Chapter 2

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**HE** commercial farm today is not merely land, machinery, livestock, and other inventory items, along with enough labor to operate it. The top one-third to one-half of our commercial farms require high-level managerial ability to coordinate the resources into a profitable operation. The value of these farms as a going concern is greater than the sum of the values of the individual resources.

Since 1940, technology has been applied to American agriculture at an unparalleled rate. All segments of agriculture have been affected. Examples are too numerous to cite here, but the results attest to the magnitude of the change. Between 1940 and 1955, crop production per acre increased one-fourth and total farm production increased more than one-third. This level of production was achieved, despite a 25 percent decline in the agricultural labor force, because output per man hour in agriculture nearly doubled. Between 1950 and 1956 alone, output per man hour in American agriculture increased approximately 20 percent.

From 1940 to 1956, physical production of commodities from the United States agricultural plant increased 36 percent. The increase from 1950 to 1956 alone was 13 percent. During the 1940-56 period, U. S. population grew only 27 percent and the increase from 1950 to 1956 was 10.5 percent. Effective demand probably increased more rapidly than population, but it still increased less rapidly than actual farm production and much less rapidly than potential farm production. Studies of the U.S. Department of Agriculture in cooperation with state experiment stations show that technology has reached the stage where farm production could easily be even higher if prices were not acting as a damper.

In general, foreign outlets for products of our agricultural plant are limited, except for those subsidized by the federal government. In 1956, our agricultural exports increased for the third consecutive year and approached the high levels of 1927 and 1952. Even so, depressed economies and exchange difficulties of foreign countries, along with our attempt to maintain domestic prices above the world level, definitely limit the extent to which normal commercial outlets abroad can help us dispose of the large surplus our agricultural plant is geared to produce.

The American agriculture production plant will be viewed from the

following three standpoints: (1) the present situation, (2) trends in agricultural resources and production, and (3) prospects for further change.

## CURRENT SITUATION

American agriculture is big business. Measured in terms of current dollars, the agricultural plant was valued in excess of 170 billion dollars on January 1, 1956. Approximately 60 percent of this total value consisted of real estate and the remaining 40 percent of other physical assets — machinery, livestock, crops on hand, household goods, and financial assets. Debts of agricultural proprietors totaled slightly less than 19 billion dollars, or approximately 11 percent of the total asset value. Financial assets of farmers exceed the total indebtedness; therefore, the debt structure remains very sound, and liquid assets continue high although not as well distributed as immediately following the war. Thus, the financial solvency of American agriculture is one of the real strengths of the current agricultural situation.

# Number and Size of Farms

The 1954 Census of Agriculture indicated that there were 4.8 million farms in the United States under the Census definition of a farm. Like many manufacturing or processing industries, a relatively small percentage of the total firms (farms) market the major share of the agricultural commodities sold each year. The effective producing farms of the United States are considerably less than the 4.8 million total enumerated by the Census. The Census lists 3.3 million commercial farms and 1.5 million noncommercial farms in 1954. Therefore, one-third of the total farms were noncommercial and their market sales totaled only 2 percent of the total agricultural sales in 1954. The classification of farms in Table 2.1, according to the value of sales, shows that a small percentage of the commercial farms produce a relatively high percentage of the total marketable agricultural production each year. For example, less than 3 percent of our farms with sales of \$25,000 and over sold nearly one-third of the agricultural market products in 1954. Less than 10 percent of the farms with sales totaling \$10,000-\$24,999 per farm produced 27 percent of the market sales in 1954; therefore, the 583,000 farms with gross sales of \$10,000 or more, representing about 12 percent of all farms, produced over 58 percent of all farm products sold. All farms with gross sales of \$5,000 or more, representing 27 percent of our farms, produced nearly 80 percent of all farm products sold in 1954. It is also noteworthy that the commercial farms averaged 336 acres in size in 1954 whereas all farms, commercial and noncommercial, averaged 242 acres.

In 1956, one farm worker produced enough for 20 people, on the average. Viewed in terms of class I, II, and III commercial farms, one

farm worker on these farms supported approximately 45 people in 1956. This indicates the wide difference in output per farm and per farm worker within the total agricultural plant. Farms in economic classes II, III, and IV, by and large, represent the family-size farms long considered the backbone of American agriculture. Half of the commercial farms are included in these classes, and they produce approximately two-thirds of the total farm products sold. The 1.2 million farms in economic classes V and VI include most of the farm families with chronically low incomes, as the small size of the farm business ordinarily does not provide adequate employment for the family labor force.

#### **Agricultural Labor Force**

Much of the management of the agricultural plant is vested in the 4.8 million farm operators. The total labor force in American agriculture in 1956 was 8.2 million workers. More than three-fourths of them were family workers. Nonfarm employment has become more attractive as the pressure to supplement family income has increased in recent years. In 1954, nearly one-half of all farm operators reported some off-farm work and almost 28 percent reported 100 days or more of offfarm work. Income of the farmer and members of his family from offfarm sources exceeded the value of agricultural products on nearly onethird of the farms in 1954.

Although still minor, an increasing share of decision-making in farm organization and operation has been shifted to federal government

Economic class	Value of sales	Number of farms	Percentage of all farms	Percentage of market sales	Ave. size of farm
	Dollars	Thousands	Percent	Percent	Acres
Commercial farms:					
Class I	25,000 and over	134	2.8	31.3	1,939
Class II	10,000-24,999	449	9.4	26.9	538
Class III	5,000-9,999	707	14.8	20.5	312
Class IV	2,500-4,999	812	17.0	12.1	201
Class V	1,200-2,499	763	16.0	5.7	133
Class VI	250-1,999	462	9.7	1.4	97
Total		3,327	69.6	98.0	336
Noncommercial farms <sup>1</sup>		1,455	30.4	2.0	71
All census farms		4,782	100.0	100.0	242

Table 2.1. Number and Percentage of Farms and Proportion of Market Sales, by Economic Class, United States, 1954\*

\*Source: United States Bureau of the Census

<sup>1</sup>Includes part-time, residential and abnormal farms.

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as a result of government programs of various kinds, to commercial agencies as a result of "packaged" technologies, and to professional farm managers on tenant-operated farms.

#### **Farm Mechanization**

By 1956, 4.5 million tractors and related power equipment had largely replaced the 26.7 million head of horses and mules on farms in 1918. More than 10 percent of cash receipts from farming are now annually being used to purchase new tractors, machinery and equipment, and new and used motor trucks and automobiles. The large amount of power machinery used is a major reason for the high agricultural production per farm worker in the United States. The importance of miscellaneous farm capital has been increasing tremendously in the farming operations. This resource includes principally livestock and necessary cash for various operating expenses such as purchase of fertilizer, feed, seed, and services of various kinds.

The investment per farm worker varies considerably with type of farm throughout the United States. For example, in 1956 investment per worker was about \$59,000 on the typical family-commercial cash grain farms in the Corn Belt, \$54,000 on winter wheat farms in the Southern Plains, \$35,000 on cattle ranches in the Northern Plains, \$14,000 for dairy farms in the central Northeast, and \$8,000 on cotton farms in the Southern Piedmont. The average investment per worker for all United States agriculture was \$18,470 in 1955.

# TRENDS IN AGRICULTURAL RESOURCES AND PRODUCTION

Let us take a closer look at the scientific and technological changes we have experienced in our generation. If the full recorded history of man, starting with the story of creation in the Book of Genesis and continuing until 1854 - 100 years ago — were to be put on the face of a clock, the hands of the clock would have moved from noon around to 11:45 p.m. The last 15 minutes would represent the last century. Output per worker in the United States would have increased more in the last 15 minutes than in the entire previous 11 hours and 45 minutes. And most of the increase within that last 15 minutes would have occurred since the turn of the present century. Many of the people now living have played a substantial role in this amazing scientific and technological revolution.

Let us imagine for a moment that a good Egyptian farmer in the day of Moses could have been brought back to life in the day of the Caesars, some twelve centuries later, and placed on a good farm in Italy, then the most advanced nation of the world. He could have farmed with practically no additional instruction, for the art of agriculture had changed little, if any, in the intervening centuries.

Suppose that same farmer were brought back to life on a good

English farm in the day of Shakespeare, some four centuries ago. He still would have been a pretty good farmer with no additional instruction.

Now let us bring that same ancient Egyptian farmer to the eastern shores of America 150 years ago and put him on Thomas Jefferson's farm, one of the advanced farms of that day. He still would not have found the art of farming very different from that which he practiced in Egypt 3,000 years earlier. He would have used the same power, the same crude implements, and large amounts of hand labor. He would need to know very little about fertilization, improved varieties, highproducing breeds of livestock, and the numerous mechanical and electrical implements and tools found on our modern farms.

On a modern American farm, that same farmer would be completely bewildered. He would not even recognize the working end of the tractor parked in the farmyard. He would probably raise the cry of "witchcraft" at all the amazing things performed by mechanical and electrical power. He would require hard years of instruction and apprenticeship to operate the modern American farm.

Family farms will inevitably become larger, as the number of workers on farms decreases and as mechanization of our farms continues at a rapid pace. A closer look at the trends in number and sizes of farms, agricultural labor force, farm output, farm mechanization, and the financial and managerial aspects of commercial farming today are needed to determine its impact on the American economy and American agriculture.

#### Fewer but Larger Farms

More than 1.5 million farms, or about one-fourth of our farms, have disappeared from American agriculture since 1929. More than onethird of this change took place in the five years, 1949-54, and more than two-thirds of the change took place since 1945 (Table 2.2). All the decline in the number of farms took place among the commercial farms.

Year	All		Commercial		Part-time, residential, and subsistence	
	(Acres)	(Thousands)	(Acres)	(Thousands)	(Thousands)	
1929	157	6,289	a	4,723	1,480	
1939	174	6,097	220	4,265	1,685	
1944	195	5,859	255	3,941	1,738	
1949	215	5,384	300	3,465	1,917	
1954	242	4,782	336	3,100	1,682	

Table 2.2. Trends in Major Groups of Farms, United States, 1929-54\*

\*Source: McElveen, J. V., "Family farms in a changing economy," U.S.D.A. Agr. Inf. Bul. No. 171, Mar. 1957, pp. 19 and 26.

<sup>a</sup>Not available.

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Part-time, residential, and subsistence farms increased approximately 200,000 in number between 1929 and 1954; therefore, only two-thirds of the commercial farms of 1929 are now in existence. Total land in farms is slightly higher than it was 25 years ago although cropland acreage is approximately the same. Thus, the 1.6 million commercial farms that have disappeared at the rate of over 60,000 per year have been absorbed into active, now-existing farms.

The average size of farms in the United States increased from 157 acres in 1929 to 242 acres in 1954, an over-all increase of nearly 40 percent since 1940 and over 50 percent since 1929. Commercial farms increased in size from 220 acres in 1940 to 336 acres by 1954 — an increase of more than 50 percent. In addition, commercial farms averaged nearly 50 percent larger than all census farms, indicating the extreme smallness of the part-time, residential, and subsistence farms.

#### **Mechanization Continues**

Even though mechanical power and equipment has replaced horse and mule power and related equipment, mechanization continues to substitute fairly rapidly for labor in agricultural production. The growth of mechanization in the past few years has been so great that the impact has not yet been fully felt. Tractor numbers in 1955 were double the total on farms in 1945, and the total number has tripled since 1940. The number of motor trucks on farms more than doubled between 1945 and 1955. The number of pick-up balers in 1955 was more than twice the total number on farms in 1950. Practically all farms now have electricity; the number of home freezers on farms in 1955 was one and one-third times the number in 1950. Approximately two-thirds of the farmers have television sets, and the remaining farmers are obtaining sets at the rate of about 1 percent per month.

Farm mechanization has had far-reaching effects and is one of the basic causes of the revolution in American agriculture. Crop production in the United States today is almost totally mechanized. The livestock industry is mechanizing rapidly. Prospects for changes in the livestock industry in the period ahead are fully as great as those in field crops during the past two decades. Much of the hard work and drudgery of farming has been removed as production practices have been modified and the timeliness of farming operations has been much improved.

# Labor Force Is Much Reduced

The workers in agriculture totaled 13.4 million in 1920, 11 million in 1940, and about 8 million in 1956 — an 18 percent decline from 1920 to 1940 and a 40 percent decline from 1920 to 1956. In 1850, one farm worker supported approximately 5 people. By 1940 one farm worker

supported 11 people and by 1956 nearly 20 people. From 1940 to 1956, the number of persons supported by one farm worker increased one and one-half times as much as in the preceding nine decades — a further indication of the revolutionary changes that have taken place in agriculture. With total agricultural production increasing and the agricultural labor force decreasing, production per farm worker obviously has been increasing at a phenomenal rate. Output per hour of farm work today is more than twice as much as 25 years ago.

One reason for this increase in farm labor productivity is the increase in the use of other resources with each unit of labor. From 1940 to 1955, for example, the quantity of various selected resources used with each unit of man labor in farm production increased as follows: cropland, 45 percent; fertilizer, 498 percent; tractors, 379 percent; and feed purchased, 243 percent. The amount of capital used per worker has become even greater in agriculture than in American industry.

The cost-price squeeze and the mechanization of the agricultural plant has induced farm people to seek more part-time nonfarm employment. In 1954 one-eighth of the farms in the United States were classified as part-time, and 28 percent of all farm operators worked off their farms at least 100 days during the year, as compared with 16 percent in 1939. In states with particular opportunities for people that work in industry to live on farms, the percentage of operators with at least 100 days of off-farm work was much higher — e.g., 48 percent in New Hampshire, 39 percent in Pennsylvania and Michigan, and 35 percent in California. Part-time farming has become an important transitional step in the transfer from agricultural into industrial occupations.

# **Technology Brings Specialization**

The pounds of plant food used in commercial fertilizers for United States farm production more than doubled from 1940 to 1948 and increased another three-fourths from 1948 to 1956. This is only one illustration of changes that have been taking place in production techniques. Genetic improvements have been striking. In Indiana, for example, none of the four wheat varieties that accounted for three-fourths of the acreage in 1955 even appeared in the list of the important varieties of 1944, and 11 varieties that constituted two-thirds of the acreage in 1944 do not appear in 1955. One result of technological improvements of various kinds has been a sharp increase in the rates of crop and livestock production. Crop output per acre in the United States increased approximately 20 percent between 1940 and 1956 and livestock production per breeding unit increased 27 percent during the same period.

Measurements of specialization for the agricultural plant as a whole are not available, but we know that the specialized knowledge and equipment needs for efficiently operating any farm enterprise encourages specialization — large volume per enterprise. Farmers are handicapped if they try to keep up to date on methods for many enterprises. They are

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also handicapped if they either purchase equipment to use labor efficiently on many small enterprises or try to get along without the equipment. An additional encouragement to specialization is that better methods of meeting adverse production conditions have: (1) reduced risk in connection with having many "eggs in the basket," and (2) increased ability to produce off-season, thus permitting the specialized producer to distribute his labor more evenly over the year than formerly.

## **Financial Position Continues Strong**

The market value of the agricultural plant more than tripled between 1940 and 1956, rising from 53.8 billion dollars to 170.1 billion dollars, while farm indebtedness increased less than 90 percent from 10 billion dollars to 18.8 billion dollars during the same period. Non-real-estate items and financial assets form an increasing part of the total value of the agricultural plant. This increase in non-real-estate items is taking place mainly in capital goods with a productive life much in excess of one year, the bulk of it being in farm machinery and breeding stock.

The agricultural plant of this country, in the aggregate, is still extremely solvent. In none of the years 1920 to 1940 was the industry's financial condition as good as during 1947 to 1956. Certainly, the strong financial condition has materially assisted agriculture in the face of the cost-price squeeze of the past several years. Nearly triple their 1940 level, land values in the United States have risen more than one-third since 1950 and have continued to rise at an average rate of 3 percent per year since the cost-price squeeze started in 1953.

A realistic examination of the farm picture must take into account the time farms were purchased and the actual dollar investment for owner-operated farms. Certain assumptions were made with regard to this in Table 2.3 which indicate clearly: (1) current earnings relative to actual investment, (2) the expanded credit base of the modern commercial farm, and (3) the continued ability of commercial farmers to adjust to profitable new technological developments.

#### The Family Farm Remains

Some public concern has been expressed about the family farm position being jeopardized by the increased farm size, expanded capital requirements, and fewer agricultural workers necessary to operate the agricultural plant during the past two decades. A close look at the ownership pattern of farm land in the United States does not bear out this public concern. As indicated in Table 2.4, nearly 98 percent of the land east of the Mississippi River is held by individuals, partnerships, or estates and more than 80 percent of the land west of the Mississippi is held in the same fashion. Corporate ownership of farm land totals less

#### Table 2.3. Typical Commercial Hog-Beef Fattening Farm, Corn Belt\*

Approximately 5 percent of the farm real estate in the United States changes hands each year. In other words, farms are transferred about once every twenty years on the average. Let us assume the typical Corn Belt farm has been owned for about 10 years and attempt to analyze its income and financial status in reviewing the current profit position of agriculture.

		1945	1955	
1.	Size of Farm:	189 acres	199 acres	
2.	Capital			
	Land and buildings	\$19,280	\$37,610	
	Machinery	2,920	7,170	
	Livestock	6,170	9,820	
	Crops on hand	4,210	6,360	
	Total	\$32,580	\$60,960	
	Estimated	· ·		
	Adjustments 1945-55:			
	Added 10 acres	1,500		
	Added machinery	1,700		
	Added livestock	1,150		
		\$36,930 - Adjusted total investment		
		1943-45 Ave.	1953-55 Ave.	
3.	Cash receipts	11,262	15,221	
4.	Net cash income	5,912	6,568	
5.	Net farm income	6,044	6,583	
6.	Return to operator and family labor	4,615	3,602	
7.	Probable credit available:			
	Real estate	9,600	18,000	
	Non-real estate	6,400	12,000	
	Total	\$ <u>16,000</u>	\$30,000	

8. Based on capital charge (5 percent) against only the actual capital investment (\$36,960), the 1953-55 average return to operator and family labor would have been \$4,737 (No. 6 above).

9. Current credit base is within \$7,000 of the actual capital invested in the farm business in 1945 and expansion since that date.

10. Though real income has fallen off materially from that of wartime and postwar years, capital gains and the credit base of commercial agriculture have expanded materially. As in many sectors of the industrial economy, consolidations have been rampant throughout the agricultural economy. As long as the U. S. economy maintains its business vigor and technological developments continue, consolidations will result in larger and stronger family farms. The commercial agricultural plant is financially solvent and sound and capable of adjustment to profitable technological developments — though at a slower rate than during the immediate postwar years.

\*Source of basic figures (Items 1 through 6, except estimated adjustments): "Costs and returns, commercial family-operated farms by type and size," Stat. Bul. No. 197, Nov. 1956, and U.S.D.A. Agr. Inf. Bul. No. 158, June, 1956.

# AGRICULTURAL PRODUCTION PLANT

		Geographic rep	gion
Type of owner	East <sup>a</sup>	West	United States
Individuals, partnerships,			
and estates	97.8%	81.1%	87.8%
Corporation	1.7	6.2	4.4
Indian	Ъ	6.0	3.6
Federal government	.2	2.2	1.4
State and local governments	.3	4.5	2.8

Table 2.4.	Percentage Distribution of All Land in Farm	ıs
	by Type of Owner, 1950*	

\*Source: Bureau of Census, U. S. Department of Commerce.

<sup>a</sup>All states east of Mississippi River.

<sup>b</sup>Less than 0.05 percent.

than 5 percent of all land in farms and is no greater than that held by public agencies. Therefore, the individual proprietorship is by all odds the principal type of farm ownership found in the United States.

Another matter closely associated with family farms is the type of tenure. There has long been considerable concern that too much agricultural land is owned by outside capital and farmed by tenants. It is interesting to note that farm tenancy in the United States changed very little from 1900 to 1940; however, from 1940 to 1955 farm tenancy decreased substantially (nearly one-third). Approximately the same percentage of the agricultural land is currently under tenant operatorship as in the 1920's and the 1930's, however. Likewise, the percentage of farms operated by hired managers has changed little during the past 50 years, although the total farm land operated by managers has approximately doubled since the 1920's (now comprising 8.6 percent of the total). During the period 1940-55, when U. S. land prices nearly tripled, the percentage of full-owner operators and part-owners in the United States economy increased materially (Table 2.5). These factors bear out the continuing strength of the family farm in United States agriculture.

				-	
Year	Full owners	Part owners	Managers	Tenants	Croppers (South only)
1900	55.8%	7.9%	1.0%	35.3%	a
1910	52.7	9.3	.9	37.0	a
1920	52.2	8.7	1.1	38.1	17.5%
1930	46.3	10.4	.9	42.4	24.1
1940	50.6	10.1	.6	38.7	18.0
1950	57.4	15.3	.5	26.8	13.1
1955	57.4	18.2	.4	24.0	11.6

Table 2.5. Percentage Distribution of U. S. Farms by Tenure of Operator, 1900-55\*

\*Source: 1954 Census of Agriculture, U. S. Department of Commerce. \*Not available.

#### **Example of Changes Taking Place**

National figures on the agricultural production plant naturally are composites of widely varying situations. Some changes that are hidden in these national figures show up more clearly in figures for a smaller area. Let us take a look at one township in Indiana, Forest Township in Clinton County, for which we have figures for various years.

Table 2.6 shows that during the period from 1910 to 1955, resources tended to shift away from labor and toward mechanical power, machinery, and miscellaneous capital items. While the total amount of land naturally did not increase, the ratio of land to labor increased greatly as the amount of labor decreased. Since the dollar values in the table are expressed in 1910-14 dollars, the shifts represent physical quantities rather than changes in the price level, except to the extent that

	1910 and 1913-15	1932	1945	1955
Value real estate				
Dollars per farm <sup>a</sup>	27,615	16,561	17,427	29,021
Percent of 1910, 1913-15	100	77	81	134
Labor				
Number of men per farm	1.62	1.62	1.65	1.17
Percent of 1910, 1913-15	100	100	102	72
Power				
Number of horses per farm	4.8	3.6	.6	.2
Percent of 1910, 1913-15	100	75	12	4
Number of tractors per farm	0	.5	1.3	1.8
Percent of 1932	0	100	260	360
Machinery				
Dollars per farm <sup>a</sup>	366	617	1,682	2,145
Percent of 1910, 1913-15	100	168	460	586
Livestock				
Dollars per farm <sup>a</sup>	1,556	1,374	1,604	1,835
Percent of 1910, 1913-15	100	88	103	118
Cash expenses				
Dollars per farm <sup>a</sup>	770	1,567	2,361	4,116
Percent of 1910, 1913-15	100	204	307	535

Table 2.6. Changes in Relative Inputs of Various ResourcesUsed in Farm Production inForest Township, Clinton County, Indiana

<sup>a</sup>At 1910-14 price level.

prices of various resources did not change exactly in line with general prices.

Table 2.7 shows a number of specific changes that have taken place in this sample township not only in combination of inputs but also in the outputs. The average acreage per farm increased more than one-half. Tenancy decreased but part renting increased. Capital requirements increased much more than the general price level. Farmers substituted machines for a large amount of labor. Fuel expenses and fertilizer expenses increased more than a hundredfold. The major shift in crops was an increase in soybeans. The major shifts in livestock, which do not show completely in the table, were an increase in beef cattle and hogs and increased specialization in livestock. Each man took care of more crops and livestock and produced more commodities.

The index of specialization shown in the table is an objective measure of the extent to which farm labor is concentrated on particular enterprises. The figure was obtained by computing for each farm the percentage of productive man work units on each enterprise, squaring these percentages, totaling them and extracting the square root of the sum. With specialization measured in this way, farms were only slightly more diversified in the earlier years. The difference from 1910 to 1955 probably is smaller than most people would expect. One possible explanation of this is that corn required so much more labor when horses were used instead of tractors, that farmers devoted a larger share of their time to corn production, whereas in 1955 they had more time for other enterprises. If the index of specialization had been computed on the basis of percentage of receipts from various sources, it might have shown a greater difference.

## PROSPECTS FOR CONTINUED CHANGE

Let us speculate about the prospects for American agriculture as we look ahead to the future. Farms will likely continue to become larger. The continuing rise of land values in the face of the cost-price squeeze is ample indication of the tremendous pressure to enlarge size. In 1956, for example, 40 percent of the Corn Belt land sold was bought by other farmers for farm enlargement. In the Wisconsin dairy area, 20 percent of the farm land sold was added to existing farms. One-third of the Southern Piedmont cotton land, 50 percent of the Southern Plains wheat land, and 40 percent of the Northern Plains cattle ranch land sold was added to existing farms.

The trend toward higher cash costs relative to operating income continues as more purchased technology is added to replace labor. This trend has been apparent for many years and is increasing as more farm inputs are purchased. Greater specialization, meaning fewer commodities produced per farm, is apparent. Where a typical farm had three classes of livestock ten years ago, it more commonly has two today. The product and production is becoming more and more standardized. More and more, the capital, labor, and management functions are being separated in agriculture as they have been in industry. In the face of

	1910 and 1913-15	1932	1945	1955
Acres per farm	116	146	174	182
Percentage of farms				
Owner operated	34	24	32	39
Part rented	23	35	34	30
Rented	43	41	34	31
Total capital per farm				
Actual dollars	24,038	12,255	41,989	74,274
1910-14 dollars	24,038	18,854	21,422	34,071
Value of real estate per acre (\$)	186	74	196	. 348
Number of machines per 100 farms				
Tractors	0	51	134	180
Combines	0	1	36	59
Corn pickers	0	4	51	66
Hay balers	0	0	8	11
Fuel and oil expense per farm (\$)	6	37	328	658
Fertilizer expense per farm (\$)	8	16	188	934
Percentage of land in:				
Corn	32.2	38.5	34.5	34.5
Soybeans	0	.4	9.2	14.9
Yield corn per acre (bu.)	49	32	66	64
Production corn per farm (bu.)	1,829	1,800	3,962	4,018
Number of animal units of livestock				
per farm				
Cattle	6.8	9.0	10.4	13.4
Hogs	10.7	17.2	19.1	12.0
Sheep	.3	1.5	.8	1.0
Poultry	1.3	3.0	3.7	.7
Colts	.8	.2	-	-
Value of products per worker				
Actual dollars	1,373	930	5,386	10,116
1910-14 dollars	1,373	1,431	2,748	4,640
Acres corn per man	24	32	36	60
Index of specialization <sup>a</sup>	49	51	ь	53
Labor income (\$)	205	-120	3,466	-974
Average deviation in labor income				
Actual dollars	470	392	2,837	3,569
1910-14 dollars	470	603	1,447	1,637

Table 2.7. Some Comparisons of Farming in Various Years on 100 Farms in Forest Township, Clinton County, Indiana

<sup>a</sup> The square root of the sums of the squares of the percentage of total man work units represented by the various enterprises.

<sup>b</sup>Not calculated for 1945.

depressed farm earnings and prices, the less efficient factors in agriculture – excess land, excess capital, and excess labor – must fall by the wayside. The "shaking out" takes time and is often retarded by other programs. For example, many government subsidies have been capitalized into higher land values, thus slowing down the needed adjustments by providing renewed incentive to stay on the farm with hope of increased earnings. With the billions of dollars poured into government agricultural programs since the war, agricultural income has been increased some, but practically none of the adjustments needed to solve the basic problems have been made.

Added technology and management skills increase the spread in earning capacity between the less efficient and the more efficient farms in commercial agriculture. If the government farm programs, which are basically the same today as originally set up in the 1930's, are superimposed over an agriculture that is totally different today, they cannot be expected to solve today's problems. Soon, the adjustment problems in agriculture must be faced squarely.

Prospective changes in the livestock industry in the period ahead are as fully dynamic as those in field crops of the past two decades. Livestock technology is reshaping, and will continue to reshape, much of the livestock farming operation.

The broiler industry gives us good insight with respect to the direction in which we are headed. For example, as the major livestock enterprise on a commercial Corn Belt farm today, the 20-cow dairy is as obsolete as the 10-cow dairy was in 1940; the 15-20 sow hog operation is as obsolete as 7-10 was in 1940; the carload beef feeding operation is as obsolete as one-half carload was in 1940. In addition, the whole farm building situation is in a state of flux, not only for livestock, but also for materials handling — grain and forage — as well. When genetics, nutrition, and disease control are combined, as they have been in broiler production, the result is an assembly line, mass production, and a standardized, integrated industry.

We know the direction in which agriculture is headed; we are not sure how far or how fast it will go. Barring severe economic depression in the general economy, it will take place faster than many of us anticipate. Certainly, the agricultural recession of the past few years has increased the rate of change taking place on the typical commercial farm. **R. F. DALY** Agricultural Marketing Service, USDA

# Discussion

A S I read over the brief description of the subject matter to be developed by Dr. Robertson and Dr. Diesslin, it seemed very broad. Indeed, the topic for the paper might be interpreted as treating the entire subject of the cost-price squeeze.

I feel that their development of the subject is too cursory in its treatment of demand. This may be partly a reflection of differences in our general areas of interest as well as the subjects to be discussed in papers to follow. Changes in demand are of strategic importance in determining the size of the production plant as a whole and in influencing the output of individual commodities. Although we quite rightly look on demand changes as largely a reflection of consumer behavior, they are not entirely independent of the supply response. Technological developments on the supply side influence consumption through price as well as in other ways. For example, the rapid expansion in the use of frozen food stems largely from technological developments affecting supply.

The nature of the demand for farm products and its relatively slow growth as the economy expands is an old story. Yet, it is pertinent to this subject. In measuring changes from the 1924-28 average to the 1951-55 average, a period of a little more than a quarter century, we find population up 36 percent and income per capita (real) up more than 58 percent. Per capita consumption of livestock products for food increased about 16.5 percent from 1924-28 to 1951-55. Livestock product prices relative to all farm products rose by about 5.5 percent offsetting a small part of the income effect on consumption. Based on the changes between the two periods and our general knowledge of elasticities for livestock products, an income elasticity around 0.3 looks reasonable. Nonfood use includes primarily wool and the tallow and greases which are a by-product of meat production. Feed use of milk products on a per capita basis has decreased during the period. Thus, total domestic use of livestock products per person for both food and nonfood uses increased less than 8 percent. With a 36 percent increase in population, domestic utilization in 1951-55 was about 47 percent above the 1924-28 average. Since both exports and imports of livestock products are relatively small, production increased about the same as domestic use.

Demand changes are primary forces influencing the kinds of products desired. With relatively favorable demand conditions for meat animals,

#### DISCUSSION

production was up 45 percent. Since technological developments in meat animal production apparently have been relatively slow, prices, compared to those of all livestock products, increased by nearly a fourth. Output of poultry products nearly doubled; technological developments in production contributed to expanded output as well as to a decline of about 30 percent in relative prices for poultry products. Milk production rose about a fourth. And dairy product prices, although supported in recent years, were off about 10 percent relative to all livestock products.

Per capita consumption of food crops as a whole has held relatively steady over the past quarter century except for a rise during World War II. If anything, the trend may be slightly downward. Food consumption of crops combines food grains and potatoes, where per capita use is declining, and fruits and vegetables where consumption is rising. These divergent trends apparently have been largely offsetting in the past quarter century. Nonfood use of crops per capita has increased even more rapidly than consumption of livestock products. This group includes cotton, tobacco, and industrial uses of oils and grains. The decline in feed use, on a per capita basis, reflects the reduction in use of feed for horses and mules as well as some apparent efficiencies in feeding. In the case of food use of crops as a whole, changes over the last 25 years suggest virtually no price and income effect on consumption. Increases for nonfood crops may result in an income elasticity as high as 0.3. With a substantial decline in feed use relative to population, domestic requirements for crops, on a per capita basis, declined nearly 5 percent from 1924-28 to 1951-55. Crop prices also declined about 5 to 6 percent



#### Fig. 2.1 - Growth of United States population with projections to 1975.

relative to all farm product prices. Since population increased 36 percent, total domestic utilization of crops was up about 29 percent even with the smaller use per person. Exports increased 6 percent, imports 27 percent and output 30 percent over the period. But this production rate resulted in substantial stock accumulation during 1951-55: about 4.5 percent of output in 1952, 7 percent in 1953, 6 percent in 1954, and 6.5 percent in 1955. It should be noted also that surplus disposal programs during these years prevented even larger stock accumulations.

Production changes for major commodity groups since the last half of the 1920's indicate that fruits, vegetables, oil crops, and tobacco were relatively more responsive to changes in income than were food grains, potatoes, and cotton, for example. A sizable reduction in relative prices for potatoes probably reflects efficiencies in output as well as the decline in total requirements. Lower relative prices for fruits were accompanied by a big increase in production and cost-reducing technological developments affecting supply, particularly for citrus fruits. Demand for oil crops has expanded very rapidly and prices in 1951-55 averaged about a fourth higher than in 1924-28 despite big gains in output per man hour.

The above changes for crops and livestock products, net of feed and seed use, sum to an increase in total domestic utilization of farm products of about 50 percent from 1924-28 to 1951-55. Since exports increased less than a tenth, total utilization was up about 45 percent. With farm output averaging in 1951-55 some 50 percent above 1924-28, net stock accumulation during the period averaged about 3 percent of total



Fig. 2.2 - Disposable income and domestic use of farm products per person, with projections to 1975.

farm output. This stock build up is now represented largely by more than a billion bushels of both wheat and corn and some 14.5 million bales of cotton.

Production in excess of requirements and the consequent build up of stocks in recent years were largely responsible for a decline in farm product prices of more than 20 percent from 1951 to 1956. With rising incomes and expanding economic activity in general, prices paid by farmers for goods and services have been maintained at a high level. The index of prices paid, interest, taxes and wage rates in 1956 was about 1.5 percent above 1951. The cost squeeze, as measured by the parity ratio, thus tightened considerably; the ratio declined from 100 in 1951 to 83 in 1956. In March, 1957, the index of prices paid was running 3 percent above the average for 1956. Prices received were up from a year earlier, but held near the average for 1956 and the parity ratio in March stood at 80. Farmers' realized net incomes declined by about a fifth from 1951 to 1956, reflecting the drop in prices and continued high production costs. Net incomes in 1956 were up 4 percent from 1955, the first increase since the gain from 1950 to 1951.

The relatively slow growth in demand for farm products, in the past two to three decades, has been accompanied by rapid increases in productivity and the trend toward mechanization of agriculture. As the authors pointed out, these developments have resulted in a substantial decline in the number of agricultural workers needed to supply food and fiber. In 1930 less than 10 persons were supported by production of one farm worker; by 1956 this ratio had risen to nearly 20. Attractive alternatives for labor in nonfarm industries also have drawn farm workers, as well as rural population, to urban centers.







Fig. 2.4 - Factors in farm production per unit of farm output.

The authors have covered changes in resources and organization of the farm production plant. These trends might be generally characterized as: a rise in capital inputs, a decline in the use of labor and land, and a trend toward fewer and larger farms. It is interesting to note, however, that acreage needed for domestic use (less exports and feed for horses and mules) has increased about 50 percent since 1910 as land used for horse feed declined. Since this shift is largely completed, it has some significance for the future.

The authors report that we are on the threshold of significant new technological developments which may be opening up tremendous possibilities for production. This and the general supply situation facing agriculture today suggest that our major concern for the next several years will involve production adjustment and possibly programs to tailor farm output to probable expansion in demand. Many of the trends in our eating habits will continue though they may be moderated somewhat. Demand for farm products, reflecting a growing population, expanding incomes, and trends in consumer preference, will expand possibly as much as 40 to 50 percent in the next quarter century. Few new land resources are in prospect. But capital inputs will likely increase further with rising yields per acre and per animal unit. Output per worker will increase, and more farm operators and workers will leave agriculture for higher paying nonfarm jobs.