketing sector of agribusiness. Consumers in the United States have steadily demanded an increasing amount of food processing as indicated by the growth rate of this sector. The fact that it has grown almost as fast as Gross National Product indicates that consumers are willing to pay increasing

amounts for leisure time which would otherwise be used in food preparation.

Agribusiness Growth Slower in Wealthy Nations

The fact that agribusiness has not grown as fast as total expenditures is not an unfavorable national trend. This is typical of wealthy and progressive countries. As a general rule, the fewer resources required to produce food, the higher the Gross National Product per capita. After allowance for exports and imports of food products, the level of living is inversely associated with the per cent of agricultural population to total population (Exhibit 9-6).

As was typical of the early decades of the United States, the relatively undeveloped nations of Zambia, Malawi and Thailand have a large per cent of their population living on farms. Furthermore, the farms are primarily subsistence units with the farm labor consuming more than 50 per cent of total output. The processing and marketing sector of agribusiness in such countries is relatively small as most food processing is performed on the farm. Also, the Gross National Product per person in these countries is relatively low. As Gross National Product per capita increases, the agricultural population as a per cent of total population declines, a larger per cent of farm output enters commercial channels,

and the processing and marketing sector of agribusiness correspondingly rises. The United States, which is relatively self-sufficient in food production and high in Gross National Product per capita, uses only 3 per cent of its agricultural output on the producing farms. In the United Kingdom, which imports about 50 per cent of its food, farms are even more specialized, with the farm families using only one per cent of farm output in their households.

Growth of Agribusiness Employment

Growth of agribusiness employment in recent decades reflects changes in both supply and demand factors. The rising stream of new farm technology, coupled with an increasing willingness of farmers to adopt new methods of production, have resulted in some employment gains in the farm supply sector of agribusiness, partially offsetting the loss of farm workers. Similarly, the movement of operations from the farm to the processing and marketing sector released farm workers and increased employment in this area.

The extent of manpower movements in the three agribusiness sectors and the rising efficiency of manpower use in the entire agribusiness complex are indicated by the employment data in Exhibit 9-7. The data for selected supply and processing

and marketing industries greatly underestimate employment in these functions. They include only workers employed directly in the named industries, whereas another layer of workers in supporting industries such as iron and steel for farm equipment, power, food refrigeration , pulp and paper for containers, transportation, utilities, finance, real estate sales, telephone companies, etc. are excluded. Despite these shortcomings, the trends from 1958 to 1966 for each sector are probably quite realistic. Furthermore, the dual role played by technology in reducing farm employment and at the same time providing more off-farm jobs is apparent.

Employment in agriculture declined from 5.6 million to 4.0 million, an annual rate of 4.2 per cent per year during the eight years 1958 to 1966. This was somewhat greater than the average rate of decline throughout the post-World War II period.

In contrast to the rapid decline in employment on farms, workers in most major agribusiness industries increased. Those in the selected supply industries group increased from 594,000 to 644,000, while those in the processing and marketing group increased from 8 million to 9 million.

The number of farm workers relative to the total in agribusiness thus declined sharply during the period. Farm employment declined from 40 per cent of agribusiness employment in selected industries in 1958 to 29 per cent in 1966.

Despite major weaknesses in the employment data, employment indicated for agribusiness points to rising production efficiency throughout all sectors of food and fiber production. Total employment has remained relatively stable, with gains in the supply and processing and marketing sectors nearly offsetting losses on farms. Thus output gains per worker have more than offset the increase in production and processing of food and fiber products.

Growth of Agribusiness Sales

Using dollar value as the yardstick, both the farm supply and the processing and marketing sectors of the agribusiness aggregate have grown at very rapid rates in recent decades. Since 1945 the value of end products from the processing and marketing sector has increased more than 4.0 per cent per year, slightly less than farm production expenses, but well above the rate of gain in farm output (Exhibit 9-1). During the two decades ending in 1945, all sectors grew at approximately the same rate.

Indicative of basic shifts in the farming sector are the growth rates of specific groups of input items. For example, during the decade ending in 1955, purchases of manufactured inputs, primarily machinery, rose at the highest rate, 7.4 per cent. This was a result of the very rapid early post-war mechanization in the industry. Agriculture came out of World War II machine hungry. Highly efficient machine power had been developed during the depression of the 1930's. When the war came and farm incomes rose concomitant with a farm labor shortage, horsepower became obsolete on almost all commercial farms. The farm machinery manufacturers had, however, retooled for making military hardware. Thus, when the war ended in 1945 there was a deluge of orders for farm tractors, multi-row equipment and other farm machinery. By the end of the 1945-55 decade, this demand had subsided somewhat.

In the 1955-67 period, the rising wave of farm specialization and recombination of resources pushed other expenses and farm produced inputs up at higher rates than manufactured inputs. The rising purchases of feed, seed, and livestock inputs indicate the further decline in number of enterprises on individual farms and the rising number of

highly specialized farm units, such as large commercial feedlots, dairy parlors, and factory-like broiler and egg operations. These farms depend on other highly specialized farms for the production of a major portion of their supplies. For example, ranches specialize in producing the feeder animals, while highly mechanized feedlots handle feeding operations. Large feedlot operators and broiler producers in turn purchase feed from other farms which specialize in feed production. Most seed is similarly produced on highly specialized farms. The high rate of gain in other expense items is heavily weighted by interest payments, the increase reflecting both higher rates and more extensive use of borrowed funds as a result of the reorganization of farms into larger units.

Value of farm output increased at an average rate of about 3 per cent from 1925 to 1967 (Exhibit 9-1). The rate was somewhat above 3 per cent in the periods 1925-45 and 1955-67 but somewhat less during the decade ending in 1955.

On the basis of realized gross farm income, farm output gains were sufficient to absorb rising production expenses during the two decades ending in 1945. As noted,

the value of both farm output and purchased inputs rose at a 3.2 per cent rate. The farm sector, however, absorbed major increases in purchased inputs during the period 1945-1967 as the purchased input rate of gain was well above the output rate.

Processing and marketing output rose at a slightly lower rate than farm output in the two decades ending in 1945, indicating that the ratio of farm product sales to retail sales of processed farm commodities was increasing. In contrast, since 1945, sales of processed farm commodities have increased at sharply higher rates, and the rate of gain in farm output has declined relative to such sales.

Changes in the contribution of value added in agribusiness since 1945 are shown in Exhibit 9-4 along with the change in total consumer expenditures. Consumer expenditures are a proxy for national economic growth since they are a fairly stable percentage of Gross National Product and account for almost two-thirds of the total. In addition, comparisons of agribusiness sales with consumer expenditures are consistent because both exclude capital investment. Although no agribusiness sector rose at the 6.6 per cent rate of total consumer expense, the processing and marketing and nonfarm inputs each had growth rates of about 5 per cent per year.

Most significant, however, is the slow rate of growth in dollar value added in agriculture during the period 1945-67 when the nation was experiencing unparalleled prosperity and relatively high employment. At the end of this period, value added at the farm was only 12.7 per cent more than at the beginning, while substantial price increases and real product gains occurred in most other areas of economic activity. This ability to produce increasing quantities of farm products at a stable level of revenue attests to major efficiency gains in agriculture during this period of rapid change.

The total dollar value of agribusiness products and the value added by each sector during the period 1945-67 is shown in Exhibit 9-2. The contribution of each sector to the total again demonstrates the rising importance of the supply and processing and marketing sectors. On the other hand, value added at the farm has been relatively stable in absolute amount but has declined relative to that in each of the other sectors and to the total as the value of end products rose.

Efficiency in Agribusiness

Efficiency gains have been very great in the farming sector of food and fiber production. Output per man-hour of labor on crops and livestock more than tripled during the 20-year

span from 1945 to 1965. In 1945 the average farm worker produced a sufficient quantity of farm products for himself and 14.5 other persons, while in 1966 the average farm worker produced an adequate quantity for himself plus 39 other people.

Efficiencies have probably occurred in the nonfarm sectors of agribusiness at about the same rate as in all nonagricultural industries. As shown in Exhibit 9-5, the rate of gain in output per man-hour for the nonagricultural portion of the private economy has been quite steady, averaging 2.2 per cent per year since 1925. The gain from 1945 to 1967 was 64 per cent, only about one-fourth the rate of gain in the farming sector.

Rising production efficiency has an impact on the value of transactions in the various sectors of agribusiness. For example, rapid increases in the efficiency of real output on the farm generally result in lower product prices and some increases in the amount of the product used. Thus, efficiency gains in agriculture generally result in greater output but smaller revenue as the increase in volume sold does not offset the price decline. The dollar volume of transactions in the various sectors of agribusiness thus reflects

feeding season, much of this credit is extended now for a year and in some cases the terms are for three years and over. A farm loan survey conducted by the Federal Reserve System in 1966 showed that the volume of nonreal estate farm loans held by commercial banks with maturities of three years and more increased faster from 1956 to 1966 than those with shorter maturities.

Reflecting the sharp increase in returns to scale in agriculture, farm mortgage credit has increased at a high rate in recent decades. Since the early post-World War II years such credit has increased about fivefold to the record $25.5 billion in 1968.[6/]

The changing cost structure of farming as a result of rapid developments in the farm supply sector places greater emphasis on farm credit analysis than heretofore. Major fluctuations in income could formerly be absorbed by the farm family, as family labor plus other non-purchased materials constituted the major portion of costs. Now, however, purchased inputs total more than four-fifths of the value of all

---

6/ U. S. Department of Agriculture, "Farm debt, interest payable by farmers ... 1919-1968," December 20, 1968.

farm inputs and two-thirds of the value of farm product sales. The farmer has thus moved into the category of a businessman. His capital requirements are high in relation to returns. His margin from operations has declined. He can now go bankrupt within a short period of time.

Credit for farming thus requires special analysis for each individual farm. Accurate and complete operating statements are essential. The professional ability of each farmer to squeeze a profit from the operation must be analyzed in greater detail with the sharp rise in costs relative to receipts and the greater exposure to risk of both farmer and lender.

Further complicating farm credit analysis is the increasingly close relationship of the different agribusiness sectors. Some firms operate in all three sectors. A feed business, which supplies inputs to farming for example, may have sizable interests in livestock feeding, meat packing, and other food processing operations. Similarly, fruit and vegetable processing firms may have a direct interest in vegetable farming. Some retail grocery chains are also producers and processors of farm commodities. In many of these highly integrated operations the farming sector

Questions Based on Chapter IX

1. What is agribusiness?
2. Why do farmers no longer produce most of their farm supplies and market their output to consumers?
3. Why is the agribusiness concept useful?
4. Which of the agribusiness sectors has had the most rapid growth rate in recent decades?
5. Explain why the quantity of food intake per person is still growing in some countries while it has leveled off in others.
6. In view of the fact that per capita food intake has leveled off in wealthier nations, how do we explain their agribusiness growth?
7. Can we credit all the efficiency gains in agriculture to the efforts of farmers? Why?
8. Why are adjustments in the declining farm sector of agribusiness more painful than adjustments in the expanding sectors?
9. Discuss the favorable features of the relatively slow growth rate of agribusiness.
10. What are the prospects for credit demand in each of the three agribusiness sectors?

11. What is the general relationship between the level of Gross National Product on a per capita basis and the per cent of population engaged in agriculture in the various nations?

Topics for Investigation

1. Prepare a list of agribusiness industries in your bank market area.
2. Make an estimate of the employment in agribusiness by sector, i.e., farm, farm supply, processing and marketing farm products and calculate the per cent of nonfarm agribusiness employment that is the result of local farming activity.
3. On the basis of above employment data, make an estimate of the per cent of your bank's loans and deposits which have originated from the agribusiness sector.

Exhibit 9-1
Size and Growth of Agribusiness

	Transactions in 1967 (billions of dollars)	Percentage Change Annual Rate 1925-1945	1945-1955	1955-1967
Cash Farm Expenses				
Purchases of manufactured inputs 1/	$ 15.5	3.7 %	7.4 %	3.5 %
Farm produced inputs 2/	8.4	5.2	3.6	5.0
Hired labor	2.7	4.1	1.4	1.3
Other labor services 3/	2.1	3.5	8.4	1.3
Other expenses 4/	6.5	0.0	3.6	6.7
Total	$ 35.2	3.2 %	5.2 %	4.0 %
Farm Output				
Sales to other farmers 2/	$ 8.4	5.2 %	3.6 %	5.0 %
Sales to the nonfarm sector	34.3	3.2	3.0	2.7
Other income items 5/	6.3	2.2	-1.5	4.8
Total (realized gross income)	$ 49.0	3.2 %	2.5 %	3.3 %
Sales of End Products				
Food and beverages	$ 109.4	3.7 %	5.2 %	4.1 %
Tobacco	9.2	3.4	5.6	5.2
Clothing, excluding footwear 6/	16.2	- 7/	1.5	2.4
Shoes	6.3	- 7/	4.6	4.8
Net exports 8/	2.3	-	-	-
Total	$ 143.4	3.0 %	4.2 %	4.1 %

1/ Gross capital expenditures plus repair and operation of capital items less estimated nonfactory labor costs; purchases of processed feed (estimated at one-third of total), fertilizer, and lime; and miscellaneous items such as pesticides, electricity, transportation, veterinary services, and insurance.

2/ Feed (estimated at two-thirds of total), seed, and livestock.

3/ Estimated nonfactory labor costs of new capital items plus repairs and operation of capital items.

4/ Interest, taxes, and net rent to nonfarm landlords.

5/ Nonmoney incomes - products directly consumed in households, rental value of dwellings, and government payments.

6/ Allocated on basis of consumption of cotton and wool to total fiber.

7/ Clothing and shoes were combined in 1925.

8/ Exports and imports of processed farm commodities assumed to be offsetting.

Sources: Farm expenses and output, United States Department of Agriculture, Farm Income Situation, July 1968. Sales of end products, United States Department of Commerce, The National Income and Product Accounts of the United States, 1929-1965; Survey of Current Business, July 1968; Statistical Abstract of the United States; The Statistical History of the United States from Colonial Times to the Present (Stamford, Connecticut: Fairfield Publishers, Inc., 1965); and United States Department of Agriculture, Statistics on Cotton and Related Data, 1930-1967.

Exhibit 9-2

Value Added in Agribusiness in 1967

	Billions of Dollars 1967	Percentage Change Annual Rate 1945-1967
Nonfarm inputs [1]	$ 23.7	5.3 %
Value added at farm [2]	16.9	0.5
Value added during processing and marketing [3]	106.8	4.8
Net exports	2.3	3.9
Total	$149.7	4.1 %
Nonmoney farm income	- 6.3	1.9
Total (retail sales plus net exports)	$143.4	4.3 %

1/ Farm production expenses less farm produced inputs and hired labor. Expense data for capital items are based on depreciation and capital consumption, and thus are not consistent with data in Exhibit 9-1.

2/ Farm product sales to nonfarm sector plus nonmoney farm income less nonfarm inputs.

3/ Sales of end products less farm sales to nonfarm sector and net exports.

Sources: Exhibit 9-1 and United States Department of Agriculture, Farm Income Situation, July 1968.

Exhibit 9-3

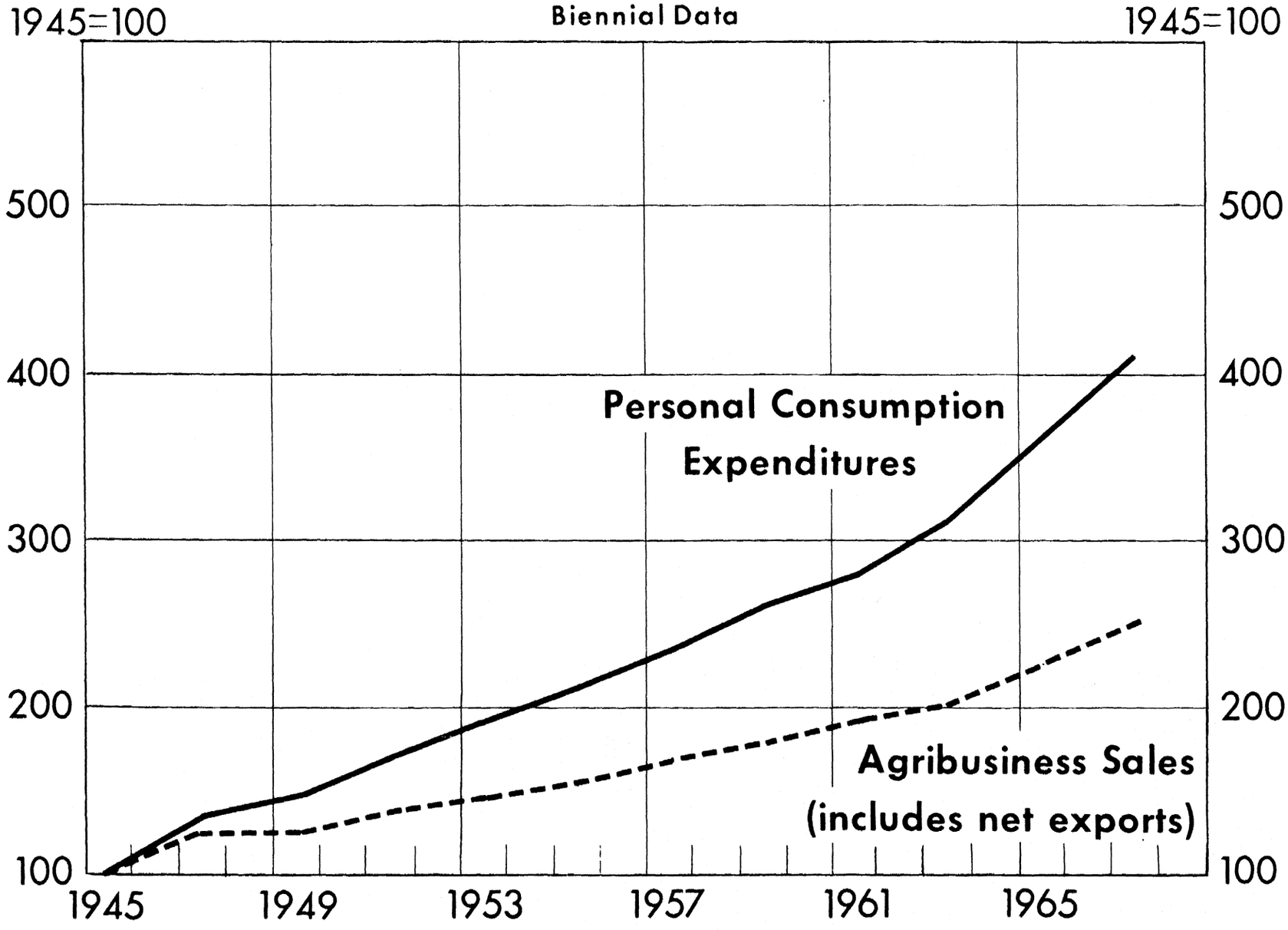
Percentage Change in Number of Commercial Farms by Type and Output, 1950-1964

Type of Farm	Value of Farm Products Sold			
	All Commercial Farms [1/]	$2,500 - $4,999	$5,000 - $9,999	$10,000 and Over
Total	- 13.1	- 49.8	- 30.1	79.2
Cash-grain	13.2	- 29.0	- 17.3	110.5
Cotton	- 32.9	- 54.4	- 35.9	21.4
Other field crops	- 7.8	- 52.1	39.0	177.1
Vegetable	- 29.0	- 52.7	- 45.9	12.9
Fruit and nut	- 2.1	- 43.3	- 24.9	67.5
Poultry	- 18.7	- 76.8	- 57.9	80.6
Dairy	- 13.8	- 67.1	- 32.5	161.0
Livestock farms and ranches	- 10.5	- 28.7	- 34.3	37.7
General	- 40.3	- 64.2	- 51.8	64.7
Miscellaneous	38.1	17.2	31.3	61.1

1/ Only farms with a value of products sold of $2,500 or more.

Source: United States Census of Agriculture, 1964.

Growth in Personal Consumption and Agribusiness



Real Product Per Man Hour in the Private Economy-United States

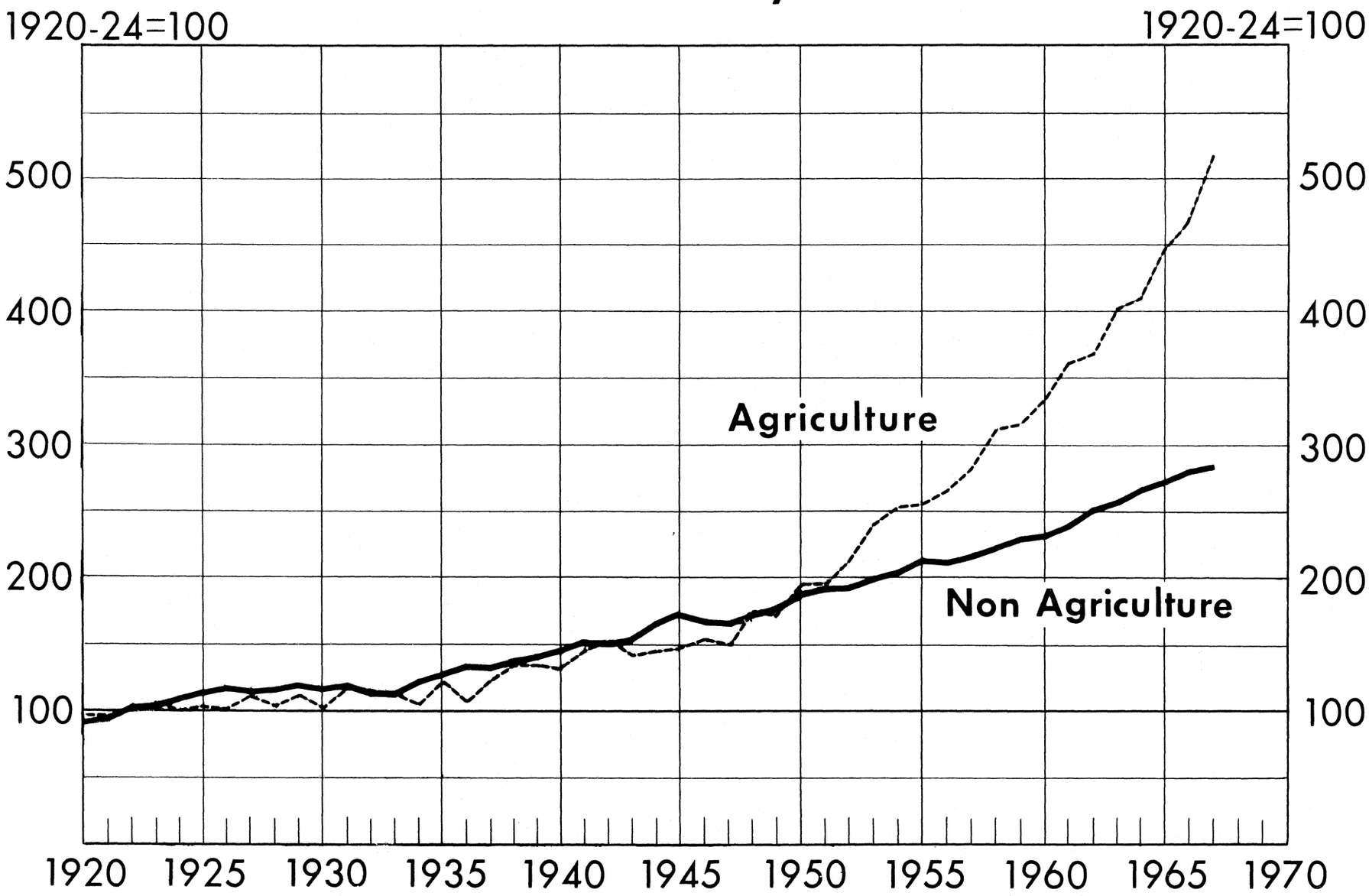


Exhibit 9-4 Growth in Personal Consumption and Agribusiness

Sources of data: United States Department of Commerce, The National Income and Product Accounts of the United States, 1929-1965; Survey of Current Business, July 1968; Statistical Abstract of the United States; The Statistical History of the United States from Colonial Times to the Present (Stamford, Connecticut: Fairfield Publishers, Inc., 1965); and United States Department of Agriculture, Statistics on Cotton and Related Data, 1930-1967.

Exhibit 9-5 Real Product per Man Hour in the Private Economy - United States

Sources of data: United States Department of Labor, Trends in Output per Man-Hour in the Private Economy, 1909-1958 and "Indexes of Output per Man-Hour for the Private Economy, 1947-1967."

Exhibit 9-6

Selected Population and Economic Characteristics for Various Countries

Country	Agricultural Population As a Per Cent of Total Population [1]	Per Cent of Agricultural Production Used Directly by Households of Producers [1]	Gross National Product Per Capita in 1965 (U. S. dollars)
United Kingdom	6	1	1,791
United States	8	3	3,536
Canada	11	5	2,505
Norway	19	13	1,905
Switzerland	11	14	2,298
France	18	14	1,922
Ireland	49	18	951
Austria	22	22	1,272
Japan	38	25	864
Germany (West)	15	28	1,976
Philippines	69	28	161
Italy	44	34	1,094
Thailand	63	45	125
Togo	91	55	
Malawi	92	67	348 [2]
Zambia	77	75	244
Ethiopia	90	82	

1/ Date of data varies by country; for five countries, including the United States, data are for 1960 or later. For other countries, data are as of some date between 1950 and 1960.

2/ Data for 1963

Sources: Food and Agriculture Organization of the United Nations, Monthly Bulletin of Agricultural Economics and Statistics, Vol. 14, May 1965. Gross National Product Per Capita calculated from gross national product data from United Nations, Statistical Yearbook, 1966 and exchange rate data from International Monetary Fund, International Financial Statistics.

Exhibit 9-7

Employment in Selected Agribusiness Industries

	Number of Workers (in thousands)	
	1958	1966
Selected Supply Industries		
Farm machinery and equipment	112.7	148.0
Agricultural chemicals	44.5	54.7
Agricultural services, forestry and fisheries	119.1 1/	151.6
Farm and garden supply stores	82.5	95.7
Petroleum industry 2/	235.3	194.3
Total	594.1	644.3
Agriculture	5,586.0	3,979.0
Processing and Marketing of Farm Products		
Food and kindred products	1,772.8	1,778.9
Tobacco manufacturers	94.5	83.9
Textile mill products (proportion of wool and cotton to total)	553.1	437.5
Apparel and related products	1,171.8	1,398.8
Leather and leather products	359.2	363.5
Food stores	1,264.5	1,538.3
Eating and drinking places	1,528.9	2,063.8
Apparel and accessory stores	591.8	665.5
Groceries and related products	484.9	511.6
Dry goods and apparel	122.0	142.8
Total	7,943.5	8,984.6

1/ Data for 1959.

2/ Includes petroleum refining and related industries and gasoline service stations. Employment allocated on the basis of expenditures by farmers for petroleum fuel and oil to portion of national income attributed to petroleum refining and related industries.

Sources: United States Department of Labor, Employment and Earnings Statistics for the United States, 1909-1967; United States Department of Commerce, National Income and Product Accounts of the United States, 1929-1965 and Survey of Current Business, July 1968; United States Department of Agriculture, Statistics on Cotton and Related Data, 1930-1967 and Farm Income Situation, July 1968; and Economic Report of the President, February 1968.