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The U.S. Broiler Industry

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ABSTRACT

Americans are eating more broilers than ever because of low real prices, new products, and preference for lean meat. Per capita broiler consumption hit a record high of 60.3 pounds in 1987, compared with 41 pounds in 1977. Production, now over 19 billion pounds liveweight, increased in all but 5 of the last 50 years. The industry has become more concentrated: the 8 largest of the more than 100 firms process over one-half the volume. Further processed products, sold mostly to fast food outlets, represent the fastest growing sector of the industry.

Keywords: Broilers, industry structure, costs, returns, poultry, marketing, further processing.

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SUMMARY

Vertical integration and technological advancement in the broiler industry have vastly improved production efficiency and enabled producers to hold costs down. Per capita consumption of broiler meat hit a record 60.3 pounds in 1987 compared with 41 pounds in 1977. Actual retail prices rose only 27 percent, but real prices fell 33 percent during 1977-87. Further processed products are the fastest growing segment of the industry. This report looks at changes in the broiler industry, focusing on the last 25 years. It finds that:

- Vertically integrated firms produce virtually all commercial broilers on farms owned and operated by contract growers or on company-owned farms. Vertically integrated firms carry out all activities in broiler production, from hatching through delivery to buyers.

- Per capita broiler consumption has risen rapidly in the last 25 years, from 26 pounds in 1962 to over 60 pounds in 1987.

- Broiler consumption, as a proportion of total U.S. meat consumption, is also on the rise, increasing from 20 percent in 1977 to 28 percent in 1987. Demand for broilers reflects consumer preferences for lean meat and further processed products, and is less influenced by price changes than in years past.

- Sales of processed or cutup broilers have increased rapidly. Cutup broilers accounted for 56.8 percent of broilers slaughtered in 1987 and further processed broiler meat accounted for 22.1 percent, compared with 38.2 percent and 7.7 percent 10 years earlier. Further processed meat is meat that is deboned, filleted, smoked, or formed into patties. Continued expansion of such value-added products is expected.

- Gross farm income from broilers in 1987 was $6 billion, up substantially from $1 billion in 1958 and $2.7 billion in 1973.

- Production is geographically concentrated. Arkansas, Georgia, Alabama, and North Carolina produce the most broilers, in that order.

- Broiler housing units are becoming increasingly automated and climate controlled. Such housing improvements, combined with better breeding, feeding, and disease control, have cut broiler production time by 2 weeks in the past 10 years.

- The number of plants under Federal inspection that slaughter broilers dropped from 288 in 1961 to 238 in 1984, but volume rose from 6 billion pounds liveweight in 1961 to 17.3 billion pounds liveweight in 1984. Seasonal variation has decreased.

- In the 1960's, the industry had increased concentration within major production areas, stepped up mechanization in processing and shipping, built larger processing plants, and made better use of plant capacity. These gains were somewhat offset in the 1970's by rising energy and labor prices. Producer costs are moderating in the 1980's.

- No completely new broiler complexes have been built recently. Producers have expanded by building new growout houses and by renovating and adding capacity to existing slaughter plants.

GLOSSARY OF TERMS

Broilers: Young chicken produced for meat. Broilers usually are 3-5 pounds liveweight and 6-8 weeks old. The terms broilers, fryers, and young chickens are interchangeable.

Broiler complex: Total or overall organization, facilities, and personnel required to perform all functions of production, processing, and marketing to the wholesale level. A broiler complex is usually vertically integrated through combined ownership and contractual arrangements.

Contract grower: A grower who provides housing, equipment, labor, litter, power and heat, and cares for the broilers during the growout. The contract grower never owns the birds, but receives a stipulated fee for these services.

Cutup: Ready-to-cook poultry carcass cut into eight or nine pieces. Some are halved or quartered.

Further processed: A poultry product prepared by cooking, smoking, grinding, deboning, dehydrating, or otherwise processing beyond the cutup stage so as to change form, appearance, texture, or to keep quality (excludes whole carcass packaged as such). (See further processor.)

Further processor: A plant that prepares further processed products from chicken or chicken meat. It is usually a specialized plant separate from the slaughter plant, even when both functions are operated by the same firm.

Growout house: Building used for brooding and rearing broilers. A typical growout house is 40 feet wide by 300 feet long and houses between 65,000 and 80,000 birds.

Horizontal integration: Combining multiple units of the same stage of production or processing under one ownership or management.

Partial house brooding: The use of only a portion of a growout house for brooding, closing off the remainder of the house to conserve energy until the birds reach the age of approximately 2 weeks.

Processor: The firm or entrepreneur who manages and operates a plant that slaughters and eviscerates poultry. The processor performs the coordinating function for the broiler complex, whether all parts are owned or some are contracted.

Producer: The firm or entrepreneur who bears risk and responsibility for broiler production. Production may be on company-owned farms or on contract growers' farms.

Ready-to-cook (RTC): Dressed, whole-bodied bird ready for the consumer to cook as a whole bird or to cut into pieces for cooking. RTC is considered the basic or commodity product.

Real prices: Current prices deflated by a price index (CPI or PPI) so as to express prices in constant dollars.

Vertical integration: Coordination of various levels of producing, processing, and distributing under one decisionmaking unit, generally through direct ownership of the different stages or through contract. A completely integrated broiler operation, for example, will consist of breeder flocks, hatcheries, feed milling and delivery, growout (often by contract), assembly, processing plants, further processing, and delivery to buyers. An integrator develops each phase to mesh with the others so that inputs and products are handled as a flow process. Ancillary services such as building and equipment supplies, fuel, and financing are often affiliated with the operation.

The U.S. Broiler Industry

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INTRODUCTION

The U.S. broiler industry supplies increasing quantities of meat year-round to the public at declining real prices. Breeding, housing, and disease-control advances have all lowered the real costs of poultry production. New management techniques and greater use of vertical integration have led to efficiency gains and lower distribution costs. Products are increasingly handled in a planned systematic flow rather than intermittent batches bought and sold at successive stages.

Spurred by changing consumer preferences and low real prices, broilers have been gaining as a proportion of total meat consumption. More convenient product forms are emerging, and further processed products are gaining popularity. The rapidly growing fast-food restaurant industry continues to expand its purchases of broiler products.

This report identifies current trends in consumption, retail prices, production costs, and returns in the broiler industry. It then looks at the structure of the processing industry and at marketing issues, identifying further processed products as a major growth area. Finally, it describes capital and staffing requirements for a modern broiler complex.

CONSUMPTION, PRICES, AND DEMAND

The average U.S. consumer eats more broiler meat than ever before. Broiler consumption in 1987 accounted for about 96 percent of total chickens consumed, with rooster and fowl (hen) consumption making up the difference. By comparison, the American public in the 1930's and 1940's mostly consumed "other" kinds of chickens: surplus roosters and pullets raised for marketing as young birds and fowl sold from egg-producing flocks. Production and consumption, therefore, were highly seasonal.

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Production of "other" young chickens for market gradually declined because lighter weight, market-egg strains were developed. And, because they were not efficient meat producers, many day-old cockerel chicks were separated out by sexing and destroyed. "Other" chickens currently marketed consist mainly of fowl or roosters. By the early 1950's, broiler consumption surpassed that of other chickens. Consumption of other chickens became relatively stable by 1960 but then declined gradually in the 1970's and 1980's. By the mid-1980's, broilers clearly had market advantage.

Consumption Trends

Per capita broiler consumption increased from 2 pounds in 1940 to 13.8 pounds in 1955, and reached 60.3 pounds in 1987, more than quadrupling in 33 years (tables 1 and 2). The increase was steady: per capita consumption rose in all but 6 of the last 32 years.

The industry's ability to improve product quality and availability, consumers' changing tastes and preferences, and favorable retail prices spurred the popularity of broilers. Convenience of precut chicken and an array of further processed items appealed to consumers and helped boost consumption. Fast food chains, in the midst of rapid expansion, found chicken an attractive, popular, and cost-favorable menu item (38).1/

Broiler meat is a highly perishable food. Only a small quantity, about 7 percent in 1987, is frozen, mostly because of lack of general consumer acceptance. Nearly all of the broilers shipped from processing plants are chilled, either ice-packed or chill-packed. Broiler meat moves directly from processing into consumer channels without being stored. The meat clears the market as it is produced, so that a change in production typically leads to a corresponding short-term change in consumption and an inverse adjustment in price. An industry saying helps explain this situation: "A surplus load of chicken gets offered to a dozen markets, and a buyer short a load calls a dozen suppliers."

Broiler consumption has increased as a proportion of total meat consumption. Until the early 1970's, per capita consumption of both red meat and poultry rose, with broiler consumption gaining the fastest (see table 1). Per capita consumption of red meat in recent years, however, stabilized or declined, while broiler and turkey consumption continued to increase enough to keep total meat consumption rising slowly.

The cyclical production patterns of beef and pork influence annual per capita consumption more than do the short-term cycles in broiler output. Broiler companies, with their shorter production periods, have greater ability to adjust output in response to demand or net returns. This flexibility holds true whether net returns are affected by product prices or input costs. It also holds true whether product price changes result from poultry meat or red meat supply changes. Broiler producers consider anticipated supplies of broilers and competing meats when determining output levels and adjustments.

1/ Underscored numbers in parentheses refer to items listed in the References section.

Table 1--Per capita consumption of poultry and meats

Year	Chicken			Turkey	Chicken and turkey	Beef	Veal	Pork	Lamb and mutton	Red meat	Red meat and poultry
	Young	Mature	Total								
	Pounds, RTC basis 1/					Pounds, retail basis					
1955	13.8	7.5	21.3	5.0	26.3	64.0	7.8	61.9	4.1	137.8	164.1
1956	17.3	7.1	24.4	5.2	29.6	66.2	7.9	62.2	3.9	140.2	169.8
1957	19.1	6.4	25.5	5.9	31.4	65.1	7.3	56.6	3.6	132.6	164.0
1958	22.0	6.1	28.1	5.9	34.0	61.5	5.6	55.9	3.6	126.6	160.6
1959	22.8	5.9	28.7	6.3	35.0	61.8	4.7	62.7	4.2	133.4	168.4
1960	23.4	4.4	27.8	6.3	34.1	63.3	5.1	60.8	4.2	133.4	167.5
1961	26.0	4.0	30.0	7.4	37.4	65.4	4.7	58.2	4.5	132.8	170.2
1962	25.8	4.1	29.8	7.1	36.9	66.1	4.6	59.4	4.5	134.6	171.6
1963	27.1	3.6	30.7	6.9	37.6	70.2	4.1	61.1	4.3	139.7	177.4
1964	27.7	3.5	31.2	7.4	38.6	74.7	4.4	61.1	3.7	143.9	182.5
1965	29.6	3.7	33.3	7.5	40.8	74.6	4.4	55.1	3.3	137.4	178.2
1966	31.9	3.6	35.5	7.9	43.4	78.1	3.9	54.6	3.5	140.1	183.5
1967	32.3	4.0	36.3	8.7	45.0	79.8	3.3	60.0	3.4	146.5	191.5
1968	32.6	4.0	36.6	8.1	44.7	81.0	3.1	61.8	3.3	150.2	194.8
1969	34.6	3.6	38.2	8.3	46.5	82.5	2.8	60.6	3.1	149.0	195.5
1970	36.5	3.6	40.1	8.1	48.2	84.4	2.4	61.9	2.9	151.6	199.8
1971	36.3	3.8	40.1	8.4	48.5	83.7	2.2	67.9	2.8	156.6	205.1
1972	37.9	3.6	41.5	9.0	50.5	85.5	1.9	62.4	2.9	152.7	203.2
1973	36.9	3.3	40.2	8.5	48.7	80.5	1.5	57.0	2.4	141.4	190.1
1974	36.9	3.5	40.4	8.8	49.2	85.4	1.9	61.4	2.0	150.7	200.0
1975	36.5	3.3	39.8	8.5	48.3	88.0	3.4	50.5	1.8	143.7	192.1
1976	39.6	2.8	42.4	9.1	51.5	94.2	3.2	53.6	1.6	152.6	204.2
1977	40.8	3.1	44.9	9.1	54.0	91.4	3.1	55.8	1.5	151.8	204.7
1978	43.5	2.9	46.4	9.1	55.5	87.2	2.4	55.8	1.4	146.8	202.4
1979	47.4	2.9	50.3	9.9	60.2	78.0	1.7	63.4	1.3	144.4	204.6
1980	46.7	3.0	49.7	10.5	60.2	76.4	1.5	68.0	1.4	147.3	207.6
1981	48.2	3.1	51.3	10.7	62.0	77.1	1.6	64.9	1.4	145.0	207.0
1982	49.6	3.1	52.7	10.8	63.5	76.8	1.6	58.5	1.5	138.4	201.8
1983	50.4	3.0	53.4	11.2	64.6	78.2	1.6	61.9	1.5	143.2	207.8
1984	52.6	2.6	55.2	11.3	66.5	78.1	1.8	61.5	1.5	142.9	209.5
1985	55.1	2.5	57.6	12.1	69.7	78.8	1.8	62.0	1.4	144.0	213.7
1986	56.3	2.4	58.7	13.3	72.0	78.4	1.9	58.6	1.4	140.2	212.2
1987	60.3	2.5	62.8	15.1	77.9	75.5	1.5	59.2	1.3	137.5	215.3

1/ RTC = Ready-to-cook basis.

Sources: (38, 74).

Table 2--Per capita consumption of broilers by calendar quarters

Year	First quarter	Second quarter	Third quarter	Fourth quarter	Annual
			Pounds		
1960	5.1	6.2	6.6	5.5	23.4
1961	5.5	7.5	7.3	5.7	26.0
1962	5.6	7.0	6.9	6.3	25.8
1963	6.1	7.2	7.4	6.4	27.1
1964	6.4	7.4	7.5	6.4	27.7
1965	6.7	7.7	8.1	7.1	29.6
1966	7.1	8.2	8.7	7.9	31.9
1967	7.5	8.6	8.6	7.6	32.3
1968	7.6	8.3	8.7	8.0	32.6
1969	7.9	9.0	9.1	8.6	34.6
1970	8.6	9.7	9.6	8.6	36.5
1971	8.6	9.2	9.6	8.9	36.3
1972	9.1	10.0	9.7	9.1	37.9
1973	8.8	9.4	9.4	9.3	36.9
1974	9.1	9.8	9.6	8.4	36.9
1975	8.4	9.5	9.5	9.1	36.5
1976	9.5	10.2	10.4	9.5	39.6
1977	9.6	10.6	10.7	9.9	40.8
1978	10.3	11.3	11.2	10.7	43.5
1979	11.2	12.5	12.4	11.3	47.4
1980	11.6	12.4	11.6	11.1	46.7
1981	11.7	12.4	12.5	11.6	48.2
1982	11.9	12.8	13.0	11.9	49.6
1983	12.5	13.4	12.7	11.8	50.4
1984	12.6	13.6	13.5	12.9	52.6
1985	13.1	14.3	14.2	13.5	55.1
1986	13.6	14.6	14.3	13.8	56.3
1987	14.7	15.2	15.3	15.1	60.3

Source: (74).

Consumer Expenditures

Consumers more than quadrupled expenditures for broilers during the past 25 years, with most of the increase from higher consumption (data are based on retail prices for ready-to-cook (RTC) broilers). By purchasing more of the higher priced further processed items, consumers have increased expenditures for all poultry products even more than these data indicate.2/

2/ See appendix tables 2, 3, and 4 for wholesale prices for whole broilers, chicken breasts, and chicken legs. Appendix table 5 shows consumer expenditures for broilers in 1955-86.

Retail Broiler Prices

Counter to the general price level (as defined by the consumer price index), retail broiler prices trended downward until 1959, when they stabilized at about 40 cents per pound RTC. They then held that level for about 14 years. The trend reversed in 1973 when economic policies, disrupted markets, shortages, general inflation, and rapidly rising feed prices caused broiler prices to increase nearly 50 percent. The upward pressure on prices has continued unevenly since then, so that retail prices for whole broilers averaged 78.5 cents in 1987, nearly double the prices of the 1960's (table 3).

Consumers can now buy broilers for less than half of what they paid 30 years ago if prices are adjusted for inflation (table 3). The consistent decline in real prices has been interrupted by only brief cyclical swings and by the general economic disruption of 1973-75. Real (inflation-adjusted) prices declined in 21 of the last 30 years.

Consumers responded to these favorable prices by increasing broiler consumption. Figure 1 relates per capita consumption of broilers to the deflated retail price (1967 = base) for 1955 through 1987. During this time, the average response to a 10-percent decline in the real price of broilers at retail was a 13-percent increase in per capita consumption. This relationship held fairly stable, except during the disruptive mid-1970's, and even held close if one compares 1970 with 1980. Although these relationships closely resemble a normal demand curve, these comparisons do not represent estimates of price elasticity. Rather, these are simple comparisons relating actual changes in real price, quantity, and expenditures for a single commodity without considering variables such as income, other prices, or quantity of other meats or substitutes. The figure shows that declining real price has been a dominant factor in increasing per capita consumption fourfold in 30 years. Broiler meat's relative price advantage over other meats will continue to play a major role in its expanding consumption.

Demand Factors

More convenient product forms, few substitutes, low retail prices, and a shift away from red meat resulted in a substantial increase in the quantity of broilers demanded over the last few decades. Efficiency gains and changes in structural characteristics in the broiler industry lowered production costs over the years. These factors made broilers cheaper than other meats and raised consumption of broiler products.3/

Data indicate that consumers are becoming less sensitive to price changes. Price elasticities of demand 4/for broilers are becoming more inelastic over time. The attractiveness of broiler meat may be due to consumers' heightened awareness of its low-fat and high-protein content, which could create a more stable purchasing pattern with less regard to price. Lower elasticities may also be due to broilers' low price tag compared with other meats and to the increased quantity of chicken being consumed.

3/ See appendix for an indepth discussion of demand elasticities and estimates for broilers.

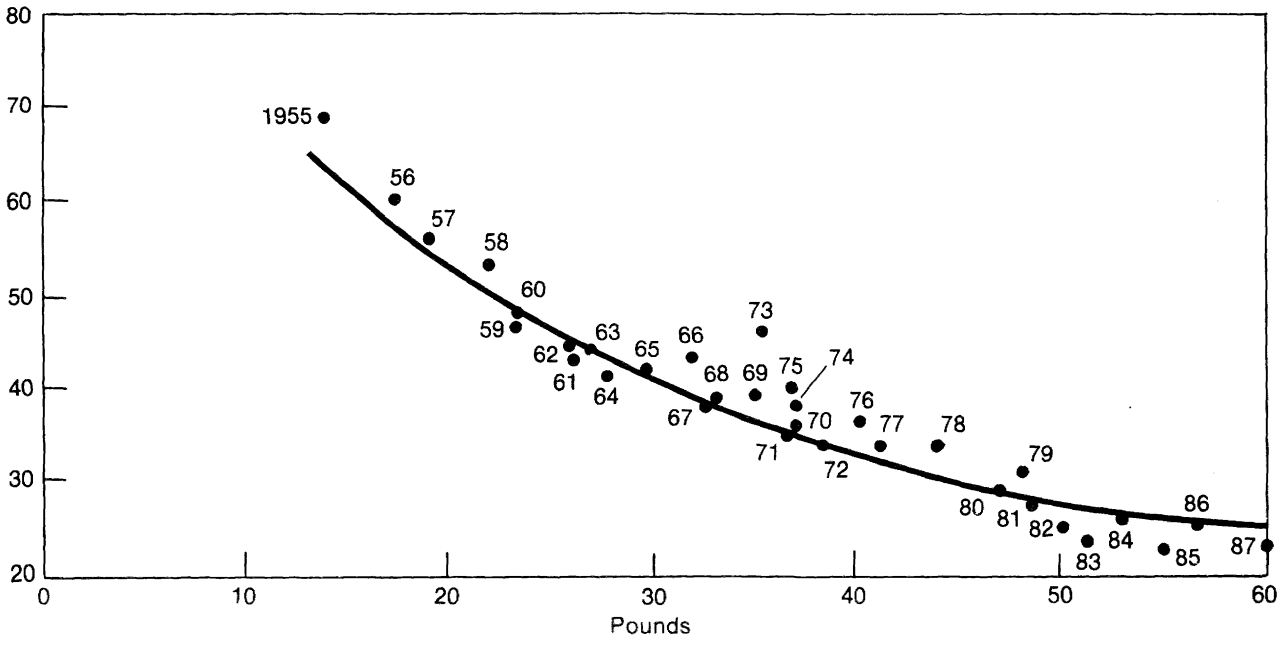
4/ The price elasticity of demand reflects the responsiveness of quantity demanded to change in price. See appendix for a complete discussion of demand elasticities and estimates.

Table 3--Actual and deflated retail prices and per capita consumption of broilers

Year	Retail price		Per capita consumption
	Actual	Deflated 1/	
	- - - Cents/pound - - -		Pounds
1955	55.2	68.8	13.8
1956	48.9	60.1	17.3
1957	47.2	56.0	19.1
1958	46.1	53.2	22.0
1959	41.2	47.2	22.8
1960	42.4	47.8	23.4
1961	38.3	42.7	26.0
1962	40.5	44.7	25.8
1963	40.8	44.5	27.1
1964	38.6	41.5	27.7
1965	39.6	41.9	29.6
1966	41.6	42.8	31.9
1967	38.7	38.7	32.3
1968	40.8	39.2	32.6
1969	43.4	39.5	34.6
1970	41.7	35.9	36.5
1971	42.0	34.6	36.3
1972	42.7	34.1	37.9
1973	60.8	45.7	36.9
1974	57.0	38.6	36.1
1975	64.3	39.9	36.5
1976	61.2	35.9	39.6
1977	61.9	34.1	40.8
1978	66.5	34.0	43.5
1979	67.7	31.1	47.4
1980	71.9	29.1	46.7
1981	73.7	27.1	48.2
1982	71.6	24.8	49.6
1983	72.8	24.4	50.4
1984	81.4	26.2	52.6
1985	76.3	23.7	55.1
1986	83.5	25.4	56.3
1987	78.5	22.9	60.3

1/ Deflated prices, or prices adjusted for inflation, are current prices deflated by the consumer price index (CPI) for all items, 1967=100.

Figure 1—Per capita broiler consumption and real retail prices[1]



[1]Prices in 1967 constant dollars.

The popularity of chicken in cutup or further processed form creates a more desirable product mix with less sensitivity to price changes. Substantial sales to fast food restaurants also foster a more stable industry price structure. Prices tend to be less variable for further processed products than for whole birds.

Demand for broilers is seasonal, peaking in the summer and slackening in the winter. As broiler meat has become a more important part of the consumer's diet, changes in prices and in consumer income seem to matter less. Consumers are less sensitive to broiler price changes in summer months, as measured by demand elasticities. Cross-elasticity estimates show that broiler consumption is influenced by changes in beef and pork prices, although the extent of these price effects has been moderate in recent years. Consumers continue to buy broilers because they are economical compared with other meat.

PRODUCTION

The broiler industry is a dynamic segment of U.S. agriculture. Production increased from 34 million head in 1934 to over 5 billion head in 1987, passing the 4-billion mark in 1981 (table 4). Output increased in all but 5 of the last 50 years and exceeded 21 billion pounds liveweight in 1987. Total farm value of broiler production steadily rose from $19 million in 1934 to $6.7 billion in 1987. This value has increased quite steadily since the Great Depression even though prices were relatively volatile from year to year. The average price dropped below that of the previous year in 22 of the past 50 years (78, 79, 80).

Table 4--Broiler production, price, value, and per capita consumption 1/

Year	Production 2/			Average price received by producers per pound 3/	Value of production	Per capita consumption
	Number	Liveweight	Pounds produced as share of preceding year			
	Millions	Million pounds	Percent	Cents	Million dollars	Pounds
1934	34	97	--	19.3	19	0.5
1935	43	123	126.8	20.0	25	.7
1936	53	152	123.6	20.6	31	.8
1937	68	196	128.9	21.4	42	1.1
1938	82	239	121.9	19.0	46	1.3
1939	106	306	128.0	17.0	52	1.6
1940	143	413	135.0	17.3	72	2.0
1941	192	559	135.4	18.4	103	2.8
1942	228	674	120.6	22.9	155	3.2
1943	285	833	123.6	28.6	238	4.1
1944	274	818	98.2	28.8	235	3.9
1945	366	1,107	135.3	29.5	327	5.0
1946	293	884	79.9	32.7	289	4.1
1947	310	936	105.9	32.3	302	4.3
1948	371	1,127	120.4	36.0	405	5.5
1949	513	1,570	139.3	28.2	443	7.1
1950	631	1,945	123.9	27.4	533	8.7
1951	789	2,415	124.2	28.5	689	10.4
1952	861	2,624	108.7	28.8	756	11.7
1953	947	2,904	110.7	27.1	786	12.3
1954	1,048	3,236	111.4	23.1	747	13.7
1955	1,092	3,350	103.5	25.2	844	13.8
1956	1,344	4,270	127.5	19.6	838	17.3
1957	1,448	4,683	109.7	18.6	886	19.1
1958	1,660	5,431	116.0	18.5	1,002	22.0
1959	1,737	5,763	106.1	16.1	925	22.8
1960	1,795	6,017	104.4	16.9	1,014	23.4
1961	1,991	6,832	113.5	13.9	947	26.0
1962	2,023	6,907	101.1	15.2	1,049	25.7
1963	2,102	7,276	105.3	14.6	1,063	27.1
1964	2,161	7,521	103.4	14.2	1,070	27.6
1965	2,334	8,111	107.8	15.0	1,218	29.6
1966	2,571	8,989	110.8	15.3	1,372	31.9
1967	2,592	9,183	102.2	13.3	1,223	32.3
1968	2,620	9,326	101.6	14.2	1,326	32.6
1969	2,789	10,048	107.7	15.2	1,531	34.6

See footnotes at end of table.

Continued--

Table 4--Broiler production, price, value, and per capita consumption 1/--Continued

Year	Production 2/			Average price received by producers, per pound 3/	Value of production	Per capita consumption
	Number	Live-weight	Pounds produced as share of preceding year			
	Millions	Million pounds	Percent	Cents	Million dollars	Pounds
1970	2,987	10,819	107.7	13.6	1,475	36.5
1971	2,945	10,818	100.0	13.7	1,487	36.3
1972	3,075	11,480	106.1	14.1	1,623	37.9
1973	3,009	11,220	97.7	24.0	2,690	36.9
1974	2,993	11,320	100.9	21.5	2,436	36.1
1975	2,950	11,096	97.5	26.3	2,915	36.5
1976	3,274	12,481	113.3	23.6	2,945	39.6
1977	3,394	12,962	103.6	23.6	3,059	40.8
1978	3,614	14,000	108.0	26.3	3,676	43.5
1979	3,951	15,522	110.9	26.0	4,032	47.4
1980	3,963	15,539	100.1	27.7	4,303	46.7
1981	4,148	16,520	106.3	28.5	4,699	48.2
1982	4,149	16,760	101.4	26.9	4,502	49.6
1983	4,184	17,038	101.6	28.6	4,873	50.4
1984	4,282	17,863	104.8	33.7	6,018	52.6
1985	4,479	18,851	105.5	30.1	5,680	55.1
1986	4,646	19,651	104.3	34.5	6,700	56.3
1987	5,003	21,520	109.5	28.7	5,501	60.3

-- = Not applicable. 1/ Includes Alaska and Hawaii beginning in 1961. 2/ Includes consumption in households of producers, which is less than 1 percent of total production. 3/ Average based on December 1 to November 30, beginning in 1970.

Sources: (79, 80, 81).

Advances in production technologies through genetic research, equipment development, improved nutrition, and better management practices enabled the industry to produce meat faster with less feed. A 3.5- to 4.5-pound broiler can now be produced in 7-8 weeks, in sharp contrast to 12-14 weeks 30 years ago. Feed conversion is now 2 or less pounds of feed per pound of live broiler compared with 4 pounds in the 1940's. The industry has kept costs down through economies made possible by vertical integration.

Although new technologies are still being developed, their potential effect on the broiler industry is likely to be less dramatic than those of the past 30 years. The most promising developments appear to be the use of poultry waste

as a feed product, new equipment to conserve energy, better meat preserving methods, genetic improvements, and more effective disease control techniques. The rising prices of feed, fuel, packaging, labor, and other inputs, however, may offset some of these prospective cost reductions.

Leading Production Areas

The major production areas are northwestern Arkansas, northern Georgia and Alabama, central Mississippi, eastern Texas, the Delmarva (Delaware, Maryland, and Virginia) Peninsula, Virginia's Shenandoah Valley, North Carolina, and central California (fig. 2). The South leads in broiler production, producing 66 percent of the country's broiler supply in 1987. The Delmarva Peninsula and the Shenandoah Valley together produced 14 percent, California produced 4 percent, and other regions produced 16 percent.

The 10 leading States in broiler production in the past few years were Arkansas, Georgia, Alabama, North Carolina, Mississippi, Maryland, Texas, Delaware, California, and Virginia (table 5). California is the only State of the top 10 that is outside the southern and eastern production areas. The top 10 States established an early lead in the broiler industry and maintained a high percentage of total U.S. production, currently about 85 percent (4).

Output per Farm

The number of U.S. farms producing broilers and other meat-type chickens dropped from 42,185 in 1959 to 32,348 in 1969, and then declined more slowly to 30,100 farms in 1982 (table 6). The Census of Agriculture, however, indicates output rose from 1.4 billion birds in 1959 to 3.5 billion in 1982.

These indicators reveal a trend of increased production per farm: broilers raised per farm increased from 33,637 in 1959 to 116,844 in 1982. Higher capacity per brood and the increasing number of broods per year accounted for the per farm production rise.

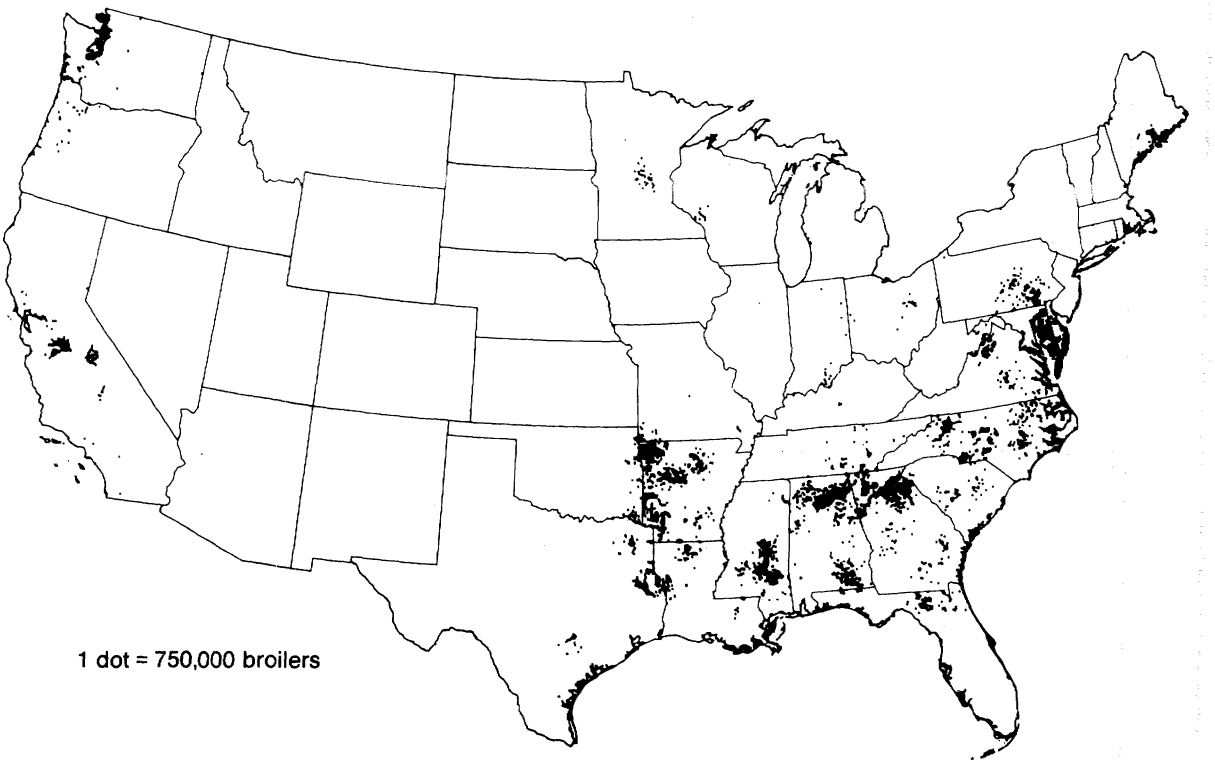
Poultry farms are becoming more specialized and production more concentrated. The 19,158 farms selling more than 16,000 birds per year in 1982 sold virtually all the broilers. Of these farms, the 13,214 in the sales group of 100,000 birds and over captured 89 percent of the total sales, averaging 237,000 birds, or 500 tons liveweight, per farm. Although the total number of farms selling broilers has declined since 1959, the number of farms producing at a commercial level has increased. Farms raising at least 100,000 birds increased from 2,254 in 1959 to 7,634 in 1969, and to 13,214 in 1982 (table 6). The number of farms with an output of fewer than 2,000 birds also has increased (6, 82). Many of these small flocks are thought to be hobby operations of "other meat-type chickens," which are included in the census classification. These operations raise a combined total of only about 1-2 million birds per year.

Industry Costs and Returns

The trends toward greater economic concentration and rapid technological change can significantly affect industry performance. USDA's Economic Research Service publishes a cost and returns series for the broiler industry that serves as an aggregate industry benchmark (13).5/

5/ See (13) and (24) for more information on the series and its computation.

Figure 2—Major broiler production areas of the United States, 1982



This series reflects economic conditions in the industry by comparing total costs of producing and marketing broilers at wholesale with the 12-city composite wholesale price for RTC whole-bodied broilers (table 7). It has been adjusted over time to reflect technical and price changes in production and marketing.6/

Net returns to integrators for RTC whole broilers at wholesale varied over time, ranging from losses of 5.4 cents in 1981 to profits of 12.7 cents per pound in 1986 (see table 7). Price fluctuations for both inputs and broilers caused sharp changes in returns, especially since 1973. Feed costs in 1953-73 were a stabilizing influence in the cost of producing poultry. Since 1973, however, feed prices have become more volatile and have been a major cause of change in net returns for broiler companies.

High energy costs and rapidly rising feed prices in 1973, 1979-81, and 1983 disrupted the industry, causing production costs to increase substantially. Production costs other than feed, just over 8 cents per pound liveweight in the early 1980's, were 3 cents higher than those of the late 1960's. This situation was primarily due to inflation, and input prices outpaced productivity. Production costs began to turn downward by the mid-1980's, due largely to slumping feed prices brought about by global grain surpluses.

Marketing costs from the mid-1950's to 1964 fell slowly because of improved productivity, but then steadily rose to 14.8 cents per pound in 1984, up from

6/ See appendix tables 6 and 7 for a fuller explanation.

Table 5--Ten leading States in broiler production, by rank

State	1950	1965	1970	1975	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
							Million birds							
Arkansas	49	320	451	482	612	678	635	675	668	673	725	760	787	879
Georgia	63	403	454	417	532	561	574	615	611	627	637	677	697	733
Alabama	--	285	376	396	442	493	495	519	500	516	537	562	588	667
North Carolina	28	234	309	284	353	377	400	423	419	420	428	447	451	478
Mississippi	17	168	248	231	269	277	276	290	299	316	312	329	336	343
Maryland	55	145	187	180	221	245	237	253	267	260	271	272	264	264
Texas	33	142	186	166	198	228	221	232	223	213	200	216	239	259
Delaware	81	109	136	136	167	176	167	170	178	182	190	196	197	210
California	39	60	86	96	122	138	152	159	167	172	175	174	185	196
Virginia	40	--	--	--	92	112	126	134	140	144	148	154	154	154
Maine	--	68	76	81	--	--	--	--	--	--	--	--	--	--
Indiana	28	--	--	--	--	--	--	--	--	--	--	--	--	--
10-State total	433	1,935	2,509	2,469	3,008	3,285	3,283	3,470	3,472	3,523	3,623	3,787	3,898	4,183
U.S. total	631	2,334	2,987	2,950	3,613	3,951	3,964	4,150	4,151	4,184	4,282	4,479	4,646	5,002
							Percent							
10-State share of U.S. total	67	83	84	84	83	83	83	84	84	84	85	85	84	84

-- = Not in top 10 States.

Source: (80).

Table 6--Number of farms and distribution of broiler sales by sales class, selected years

Sales class	1959			1969			1978			1982		
	Farms	Broilers sold	Share of broiler sales	Farms	Broilers sold	Share of broiler sales	Farms	Broilers sold	Share of broiler sales	Farms	Broilers sold	Share of broiler sales
Number of birds	Number	Millions	Percent	Number	Millions	Percent	Number	Millions	Percent	Number	Millions	Percent
1,000-1,999	954	1	0.1	3,621	1	1/	9,941	1	1/	10,353	1	1/
2,000-3,999	2,388	6	.5	191	1	2/0.1	159	3/	1/	118	3/	1/
4,000-7,999	4,473	25	1.8	556	3	.1	222	2/1	1/	140	1/	2/0.1
8,000-15,999	8,347	97	6.8	1,643	19	.8	494	6	2/0.3	331	4	.1
16,000-29,999	10,334	223	15.7	2,927	66	2.7	770	17	.6	451	10	.3
30,000-59,999	9,587	384	27.1	8,581	373	15.4	2,850	127	4.2	1,816	82	2.3
60,000-99,999	3,848	278	19.6	7,195	540	22.2	5,284	400	13.1	3,677	283	8.1
100,000 or more	2,254	405	28.5	7,634	1,425	58.7	12,023	2,508	81.9	13,214	3,135	89.1
100,000-199,999	NA	NA	NA	NA	NA	NA	7,802	1,091	35.6	7,087	1,012	28.8
200,000-499,999	NA	NA	NA	NA	NA	NA	3,849	1,054	34.4	5,509	1,569	44.6
500,000 or more	NA	NA	NA	NA	NA	NA	372	364	11.9	618	554	15.7
Total	42,185	1,419	100.0	32,348	2,427	100.0	31,743	3,062	100.0	30,100	3,517	100.0

NA = Not available. 1/ Less than 0.05 percent. 2/ Cumulative. 3/ Fewer than 500,000 birds sold. Sources: U.S. Agricultural Census Reports, various issues. These data differ from those reported by the U.S. Department of Agriculture Statistical Reporting Service in Poultry Production Disposition, and Income Final Estimates for 1980-83, which indicates that 4,148,970,000 broilers (including other meat-type chickens) were produced in the 1982 marketing year (Dec. 1, 1981-Nov. 30, 1982) (80, 82).

Table 7--Costs and returns for RTC broilers, wholesale

Year	Feed ingredient base price		Liveweight		Ready-to-cook broiler, wholesale			
	Decatur soybean meal	Chicago no. 2 corn	Feed cost	Total production cost	Production cost	Total cost 1/	Wholesale price 2/	Net returns
	$/ton	$/bu.	Cents/lb.					
1955	52.55	1.35	13.1	20.5	27.9	35.7	41.5	5.2
1956	51.30	1.45	12.3	19.0	26.4	34.0	34.7	.7
1957	47.05	1.29	11.9	18.2	25.3	32.6	33.0	.4
1958	55.95	1.26	11.6	17.6	24.4	31.4	32.1	.7
1959	56.45	1.23	11.0	16.7	23.2	30.1	29.0	-1.1
1960	60.60	1.12	10.3	15.7	21.8	28.4	29.9	1.5
1961	63.15	1.14	10.0	15.1	21.0	27.4	26.1	-1.3
1962	71.30	1.24	9.9	14.8	20.6	26.8	28.0	1.2
1963	72.50	1.25	10.1	14.8	20.6	26.6	27.2	.6
1964	69.15	1.25	10.0	14.5	20.1	26.0	25.4	-.6
1965	89.60	1.34	9.8	14.5	20.1	26.3	26.4	.1
1966	83.80	1.37	9.8	14.7	20.4	26.8	27.6	.8
1967	97.16	1.45	9.1	14.1	19.7	25.7	25.2	-.5
1968	96.98	1.24	8.4	13.5	18.8	25.4	27.2	1.8
1969	94.33	1.33	8.5	13.8	19.2	26.2	29.2	2.9
1970	98.67	1.42	8.8	14.2	19.7	26.9	26.4	-.5
1971	96.11	1.55	9.0	14.3	19.9	27.5	27.2	-.3
1972	113.40	1.35	9.0	14.3	19.9	28.2	28.2	-.1
1973	273.01	2.11	16.4	22.2	30.8	39.8	42.4	2.6
1974	171.91	3.13	15.8	22.0	30.1	40.1	38.0	-2.0
1975	149.93	3.13	15.1	21.3	29.1	39.4	45.2	5.8
1976	173.05	2.85	14.9	21.1	28.9	39.4	40.2	.9
1977	228.23	2.37	15.4	21.7	29.7	40.5	40.9	.4
1978	194.52	2.52	15.0	21.5	29.1	40.2	44.6	4.4
1979	221.49	2.83	16.8	24.6	32.9	45.4	44.3	-1.1
1980	217.20	3.12	17.7	26.1	34.8	48.3	46.8	-1.5
1981	245.66	3.61	20.0	28.6	38.2	51.7	46.3	-5.4
1982	213.08	2.90	16.6	24.9	32.8	46.8	44.0	-2.8
1983	227.36	3.48	18.6	27.1	36.2	51.0	49.3	-1.7
1984	215.47	3.75	18.8	27.0	36.0	50.8	55.5	4.7
1985	154.03	3.07	14.7	22.7	30.2	44.6	50.3	5.7
1986	186.08	2.59	14.4	22.4	29.9	44.3	57.0	12.7
1987	198.94	2.07	13.4	21.4	28.5	42.9	47.4	4.4

1/ Total cost is the sum of production cost and marketing cost consisting of assembling, processing, and distributing to the wholesale level. 2/ Based mainly on New York wholesale price 1955-63; 1964-82 wholesale price based on 9-city report; 1983-1986 wholesale price based on the 12-city composite price for whole broilers, which replaced the 9-city price in May 1983 (both as reported by U.S. Department of Agriculture, Agricultural Marketing Service's Market News). Sources: (13, 74).

a low of 6 cents in the mid-1960's. Marketing costs consist of expenses for processing, assembling, and transporting broilers from the farm to the wholesale level. Total costs of production and marketing underwent a long-term decline to a low of 26 cents in 1964, and then leveled off until 1973, when a sudden rise in input prices resulted in a rapid increase in total costs to 40 cents. Since 1973, average annual total costs have been in the 40-50 cents per pound range, and were 42.9 cents in 1987. Total costs have been highly variable, declining in 18 years and increasing 13 years during the 1955-87 period.

Wholesale prices of broilers have been highly variable, much like costs. Rapidly expanding supplies of broiler meat, greater efficiency in production and marketing, and expanding red meat supplies minimized the rise in broiler prices. Prices paid to processors declined during the 1950's and early 1960's, dropping from 40 cents to about 26 cents, even though the general price level (as measured by the consumer price index) was rising. The energy crisis and worldwide feed grain shortage in the early 1970's caused broiler prices to rise from 28.2 cents in 1972 to 42.4 cents in 1973. Average prices rose to 57.0 cents in 1986, but dropped to 47.4 cents in 1987.

Net returns for whole broilers varied relatively more than either costs or wholesale prices during the past 33 years. Net returns reflect the difference between prices received and total costs for the industry. Changes in wholesale prices, more than changes in costs, influenced changes in returns.

Net returns were within 2 cents per pound RTC of the estimated break-even point in 22 of the past 33 years. A small change in either costs or prices, at this level, could result in a large relative change in returns. Net returns, averaging 1.1 cents per pound over the 33-year period, were positive for 20 years and negative for 13 years. Net returns were lower than the previous year for 15 years and higher for 18 years. Of the 15 times that returns fell, falling prices were the major cause 11 times. Rising costs were the main cause only four times. Net returns fell only twice when prices were rising, in 1977 and in 1980. Higher prices were the chief factor leading to more favorable returns for 13 of the 18 years, while lower costs were the chief factor for 5 years. Only three times did returns improve when prices were falling from the previous year.

The broiler industry will continue to experience wide swings in net returns caused by fluctuating product prices and input costs, especially for feedstuffs. The 12 largest firms in 1984 produced about 8 billion pounds of RTC broilers, or 61 percent of the total. At 55.5 cents per pound, this volume was worth $4.44 billion. The price averaged 5.2 cents less per pound a year later. Thus, the same volume was worth $4.02 billion, a drop of $420 million in the value of output generated by the top 12 broiler firms. The cost of producing and processing these broilers coincidentally declined by $496 million due to a $567-million drop in the cost of feed.

Broiler firms control neither the fluctuation in broiler price nor feed prices. Successful integrators must, however, provide financing and management capable of coping with these fluctuations, for they continue to affect the industry.

Many broiler firms have suffered financially because of the extreme variability in net returns and the cyclical nature of the industry. Risk avoidance has been a major industry consideration as it moves toward adding

products in the form of cutup parts and innovative further processed products. Although producing the basic commodity of whole-bodied birds continues to be the central operation for many firms, the industry has found that cutting and further processing adds more profit per unit, expands its market volume, and contributes to volume and price stability.7/ Many broiler operations have recently improved their net returns to levels not always reflected by the cost and returns series for the basic commodity pack. The series, however, does provide a useful benchmark for the industry.

Production Costs

The cost of producing broilers has changed substantially over the last 30 years. Significant increases in production efficiency lowered the cost of production from 20.5 cents per pound liveweight in 1955 to 14.3 cents in 1972 (see table 7). Feed and other input prices rose substantially since 1972, however, resulting in higher costs which peaked at 28.6 cents per pound in 1981.

The industry's integrated structure, which fostered new production techniques, led to productivity gains. Increased feed conversion, for example, helped keep down unit costs of production for many years. Where 4 pounds of feed were needed to produce 1 pound of live broiler in the 1940's, less than 2 pounds are needed today. Improved poultry housing, feeding, and watering equipment have cut growers' labor needs (47). Better control of environmental factors such as light, temperature, humidity, air quality, and air movement have also led to greater production efficiency. These improvements in production facilities, feed formulation, and broiler strains, plus new vaccines and medicines, have sharply reduced mortality from the 10- to 20-percent range typical 30 years ago to the 3- to 5-percent level of today. Labor needed to produce 100 pounds of broilers dropped from 5.1 hours in 1945-49 to about 8 minutes in 1980-84 (38).

Comparing production costs among regions is difficult due to several factors. Costs, for example, vary seasonally, annually, and regionally. Costs also differ among the contracts that bind integrators and contract growers. The costs of housing, equipment, grower's labor, and a share of the fuel and litter costs are usually included in the contract grower's fee. A typical breakdown of growout costs to the integrator in 1985 was as follows:

Item	Percent	Item	Percent
Feed	70-75	Fuel allowance	1-1.5
Chicks	13-15	Litter allowance	.5-1
Grower fee	8-12	Other	.5-1.5

Although feed conversion rates are comparable nationwide, feed costs account for most of the production cost differences among regions. The price of feedstuffs delivered to the integrator's feed mill varies widely. That variation is mainly due to transport costs of grain and soybean meal from midwestern surplus areas to feed-deficit broiler production areas. Broiler housing costs differed regionally in 1985, but not as much as in previous years.

7/ Appendix tables 2-4 detail monthly wholesale prices for RTC broilers and broiler parts.

Table 8 shows representative production costs in major production regions for the early 1980's, compared with the same costs in 1972-74. These figures show that broiler production costs in the South increased from 22.5 cents per pound liveweight in 1972-74 to 24.8 cents per pound liveweight in 1982-83, a 10-percent rise in contractor costs (33). Grower costs increased from 1.6 cents per pound to 3 cents during the same period, an 81-percent rise. Much of that cost hike was due to higher fuel and electricity costs and increased overhead costs, primarily depreciation and interest. Grower payments, however, rose from 2.3 cents per pound in 1972-74 to 3.4 cents per pound in 1982-83.

Production costs in the Northeast were also higher in the early 1980's (see table 8). Pennsylvania farms reported higher costs in nearly every category, with feed costs showing the greatest increase, from 16.2 cents per pound liveweight in 1972-74 to 22.6 cents per pound liveweight in 1980-81 (23, 26). A year or two of difference in the time periods compared account for some of the regional differences in feed and chick costs in the early 1980's. Northeastern grower costs were up 84 percent from the early 1970's to the early 1980's, paralleling the trend in the South. Contract payments to growers in the Northeast were also up, however, from 2.6 to 3.4 cents per pound during this period.

Live production costs in 1984 were near the 1980-81 average and were about 1 cent per pound higher than the 1982-83 average. Considering the different time periods used for cost comparisons in the three production regions, west coast feed costs per pound liveweight for the heavier birds were running about 1-2 cents higher than in the Northeast and about 4 cents higher than in the South. Complete integrator ownership is more dominant than contract growing on the west coast. West coast production costs for 1984, presented in table 8, are, therefore, estimated on the basis of complete vertical integration, in which production facilities are operated by hired labor rather than by contract growers.

Grower Contracts

Approximately 92 percent of all broilers are produced under contract. The remaining 8 percent are raised on integrator-owned farms. The integrator usually owns the breeder flocks, hatchery, feed mill, and processing plant (fig. 3). The integrator provides the chicks, feed, medication, part of the fuel, and some litter. Field supervisors employed by the integrator oversee farm production units. The supervisor typically visits each unit once each week, and more often when problems arise. This practice leads to improved efficiency and uniformity of product.

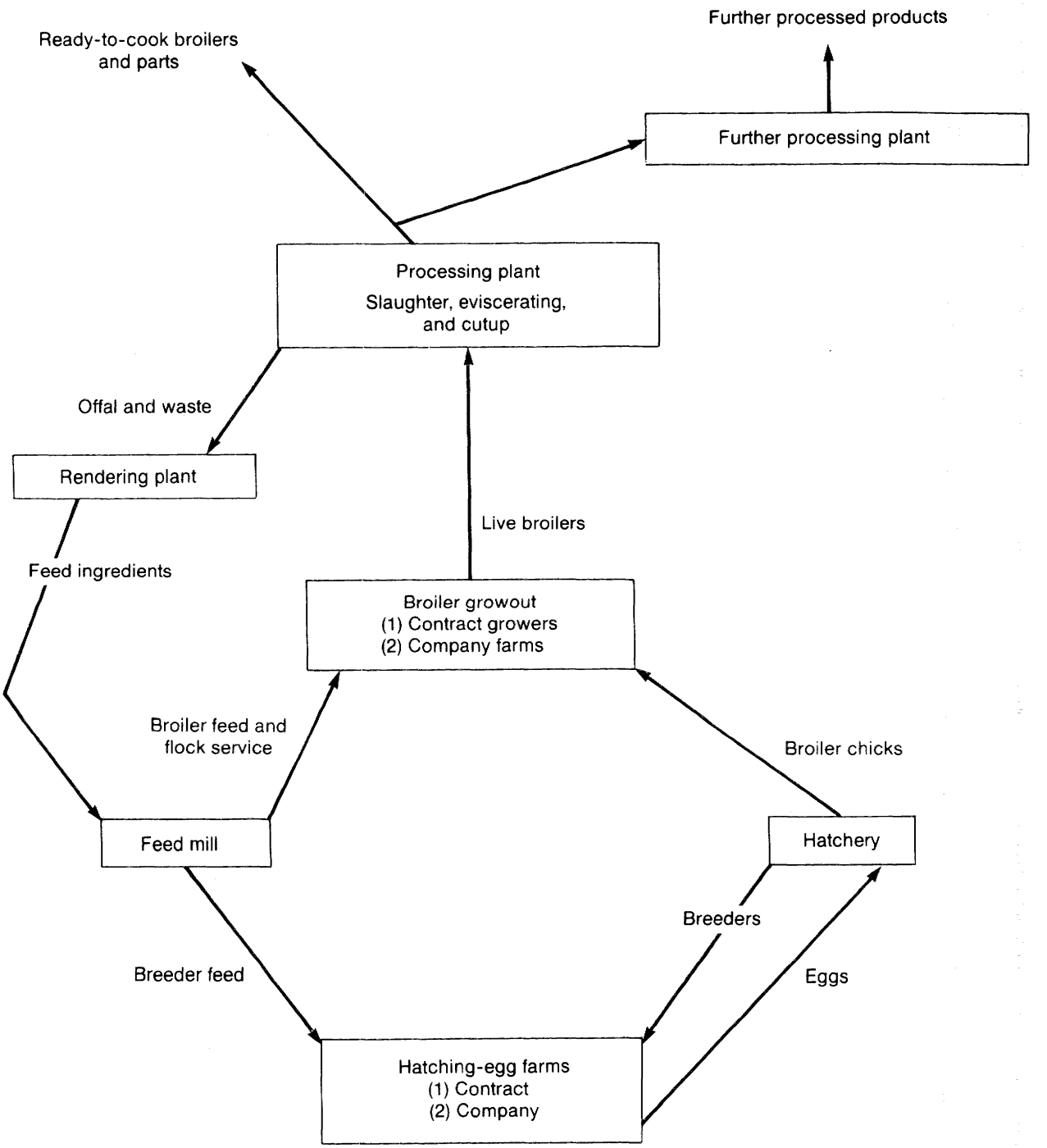
The contract grower provides the housing, equipment, labor, water, and all or part of the fuel and litter in return for a stipulated contract fee. The typical contract is stated in terms of a base rate of a specified number of cents per net pound liveweight, although some contracts are based on the number of birds sold. A few provide weekly payment for square footage whether birds are being housed or not. Grower fees averaged 3.6 cents per pound liveweight in 1985, including performance incentives. Contracts usually provide positive incentives for superior performance and penalties for below-standard performance. Most integrators rank their growers monthly or weekly to determine the incentive payment due each grower. A typical incentive awarded to a grower is 0.1 cent per pound for each 0.1-point advantage in feed conversion over the average for all growers bringing birds

Table 8--Regional comparisons of broiler production factors and costs, selected years 1/

Item	South 2/		Northeast 3/		West Coast	
	1972-74	1982-83	1972-74	1980-81	1974-76	1984
			Number			
Sample characteristics:						
Farms	108	NA	118	55	88	NA
Flocks sold	415	NA	592	264	396	NA
Average liveweight			Lbs./bird			
	3.77	3.93	3.96	3.90	3.98	4.41
Feed conversion			Lbs. feed/lb. broiler			
	2.17	1.99	2.14	2.04	2.2	2.09
			Avg. cents/lb., salable liveweight			
Production costs:						
Grower--						
Fuel	.14	.55	4/.09	NA	.06	
Electricity	.07	.14	.10	.23	.11	.33
Litter	.10	.21	.03	NA	.02	11/ .21
Hired labor	.15	NA	5/.19	.02	.10	.74
Miscellaneous	6/.19	.05	7/.02	.03	.03	.16
Total variable	.65	.95	.43	.28	.32	11/1.44
Depreciation	.43	.92	8/.43	.93	.47	NA
Interest	.32	.79	.21	.82	.45	NA
Insurance	.08	.10	.08	.11	.15	NA
Repairs maintenenace	.11	.13	.15	NA	.13	NA
Taxes	.05	.08	.09	.42	.15	NA
Total fixed	.99	2.02	.96	2.28	1.35	11/1.76
Total grower	1.64	2.97	1.39	2.56	1.67	11/ NA
Contractor--						
Feed	16.65	17.34	16.25	22.65	18.43	23.84
Chicks	2.80	3.30	2.77	4.08	4.13	3.65
Grower payment	2.30	3.37	2.63	3.42	2.15	NA
Medication and vaccination	.24	.34	9/.34	.43	.20	.45
Fuel	.14	NA	.32	.33	.39	0
Litter	.02	NA	.10	.26	.05	0
Other	10/.32	.48	7/.11	.08	.24	.18
Total contractor	22.47	24.83	22.52	31.25	25.59	11/31.36
Administrative costs for complex	.47	1.14	NA	NA	NA	NA

NA= Not available. 1/ Data for 1972-74 collected by Georgia, Pennsylvania, and Missouri Agricultural Experiment Stations under cooperative agreements with U.S. Department of Agriculture, Economic Research Service. Data for 1982-83 for the South come from results of a 1983 Georgia survey (33, 37). Data for 1980-81 for the Northeast come from a Pennsylvania study (23, 33). 2/ South includes Alabama, Georgia, North Carolina, Arkansas, Mississippi, Texas. 3/ Northeast includes Pennsylvania, Maine, Delaware, Maryland, Virginia. 4/ Includes fuel use for manure and other waste disposal and fuel for heat. See also 5/. 5/ Unadjusted for payment in kind frequently associated with manure disposal. 6/ Includes waste disposal, water, dues, and other costs. 7/ Includes sanitation, dues, and other miscellaneous costs. 8/ Includes rent. 9/ Includes services for sexing and debeaking. 10/ Includes administration, field supervision, insurance, and miscellaneous. 11/Estimated on basis of complete ownership operated by hired labor.

Figure 3—Functions of a typical integrated broiler firm



to market during the measuring period. A penalty in the same amount is levied against growers with below-average performance.

Contract growers express concern over the risk of contractors not keeping chicks in housing units on a regular basis. Integrators control the timing of chick placements to fit their marketing needs. When more birds are needed, a new batch is quickly placed. But if the processor needs fewer birds, placements will be slowed. Growers find these long delays costly, especially when they must make regular mortgage payments on housing units. The integrator, however, almost always assumes shortrun price risks. Moreover, market conditions determine the number of chicks placed and the time intervals between batches. In periods of adjustments, growers with the poorest performance records or located farthest from processing plants or feed mills could be dropped as integrators adjust to market conditions.

Growers have benefited from advances enabling them to turn out a younger and heavier bird for market. Birds reach market weight 1-2 days earlier each year. This phenomenon has shortened the time each brood spends in growout by nearly 2 weeks in the past decade, permitting growers to raise one more brood per year in the 1980's than in the 1970's. Average time between broods also has been shortened, so that many growers can now produce more than six broods a year.

The combination of an extra brood and heavier average weight increased grower output by about one-third in the past 10 years. Growers can reduce per pound production costs by spreading fixed costs over more weight. The higher volume has increased their gross receipts.

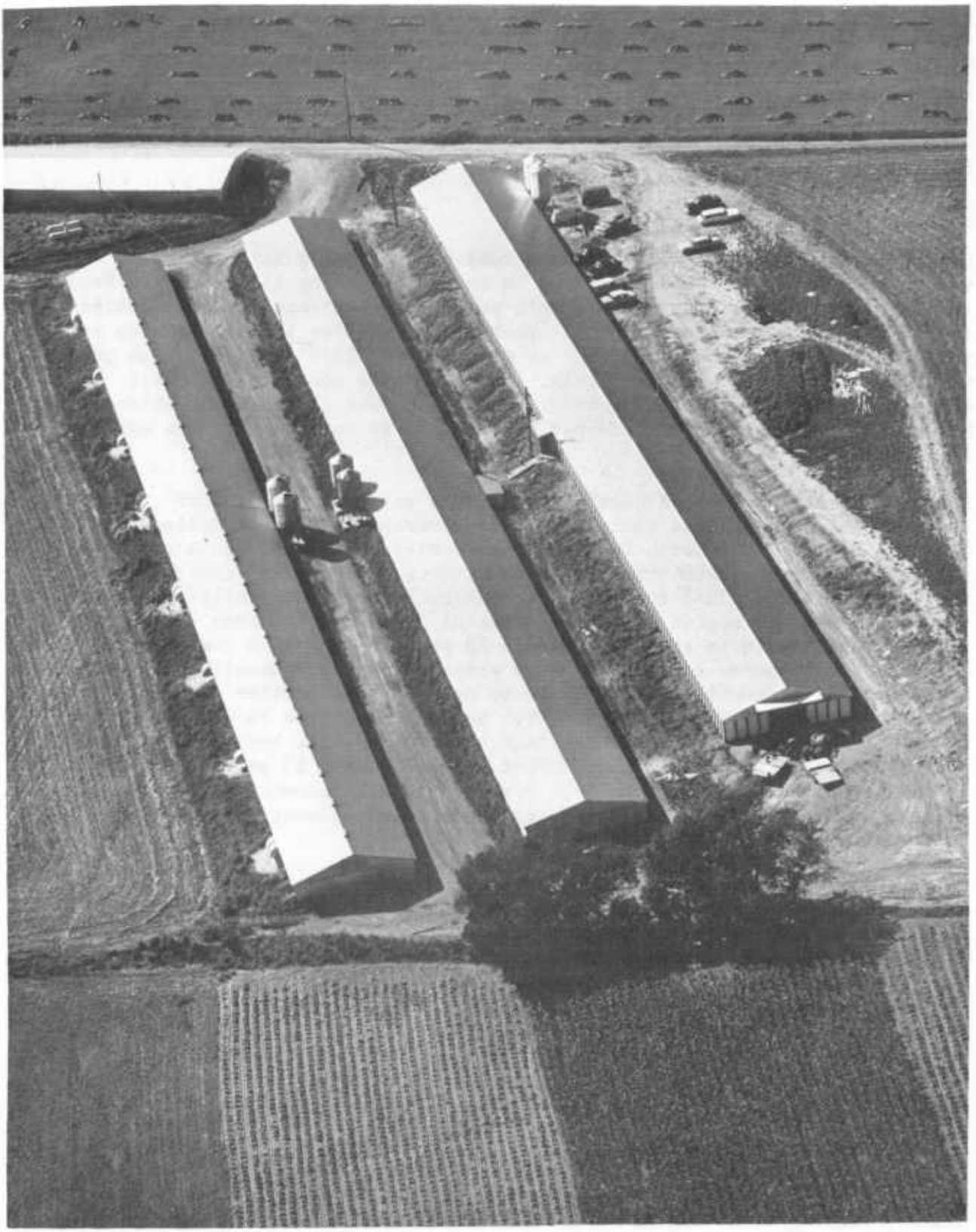
Growers and integrators share the risk of losses from disease. Although contracts vary, growers generally risk reduced payment or nonpayment from disease loss. The integrator risks actual cash loss. Society bears part of the risk by funding emergency programs to defray growers' losses caused by highly transmissible disease outbreaks (39).

Housing and Equipment

Most broiler houses in the South are basic wood- or metal-framed structures with insulated metal roofs and dirt floors covered by deep litter. The buildings are 30-40 feet wide and 250-500 feet long. Newer buildings tend to be wider and longer, and of clear-span construction. Older units usually are supported by one or two rows of posts down the center.

The major difference in housing systems is in the form of ventilation. The ventilation system controls air flow and quality, temperature, humidity, dust, oxygen, and light. Conventional houses have open sides covered by curtains, which are raised or lowered either manually or mechanically. Mechanical curtains can be automatically controlled by thermostats to regulate ventilation according to air temperature. Curtained houses with automatic systems generally have thermostatically controlled power fans.

Curtained houses with power ventilation typically have 36- or 48-inch exhaust fans mounted in the sidewalls. Air is drawn in through baffle vents above the curtains. Fans are controlled by both thermostats and clocks. These houses require greater managerial skill to operate successfully than do the more open houses.



Modern broiler houses such as these are ventilated facilities where broilers are raised from chicks to maturity.

Environmentally controlled houses are totally enclosed, windowless, with insulated roofs and side walls, and use exhaust fans for power ventilation. Windowless buildings allow the operator to more precisely control light, thereby gaining some feed efficiency. Careful supervision, however, is required to regulate fans and brooders. Of all systems, windowless houses have the greatest potential risk of heavy losses from suffocated birds should power be disrupted (36).

Housing Costs

Construction costs for broiler houses rose substantially in the last 30 years. Building and equipment costs in the South in the 1950's ranged from 50 to 75 cents per square foot for simple pole-type construction, but doubled in the 1960's. Table 9 shows capital investment costs for broiler housing over selected periods. Costs continued to climb in the 1970's as inflation pushed up the price of labor and materials. Broiler house costs in the South exceeded $2 per square foot by 1975. Poultry houses in the North Atlantic and Midwest regions cost $4 or more per square foot to construct in the early 1980's.

Environmentally controlled housing costs more per square foot than conventional housing (see table 9). Most environmentally controlled housing has been built in the North because of more severe climate. Such buildings required sturdier construction, more insulation, and greater control of ventilation, which added to the cost. Environmentally controlled houses in the North Atlantic region cost an average of 40-60 percent more than conventional houses in the South, and 5-20 percent more than conventional units in the Delmarva Peninsula. Many environmentally controlled houses also have been built recently in the South to help improve broiler growing performance and lower production cost. A study conducted in Georgia in the early 1980's showed that environmentally controlled dark houses in the South cost $3.70 per square foot to construct, compared with $3 per square foot for conventional houses with curtains. Performance was somewhat better in dark houses, but such buildings require more intense management to get higher performance.

PROCESSING

The broiler processor is typically part of an integrated firm that coordinates all stages of production and marketing through a combination of direct ownership and contractual arrangements. The first point of sale occurs at a slaughter-eviscerating plant, when the processor sells the dressed RTC broiler at wholesale to a retailer, a distributor, or a further processor. Substantial changes in market structure and costs have taken place in the broiler processing industry over the years (40, 60, 64).

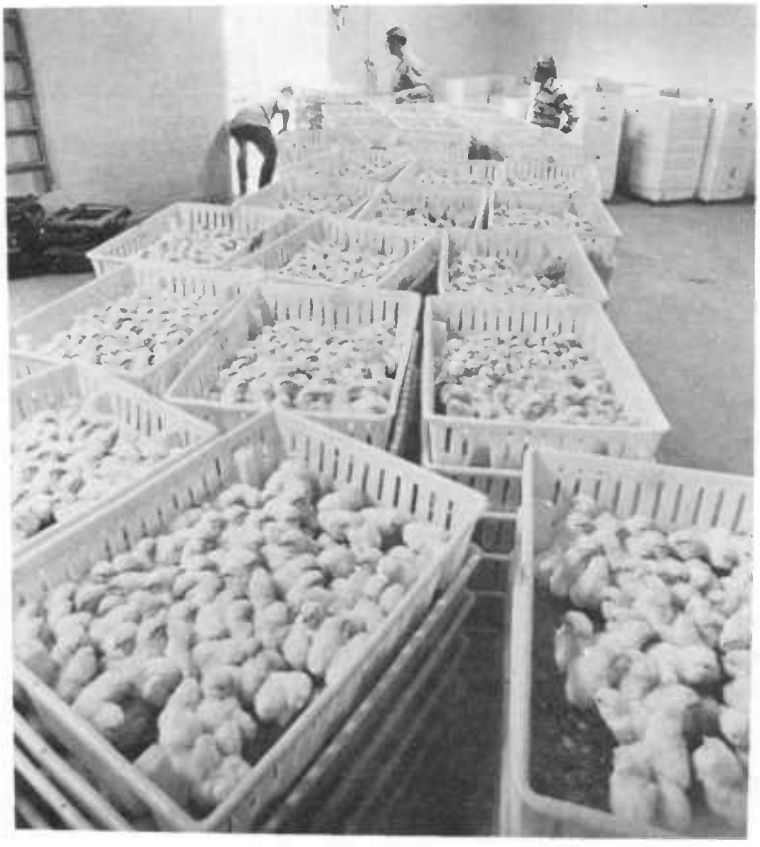
Number and Size of Firms and Plants

Broiler processing firms and plants continue to grow in size and decline in number, leading to a longrun trend toward greater concentration (tables 10 and 11). A total of 134 firms in 1984 operated 238 federally inspected plants in which they slaughtered 4.3 billion broilers weighing 17.8 billion pounds, yielding 13.0 billion pounds of RTC product. Twenty years earlier, 201 firms operated 320 plants that slaughtered less than one-third that volume under Federal inspection. Average slaughter per plant more than tripled, rising from 20.8 million pounds in 1964 to 74.8 million in 1984 (6, 49).

Table 9--Regional capital investment costs for typical commercial broiler housing, selected periods 1/ 2/

Period in which built	North Atlantic Environmentally controlled housing	Delmarva Conventional housing	South 3/ Conventional housing	West 4/ Conventional housing
		Dollars per square foot		
1960-64	1.59	1.18	0.78	--
1965-69	1.92	1.77	1.02	--
1970-74	2.38	1.99	1.43	--
1975-79	5/ 3.23	6/ 3.00	7/ 2.06	2.77
1980-85	8/ 4.65	8/ 4.45	9/ 3.31	--

-- = Not applicable. 1/ Based on data collected in Federal-State surveys, except where noted. Investment costs reflect construction costs for equipped houses. 2/ Houses denoted are the dominant type in the region. 3/ South Atlantic and south-central regions excluding the Delmarva Peninsula. 4/ Compiled by Kannan Nagappan, Univerity of California, Davis. 5/ See (26). 6/ Estimated by George Stevens, University of Maryland. 7/ Georgia only, see (36). 8/ See (7). 9/ See (85).



A batch of broiler chicks are moved out of a hatchery to growout houses where they will be set out, warmed, and fed. By the time they are 6-8 weeks old, they will be mature and ready for market.

Table 10--Market share of top broiler firms and number of plants operated by those firms, selected years 1/

Year	Firms			Firms		
	4 largest	8 largest	20 largest	4 largest	8 largest	20 largest
	Percentage of total U.S. slaughter			Number of slaughter plants operated		
1960	12	18	32	21	31	52
1964	18	28	44	36	51	80
1968	18	29	47	31	48	84
1971	16	26	44	26	46	80
1972	17	29	43	25	47	80
1973	17	27	46	24	39	75
1974	17	28	50	28	44	93
1975	18	31	55	25	45	89
1976	18	31	55	26	47	91
1977	20	33	55	26	58	95
1978	21	36	60	37	61	100
1979	23	39	64	36	69	113
1980	23	39	66	34	60	104
1981	25	41	66	33	67	107
1982	27	44	69	31	64	107
1983	33	48	72	37	68	107
1984	34	51	73	41	68	105
1985	33	50	72	39	63	105
1986	36	54	75	49	73	108
1987	38	55	78	50	77	116

1/ Includes only those firms slaughtering broilers under Federal inspection.
Source: Compiled from (76).

While the average firm slaughtered about 130 million pounds in 1984, the four largest firms operated 41 plants that slaughtered 33.7 percent of the total. The top four firms operated 28 plants and slaughtered 17.1 percent of the total in 1974, about the same percentage as in 1964 (see table 10). The eight largest firms increased their share to 51.4 percent in 1984, up from 28 percent in 1964 and 1974.

Although the trend has been toward greater concentration, there has been considerable change among the largest firms. Three different firms were listed as the largest broiler processor in Broiler Industry's annual list of largest broiler processors in 1976-86 (18); 8 were listed in the top 4 for different years; and 13 were shown in the top 8. Most of the changes resulted from buyouts by firms seeking higher market shares.

Five firms each slaughtered more than a billion pounds of young chickens liveweight in 1984. These five continued their past pattern of growth, increasing their combined volume by 877 million pounds over the prior year.

Table 11--Firms slaughtering broilers under Federal inspection, 1984

Firm size	Slaughtering plants	Head	Liveweight	Share of U.S. slaughter	Share of U.S. cutup 1/	Share of U.S. further processed 2/
	Number	Millions	Mil. lbs.	- - - - Percent - - - -		
4 largest	41	1,379	5,874	33.71	34.79	38.72
8 largest	68	2,127	8,964	51.45	48.67	41.77
12 largest	83	2,556	10,698	61.40	55.74	42.25
20 largest	105	3,028	12,850	73.75	67.53	44.37
36 largest 3/	134	3,613	15,297	87.79	80.51	56.11
57 largest 4/	157	3,992	16,847	96.69	87.83	58.96
70 largest 5/	172	4,101	17,309	99.34	89.52	59.05
73 largest 6/	175	4,114	17,362	99.64	89.65	59.05
90 largest 7/	194	4,124	17,412	99.93	89.73	59.44
134 total	238	4,126	17,423	100.00	89.77	59.49

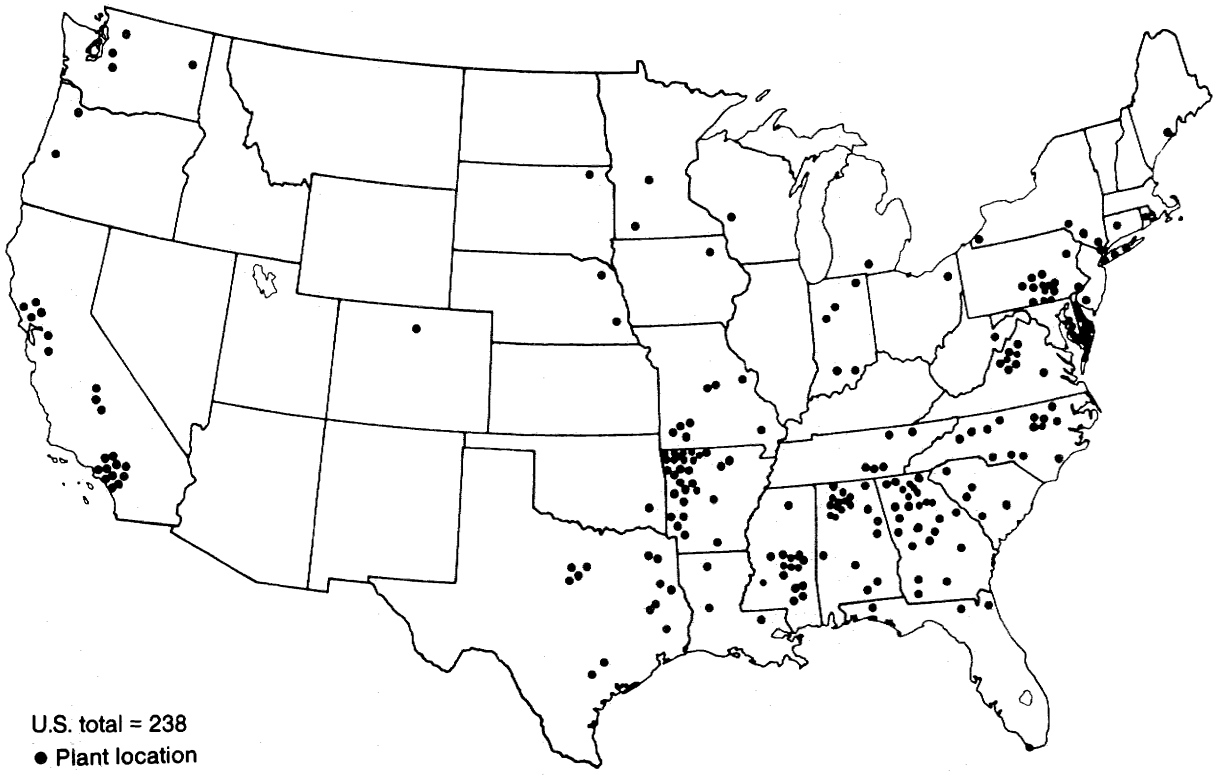
1/ Percentage of total U.S. cutup volume that was cutup by these slaughtering firms. 2/ Percentage of total U.S. volume used in further processing that was used by these slaughtering firms. 3/ Above 100 million pounds, liveweight. 4/ Above 50 million pounds. 5/ Above 20 million pounds. 6/ Above 10 million pounds. 7/ Above 1 million pounds.

Sources: Unpublished U.S. Department of Agriculture, Food Safety and Inspection Service, plant data, based on fiscal year 1984 (76). Revised aggregate data show a total of 4,272 million head and 17,800 million pounds liveweight (78).

All of the top eight firms (each of which slaughtered over 500 million pounds per year) increased their volume, slaughtering 1,030 million pounds more in 1984 than in 1983. These eight firms increased slaughter in 50 of the plants by 512 million pounds, decreased slaughter by 79 million pounds in eight plants, and held volume steady in four plants. Net expansion in the 62 plants operated by the same eight firms in both 1983 and 1984 was 433 million pounds (75, 76). These firms also expanded by acquiring eight plants and closing two, adding a net of 597 million pounds liveweight by acquisition.

Slaughter capacity also became more concentrated geographically. Although slaughter plants are located throughout the major broiler production areas, they are most concentrated in South Central and Southeastern areas (fig. 4). Northern plants have not kept pace with the growth in size of southern plants (table 12). Large plants account for the expansion in all production regions. The proportion of broilers processed in plants smaller than those capable of slaughtering a million pounds per week continues to decline in all areas.

Figure 4—Poultry plants under Federal inspection that slaughtered young chickens, 1984



Larger plants grew most rapidly and small plants shrank in slaughter volume in 1980-84. The 138 largest plants, slaughtering more than 50 million pounds each, expanded their volume by a net of 3,730 million pounds. The 84 plants slaughtering less than 30 million pounds lost 175 million pounds, while the midsized group showed little change in volume (table 13). All of the 27 plants slaughtering over 150 million pounds volume expanded, with an average growth in current volume of 28 percent, compared with that of 1980. Only one plant slaughtering more than 100 million pounds lost volume, and that loss was only 5 million pounds. The net gain of 3.1 billion pounds for these 73 plants represents over 26 percent of their 1984 volume. More small plants lost volume than gained, with the aggregate loss for those under 30 million pounds nearly equal to half of their current volume. These comparisons exclude plants that did not slaughter young chickens in both 1980 and 1984. They also exclude data that were not comparable for these 2 years (75, 76).

Broiler processors have been shifting from the basic commodity type whole-bodied bird to value-added products. All of the processors slaughtering more than 30 million pounds (liveweight) and all but two slaughtering more than 15 million pounds also cutup chicken at one or more of their plants. Only 41 firms that slaughtered young chicken did not cutup chicken in 1984, and they slaughtered a combined total of only 65 million pounds. Among the major processors there is a very close, almost proportional, relationship between the volume slaughtered and the volume cutup (see table 11). A few firms specialize in cutting chicken, but they handle only a small part of the total. The 168 firms that cut but do not slaughter chicken used only 204 million pounds of young chickens for their operations, or 3 percent of the total chicken cutup.

Table 12--Broiler slaughtering plants under Federal inspection and annual slaughter volume (liveweight) by region and plant size 1/

Year and region	Plants with annual volume of-- (in 1,000 pounds)				Annual volume (in 1,000 pounds)			
	0-15,999	16,000-51,999	52,000 and over	Total	0-15,999	16,000-51,999	52,000 and over	Total
	Number				1,000 pounds			
1970:								
North Atlantic	10	8	6	24	55,473	240,505	386,099	682,077
E. North Central	6	4	0	10	23,626	93,904	0	117,530
W. North Central	7	5	2/	12	50,253	157,387	2/	207,640
South Atlantic	8	44	2/33	85	47,019	1,586,772	2/2,635,390	4,269,181
South Central	11	59	3/32	102	68,118	2,080,240	3/2,386,975	4,535,333
West	7	6	3/	13	67,042	133,622	3/	200,664
Total	49	126	71	246	311,531	4,292,430	5,408,464	10,012,425
1975:								
North Atlantic	9	5	7	21	43,259	143,519	470,189	656,967
E. North Central	3	3	0	6	19,546	108,546	0	127,599
W. North Central	5	4	2/	9	19,639	144,778	2/	164,417
South Atlantic	4/	30	2/40	70	4/	1,153,388	2/3,414,686	4,568,074
South Central	4/8	46	3/39	93	4/89,069	1,788,943	3/3,338,421	5,216,433
West	8	8	3/	16	45,778	172,024	3/	217,802
Total	33	96	86	215	216,798	3,511,198	7,223,296	10,951,292
1981:								
North Atlantic	12	7	5	24	33,685	240,951	394,251	668,887
E. North Central	3	5/	5/2	5	4,859	5/	5/105,662	110,521
W. North Central	5	2	3	10	6,487	74,896	287,492	368,875
South Atlantic	2	10	55	67	7,140	371,135	6,174,271	6,552,546
South Central	5/	5/26	64	90	5/	5/1,006,922	6,220,020	7,226,942
West	18	9	2	29	43,454	266,501	564,488	874,443
Total	41	54	130	225	95,935	2,005,974	13,700,305	15,802,214
1984								
North Atlantic	24	3	4	31	45,794	101,228	305,015	452,037
E. North Central	8	0	5	13	16,062	0	384,277	400,339
W. North Central	9	5/	5/5	14	9,608	5/	5/433,072	442,680
South Atlantic	10	5	54	69	12,922	176,954	6,952,779	7,142,655
South Central	5	13	66	84	7,477	500,520	7,557,063	8,065,060
West	17	8	2	27	32,510	228,519	659,300	920,329
Total	73	30	135	238	124,373	1,028,663	16,270,064	17,423,100

1/ Data for 1970, 1975, and 1981 are for plants that predominantly slaughtered young chickens. Data for 1984 are for all plants that slaughtered young chickens. 2/ Plants and volume for West North Central and South Atlantic regions were combined to avoid disclosure of individual plant data. 3/ Plants and volume for South Central and Western regions were combined to avoid disclosure of individual plant data. 4/ Plants and volume for South Atlantic and South Central regions were combined to avoid disclosure of individual plant data. 5/ Plants and volumes were combined for two size groups to avoid disclosure.

Sources: Compiled from unpublished plant data, U.S. Department of Agriculture, Food Safety and Inspection Service. (76). Revised aggregate data show a total of 117,800 million pounds liveweight (78).

Table 13--Changes in federally inspected broiler slaughter volume by size of plant, 1980-84

1984 plant slaughter volume	Plants	Plants that gained volume in 1980-84 by--			Plants that lost volume in 1980-84 by--			Net volume change, 1980-84	Change as percentage of 1984 volume
		Any amount	50 million pounds	20-49 million pounds	0-19 million pounds	Any amount	0-19 million pounds	20-49 million pounds		
	Number								Percent	
Million lbs.										
150+	27	27	12	12	3	0	0	0	--	--
100-149	46	45	7	26	12	1	1	0	--	--
50-99	65	50	0	15	35	15	11	4	--	--
30-49	16	10	0	0	10	6	6	0	--	--
10-29	13	6	0	0	6	7	4	3	--	--
1-9	22	10	0	0	10	6	4	2	--	--
Below 1	49	7	0	0	7	14	14	0	--	--
Total	238	155	19	53	83	49	40	9	--	--

	Total volume	Plants that gained volume in 1980-84 by--			Plants that lost volume in 1980-84 by--			Net volume change, 1980-84	Change as percentage of 1984 volume
		Any amount	50 million pounds	20-49 million pounds	0-19 million pounds	Any amount	0-19 million pounds	20-49 million pounds		
	Million pounds								Percent	
150+	5,987	1,668	1,169	476	23	0	0	0	1,668	27.9
100-149	5,724	1,447	513	798	136	-5	-5	0	1,442	25.2
50-99	4,655	818	0	425	393	-198	-71	-127	620	13.3
30-49	655	55	0	0	55	-45	-45	0	10	1.5
10-29	276	13	0	0	13	-115	-26	-89	-102	-37.0
1-9 1/	72	8	0	0	8	-75	-18	-57	-67	-93.1
Below 1 2/	14	1	0	0	1	-7	-7	0	-6	-42.9
Total 3/	17,383	4,010	1,682	1,699	629	-445	-172	-273	3,565	20.5

-- = Not applicable. 1/ Data were not comparable for 6 plants with a total of 19 million pounds. 2/ Data were not comparable for 28 plants with a total of 6 million pounds. 3/ Total volume of 17,383 million pounds compares with the total of 17,791 million pounds shown by Statistical Reporting Service, U.S. Department of Agriculture. Source: Compiled from (76).

Further Processing

A more affluent, mobile, and growing population has created a demand for more convenience food products. And convenience foods are sought by two-earner families short on time. Further processed poultry items represent one segment of the convenience food market, a segment that has been expanding rapidly in recent years as broiler production grew and companies increased output of value-added products. Further processed poultry products rose dramatically in both volume and market share as food processors, retail markets, and institutional fast food outlets stepped up their purchases. Especially strong demand in the fast food outlet sector stems from the fact that the outlets use only certain parts of the bird, need the convenience of a precut product, and are vastly increasing chicken items on their menus.

Whole broilers can be cut up or further processed to add value. Both operations allow processors to boost sales volume and markup per unit. Identifying the product by brand and using chilled prepacked trays also adds value to the end products. Further processed products can be derived from whole eviscerated birds, cutup parts, or boned meat. Further processing, however, implies a level of processing that extends beyond the eviscerated carcass or cutup stage. It involves a change of product form in which the raw carcass or meat is frozen, heated, boned, sliced, smoked, formed into patties and breaded, or otherwise altered in flavor or texture from the raw state (64).

The further processing industry is marked by a high degree of product differentiation, emphasizing quality, flavor, and convenience. Marketing, advertising, and selling costs consequently are relatively more important than production or raw material costs in some segments of the industry. Poultry meat costs are becoming less important in those products containing smaller proportions of poultry meat, as in some of the older, more traditional products such as frozen entrees, pot pies, and frozen dinners. Many of the newer products such as chicken fillets and patties, however, may be more sensitive to changes in broiler meat prices.

Structure

Multiplant processors tend to do most of their further processing in specialized plants, although they also have cutting operations in most slaughtering plants. Many of the further processors also process meats other than chicken, providing a wider product line, reaching more outlets, and making fuller use of facilities and distribution services.

More firms and plants are engaged in further processing than in slaughtering young chickens. A majority of these further processors buy dressed chickens or chicken meat from another processor. A total of 581 firms further processed young chickens under Federal inspection in 649 plants in 1984. Further processing, however, is slightly more concentrated in the top four and the top eight firms than is slaughter (table 14). The top four firms used 41.1 percent of the total further processed volume, while the top eight used 56.2 percent. The 40 largest firms, in 84 plants, used 85.6 percent of the total young chicken approved for further processing. These 40 firms each used more than 10 million pounds of young chicken for further processing. The 56 firms that used more than 5 million pounds each accounted for 90.8 percent of the total in 107 plants. The smallest 525 firms, using less than 5 million pounds, further process only 9.2 percent of the total in 542 plants. Those 461 firms below 1 million pounds used only 2.2 percent of the total (75, 76).

Table 14--Firms further processing broilers under Federal inspection, 1984

Further processing firms, by volume	Plants processing broilers 1/	Plants further processing broilers	Broilers further processed	Share of U.S. total	Firms considered broiler processors 2/	Broiler slaughter as share of U.S. total
	- - - Number - -		Million lbs.	Percent	Number	Percent
4 largest	49	29	851	41.1	*	*
8 largest	68	42	1,164	56.2	6	43.0
12 largest	80	48	1,311	63.3	7	44.6
20 largest	95	59	1,510	72.9	10	48.0
40 largest 3/	125	84	1,772	85.6	14	50.6
56 largest 3/	173	107	1,880	90.8	19	52.2
74 largest 3/	199	127	1,947	94.0	22	52.9
89 largest 3/	220	144	1,984	95.8	25	53.4
120 largest 3/	262	179	2,027	97.8	29	53.8
146 largest 3/	291	208	2,044	98.7	32	53.9
166 largest 3/	322	231	2,053	99.1	34	53.9
192 largest 3/	350	250	2,060	99.5	34	53.9
237 largest 3/	399	299	2,069	99.9	34	53.9
581 total	755	649	2,071	100.0	34	53.9

* Not shown to avoid disclosure. 1/ Plants that either slaughter or further process broilers under Federal inspection. 2/ Number of firms generally considered as primarily integrated broiler producing-processing firms. There were 48 firms of the 581 that slaughtered broilers. 3/ The 40 largest each further processed at least 10 million pounds of broilers; the 56 largest at least 5 million pounds; the 74 largest at least 3 million pounds; the 89 largest at least 2 million pounds; the 120 largest at least 1 million pounds; the 146 largest at least 0.5 million pounds; the 166 largest at least 0.3 million pounds; the 192 largest at least 0.2 million pounds; and the 237 largest at least 0.1 million pounds.

Source: Compiled from (76).

The four largest broiler slaughtering firms also further process large volumes, amounting to 38.7 percent of the total approved under Federal inspection. Many further processors, however, consider themselves "food processors" rather than "broiler producers." The top eight further processors account for 43 percent of all further processing of broilers (see table 14). Six of the eight are primarily broiler producer-processors.

Ten such slaughter firms are among the top 20 further processors. They account for 48 percent of total slaughter and use 53 percent of the volume approved for further processing. Beyond this point, however, integrated broiler firms are in the minority, with only 34 such firms doing any further processing of young chickens. Only 48 firms both slaughtered and further processed young chickens. Most further processors, 533 of the 581, did not slaughter young chicken under Federal inspection.

The largest 21 further processing plants used almost 51 percent of the total amount of broilers used by all plants in further processing (table 15). The top 50 plants used 75 percent of the total, and fewer than half of the plants further processed 99.6 percent of the total. The 355 smallest volume plants are so small that they have no significant effect on the total volume used. In fact, three-fourths, or 485, of all the plants used only 50.7 million pounds, or 2.4 percent of the total young chicken that was further processed (75, 76).

Location

Further processors find it advantageous to locate larger plants near broiler production centers. Nearly three-fourths of all further processing is done in the South. Arkansas, Georgia, and North Carolina account for half the U.S. total. Pennsylvania and Missouri, which are near production centers, are the only other States annually processing more than 100 million pounds (table 16).

Further processors gain both a cost- and time-saving advantage by locating near production areas. Because further processed products are often frozen and/or fully cooked, they are generally less perishable. They can be shipped, stored, and distributed more economically than can chilled RTC broiler meat. Broiler meat can be more quickly and easily procured in the desired quantity, quality, and form in areas where sources are concentrated. Broiler integrators, accounting for over half the total volume of further processing, often locate the further processing plant close to one of their major slaughter plants. This pattern is especially true of the largest broiler firms (table 17).

Volume Trends

The volume of processed broilers rose from 4.4 billion pounds in 1962 to 13.6 billion pounds in 1985 (78). The volume of cutup parts and further processed products increased even faster, however.

The volume of cutup parts increased tenfold after 1962 and accounted for 53.4 percent of total broilers processed in 1985 (78). Cutup volume nearly tripled since 1975, with increases occurring in both retail and institutional markets. The increase in cutup volume from processing plants is caused by a number of factors: (1) increased consumer purchases of cutup chicken and parts, (2) more broilers being cut up at the processing plant rather than in retail stores, (3) substantial rises in retail sales of cutup tray packs

Table 15--Further processing of broilers under Federal inspection, by size of plant, 1984 1/

Plant volume	Plants per group	Cumulative number of plants	Cumulative share of total plants	Volume per group	Cumulative volume	Cumulative share of total volume
Million lbs.	- - Number - -		Percent	- Million lbs. -		Percent
50 +	6	6	0.9	504.6	504.6	24.4
30-49.9	10	16	2.5	400.9	905.5	43.7
25-29.9	5	21	3.2	141.5	1,047.0	50.6
20-24.9	8	29	4.5	178.5	1,225.5	59.2
18-19.9	6	35	5.4	116.9	1,342.4	64.8
12-17.9	15	50	7.7	217.5	1,559.9	75.2
10-11.9	8	58	8.9	86.7	1,646.6	79.5
6-9.9	18	76	11.7	137.6	1,784.2	86.1
5-5.9	9	85	13.1	50.9	1,835.1	88.6
4-4.9	5	90	13.9	22.8	1,857.9	89.7
3-3.9	17	107	16.5	61.1	1,919.0	92.7
2.5-2.9	12	119	18.3	32.3	1,951.3	94.2
2.0-2.4	9	128	19.7	19.8	1,971.1	95.0
1.0-1.9	36	164	25.3	49.4	2,020.5	97.6
0.5-0.9	31	195	30.0	20.9	2,041.4	98.6
0.1-0.4	99	294	45.3	22.1	2,063.5	99.6
Below 0.1	355	649	100.0	7.7	2,071.2	100.0

1/ Includes 88.3 million pounds deboned broiler meat reported under "other." The Food Safety and Inspection Service, U.S. Department of Agriculture, reported 1,983.8 million pounds of broilers used in further processing in their fiscal year 1984 summary and the Statistical Reporting Service, U.S. Department of Agriculture, reported 2,192.9 million pounds in calendar year 1984.

(including chill-pack products, both with a brand and without a brand), and (4) increased volume of parts sold to fast food outlets in recent years. Prepackaged chill-pack broilers sold to retailers grew from 22 percent of total processor volume in 1974 to 27 percent in 1983. About two-thirds, or 2.2 billion pounds of this volume, was cut up. Fast food sales accounted for about 2 billion pounds of cutup volume in 1983, which was 31 percent of total broilers cut up at processing plants (48).

The volume of further processed products expanded even faster than the volume of cutup parts, growing from 87 million pounds in 1962 to nearly 2.4 billion pounds in 1985 (78). This trend represents a 27-fold volume increase in 23 years. New convenience food products and improved processing technology contributed to the expansion. Primary products in the 1960's were breaded and precooked parts, fried chicken dinners, and miscellaneous products such as rolls, entrees, breasts, and boned meat (31).

Table 16--Volume of broilers used in further processing by plants under Federal inspection: Region and State, 1984

Region and State	Plants	Volume	Region and State	Plants	Volume
	Number	Million lbs.		Number	Million lbs.
North Atlantic	208	274.6	East North Central	75	68.2
Maine	4	33.9	Ohio	18	15.2
New Hampshire	5	3.0	Indiana	5	8.0
Vermont	0	0	Illinois	29	34.8
Massachussets	20	14.3	Michigan	13	5.5
Rhode Island	13	3.8	Wisconsin	10	4.7
Connecticut	17	2.2			
New York	48	19.2	West North Central	53	134.7
New Jersey	26	36.0	Minnesota	21	2.0
Pennsylvania	75	162.2	Iowa	3	6.4
			Missouri	17	110.3
South Atlantic	91	794.9	North Dakota	1	*
Delaware	5	26.6	South Dakota	0	0
Maryland	17	93.5	Nebraska	7	16.0
Washington, DC	2	*	Kansas	4	*
Virginia	12	93.2			
West Virginia	2	*	Mountain	17	0.5
North Carolina	9	141.4	Idaho	3	*
South Carolina	2	*	Montana	1	*
Georgia	33	360.6	Wyoming	0	0
Florida	9	6.9	Colorado	3	*
			New Mexico	4	*
South Central	99	739.8	Arizona	2	0
Kentucky	6	.8	Utah	2	*
Tennessee	11	60.6	Nevada	2	0
Alabama	13	62.3			
Mississippi	5	34.1	Pacific	106	58.5
Arkansas	35	517.1	Washington	10	.2
Louisiana	2	15.2	Oregon	6	7.2
Oklahoma	6	*	California	90	51.1
Texas	21	49.7	U.S. total	649	2,071.2

*States were combined within the region to avoid disclosure of individual plant volume.

Source: (76). Includes 88.3 million pounds of deboned broilers reported as "other" by U.S. Department of Agriculture, Food Safety and Inspection Service.

Further processed broiler products made significant volume gains in the mid- to late-1970's, when items such as patties, fillets, chicken chunks, and other specialty products began to appear in retail markets (19). Fast food chains introduced products such as nuggets and fillet sandwiches in the early 1980's. Sales in both of these market segments contributed to consumer awareness, adding sales momentum. The volume of further processed broiler products more than doubled since 1979 and accounted for nearly 18 percent of total broilers processed and sold in 1985.

Table 17--Number of large integrated U.S. broiler companies and their plants producing further processed broiler products by State, 1984 1/

State	Companies	Plants	Plants engaged solely in further processing	Predominant firms located in State
		Number		
Arkansas	10	23	5	ConAgra, Tyson, Valmac, Continental Grain, Pilgrim, Hudson Foods, Campbell Soup, Simmons, Peterson, O.K. Foods
Georgia	6	10	1	ConAgra, Gold Kist, Seaboard Farms, Cagles, Continental Grain, Mar-Jac.
Alabama	6	10	--	Gold Kist, Continental Grain, Lane, Marshall Durbin, Corbett Enterprises, V.F. Weaver
Virginia	4	7	1	Holly Farms, Rockingham, Rocco Foods, Perdue
Texas	5	8	2	Holly Farms, Lane, Pilgrim, Valmac, Campbell Soup
North Carolina	5	7	--	Holly Farms, Lane, Continental Grain, Perdue, Gold Kist
Delaware	5	5	--	ConAgra, Perdue, Cargill, Townsends, Mountaire
Maryland	4	5	2	ConAgra, Perdue, Showell Farms, Corbett Enterprises
California	2	4	--	Foster Farms, Zacky Farms
Missouri	3	4	3	Tyson Foods, ConAgra, Hudson
Mississippi	2	3	2	McCarty Farms, B.C. Rogers and Sons
Louisiana	2	2	2	ConAgra, Tyson Foods
Tennessee	2	2	1	ConAgra, Seaboard Farms
Florida	2	2	--	Gold Kist, Showell farms
Oklahoma	1	1	--	Lane

See footnotes at end of table.

Continued--

Table 17--Number of large integrated U.S. broiler companies and their plants producing further processed broiler products by State, 1984 1/--Continued

State	Companies	Plants	Plants engaged solely in further processing	Predominant firms located in State
		- - - - Number - - - -		
Indiana	1	1	--	Corbett Enterprises
Minnesota	1	1	--	Jack Frost
Pennsylvania	1	1	--	V. F. Weaver
South Carolina	1	1	--	Campbell Soup
Maine	1	1	--	Penobscot Poultry
Total 2/	33	93	19	--

-- = Not applicable. 1/ Based on statistics for the Nation's 52 largest broiler firms as compiled by Broiler Industry (20, 52). 2/ Total companies by State are not additive since many companies operate in more than one State. Of the 52 largest firms listed by Broiler Industry, 32 produced further processed broiler products.

Product Forms

Although a wide variety of further processed poultry products are sold today, the primary processed broiler products are breaded and precooked parts and other precooked products. That category grew from 7 million pounds in 1960 to 637 million pounds in 1984 (table 18). Total sales value of all precooked products grew even more than production, from $5 million in 1960 (64) to $953 million in 1984. Frozen fried chicken parts traditionally were predominant products in this category, accounting for a substantial portion of sales in earlier years. Annual sales of frozen fried chicken ranged from $234 to $240 million in 1983-84 (56). Competition from the newer boneless products pushed down sales of frozen parts by 5 percent by the middle of 1985. Frozen boneless chicken sales rose substantially in the early 1980's, from $248 million in 1983 to $363 million by mid-1985. Sales of chicken entree products other than fried averaged about $180 million in late 1983 and increased to $278 million by mid-1985.

The overall average value of precooked products increased from 53 cents per pound in the early 1960's to $1.28 in the early 1980's (table 19). Both institutional and retail markets expanded rapidly. Institutional sales to restaurants, fast food outlets, hotels, hospitals, and schools, however, became somewhat more important than retail markets starting in the late 1960's (see table 19). Unit sales in pounds to institutional outlets accounted for

Table 18--Production and value of various types of frozen further processed chicken products and other convenience foods

Year	Precooked chicken 1/		Prepared dinners 2/		Pot pies 3/		Entrees 4/	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Mil. lbs.	Mil. dol.	Mil. lbs.	Mil. dol.	Mil. lbs.	Mil. dol.	Mil. lbs.	Mil. dol.
1960	7	5	137	128	160	82	86	42
1961	15	10	165	151	158	80	95	46
1962	25	12	185	173	161	83	117	61
1963	33	16	250	215	167	86	152	92
1964	43	19	330	280	195	99	213	129
1965	49	22	396	336	199	104	239	145
1966	57	25	444	376	213	113	278	167
1967	76	31	562	421	222	119	305	185
1968	108	42	607	471	255	136	382	226
1969	126	63	643	491	268	143	414	253
1970	160	79	643	495	266	145	405	254
1971	180	93	650	501	266	145	405	253
1972	200	110	676	534	269	148	446	329
1973	224	132	609	588	270	163	576	435
1974	228	139	590	595	240	161	583	478
1975	322	246	557	597	254	166	540	558
1976	381	307	567	626	261	171	587	617
1977	433	371	567	637	248	171	623	675
1978	465	467	529	657	259	194	660	789
1979	500	540	512	640	256	210	670	880
1980	510	575	470	603	231	208	628	899
1981	532	646	429	619	216	213	632	959
1982	521	646	430	688	223	230	635	1,155
1983	614	830	470	926	207	220	662	1,331
1984	637	953	541	1,230	229	246	713	1,568

1/ Includes breaded and precooked parts and other precooked products sold to institutional and retail markets (see table 19). 2/ Includes all types of frozen dinners. About 88 percent of prepared frozen dinners are sold to retail markets. Precooked breaded chicken dinners accounted for about 25 percent of total dinners in 1984, while other chicken plates accounted for about 5 percent of total. Dinners must contain at least 18 percent poultry meat to meet Federal inspection standards (77). 3/ Includes all types of pot pies, nearly all sold to retail markets. Chicken pies probably account for nearly 50 percent of total pies (55). Pies must contain at least 14 percent poultry meat to meet Federal inspection standards (77). 4/ Entrees are center plate products of meat, poultry, or fish in sauce or glaze with not more than one side dish. Includes sliced meat and gravy combinations, beef stroganoff, veal scallopini, chicken and noodles, turkey tetrazinni, boilable pouches, and other products. About 66 percent are sold to retail markets and 34 percent are sold to institutional markets.

Table 19--Breaded and precooked frozen chicken: Production and sales values for institutional and retail markets

Year	Institutional market 1/		Retail market 2/		Total market	
	Quantity	Value	Quantity	Value	Quantity	Value
	Mil. lbs.	Mil. dol.	Mil. lbs.	Mil. dol.	Mil. lbs.	Mil. dol.
1960	NA	NA	7	5	7	5
1961	7	4	8	6	15	10
1962	11	5	14	8	25	13
1963	15	7	18	9	33	16
1964	22	9	21	10	43	19
1965	26	11	23	11	49	22
1966	32	13	25	12	57	25
1967	50	19	26	12	76	31
1968	80	29	28	13	108	42
1969	86	33	40	30	126	63
1970	106	39	54	40	160	79
1971	119	48	61	45	180	93
1972	133	57	67	53	200	110
1973	154	72	73	60	224	132
1974	165	82	63	57	228	139
1975	180	110	142	136	322	246
1976	213	138	168	169	381	307
1977	243	163	190	208	433	371
1978	260	190	205	277	465	467
1979	275	210	225	330	500	540
1980	280	255	230	320	510	575
1981	292	286	240	360	532	646
1982	286	289	235	357	521	646
1983	337	383	277	447	614	830
1984	371	478	266	480	637	953

NA = Not available. 1/ Includes sales to restaurants, fast food outlets, hotels, hospitals, schools, and vending companies. 2/ Includes sales to retail stores with bone-in, 2-pound boxes a major product category.

Source: (55).

58 percent of breaded and precooked chicken volume, and sales to retail markets accounted for 42 percent of the market in 1984. The sales value of these products in dollars was higher in retail markets, however, where the products averaged $1.80 per pound in 1984 compared with $1.29 per pound for institutional sales.

Frozen chicken dinners are another major broiler product category. Most are sold to retail markets. Total sales of frozen prepared dinners grew rapidly

in the 1960's, expanding from 137 million pounds in 1960 and peaking at 676 million pounds in 1972. Sales then declined to 429 million pounds in 1981 (see table 18). They increased slightly since then to 541 million pounds in 1984. The value of sales continued to grow over the years, however, reflecting inflationary trends and the production of higher valued products such as frozen gourmet dinners. Production of premium quality dinners recently has been growing very fast, accounting for nearly 30 percent of all dinners in the last half of 1984. The average sales value of all dinner products increased from 89 cents per pound in the early 1960's to $1.71 per pound in the early 1980's. Precooked breaded chicken dinners, as a share of the total prepared dinner market, were estimated to equal 28 percent in the late 1970's and early 1980's. Other chicken plates probably accounted for about 5 percent of the total (55). Breaded chicken dinners accounted for about 134 million pounds in 1984 and other plates amounted to 27 million pounds. These constituted about 30 percent of the total dinner market in 1984. They had a sales value of about $365 million.

Other frozen further processed chicken products include pot pies and entrees. Total pot pie sales rose rapidly from 160 million pounds in 1960 to a peak of 270 million pounds in 1973, but declined somewhat to 229 million pounds by 1984 (see table 18). The value of sales continued to grow, however, reflecting inflation and higher valued products for upscale markets. Sales value of pot pies doubled from 51 cents per pound in the early 1960's to about $1.01 per pound in the early 1980's. Nearly all pot pies are sold to retail markets. Although chicken pies account for about 50 percent of total pies, most are made from fowl rather than broiler meat. Pies or similar products could be a possible market for certain types of low-valued broiler meat products, depending upon price relationships and availability of other supplies.

Production of frozen entrees grew very rapidly, from 86 million pounds in 1960 to 713 million pounds in 1984 (see table 18). Entrees are center plate products of meat, poultry, or fish in sauce or glaze with not more than one side dish. About 66 percent are sold to retail markets and 34 percent are sold to institutional markets. The sales value of these products continued to increase very rapidly over the years, reflecting inflationary trends, newer gourmet products, and improved quality. About 70 percent of entree sales were estimated to be in the premium quality category in 1983-84 (57). The average sales value of all entree products tripled, from 55 cents per pound in the early 1960's to $1.79 per pound in the early 1980's. Of total sales volume of entrees, poultry makes up about 15-20 percent (56).

Other further processed products include chicken and turkey franks, together accounting for 140 million pounds in 1982, or about 14 percent of the total frank market (84). Poultry franks were estimated to account for 17 percent of the total frank market in 1984 (12).

One of the fastest growing categories of further processed products in the last 5 years has been boneless chicken in the form of patties, fillets, chunks, and nuggets which are sold to institutions and to retail food markets. Annual sales of these products probably exceeded 200 million pounds in 1982-83 (11, 46). Annual dollar sales were estimated at $248 million in late 1983 and grew to $363 million by mid-1985 (56). Fast food outlets introduced boneless chicken fillet sandwiches in the late 1970's, contributing to the sales increase. The newer chunk and nugget products, which began to be featured at fast food chains and retail stores in 1980-81, quickly gained

popularity (5). Estimates indicate that demand for boneless white and dark meat increased by at least 4 million pounds per week by the summer of 1985 (19).

Price Trends

Prices for further processed convenience foods vary greatly from item to item. These products are highly differentiated, and most are sold under distinguishing labels and brands. Although a wide variety of brands are available, grading and inspection laws have helped standardize quality characteristics, at least by requiring minimum levels of ingredient content.

Table 20 shows retail price trends for several important further processed chicken products. These prices were derived from newspaper advertisements in selected U.S. trading centers over a number of years. They, therefore, represent the low end of the price range for these products, since many of the items large retail chains advertised were run as specials.

Frozen meat pies and dinners are one important group of products. Meat pies showed great price variability in the last three decades. They contain relatively small amounts of poultry meat, but constitute an important segment of the convenience food market. First introduced in the early 1950's, chicken pies are one of the oldest convenience foods. Initial prices were as high as 39 cents per package, but gradually dropped to around 19 cents in the late 1960's and early 1970's (31). Prices increased substantially to the 36- to 38-cent level in the early 1980's (see table 20). Early price declines generally were due to the increased output of meat pies and to development of mass production techniques in frozen pie manufacturing. Post-1970 price increases reflect inflationary trends in the economy and, to some extent, a move toward higher quality ingredients and product lines.

Prices for chicken dinners show a similar pattern. When first introduced in the early 1950's, they were priced relatively high, as much as $1.09 per dinner (31). Expanded production, more efficient marketing, and increased competition greatly lowered prices over the years, however. Frozen dinner prices dropped from 75-80 cents per package in the early and mid-1950's to 42-45 cents in the late 1960's and early 1970's. Prices for dinners increased substantially to $1.04 in 1984. Gourmet or premium dinners are much higher priced, ranging up to $3 or more per package. The early price declines for chicken dinners were due to production efficiency, distribution gains, and the expanded availability of convenience foods. Price increases since the early 1970's, however, have been due to inflation. A trend toward higher quality gourmet products pushed up prices in the early 1980's. Frozen dinners were one of the fastest growing convenience foods on the market in the 1950's and 1960's, but sales volume has generally declined since then (see table 20).

Other specialty products, such as frozen chicken with gravy and chicken boiled in bags, also rose substantially in price since the early 1970's (see table 20). Prices for chicken and gravy combinations increased from $1.18 per package in 1970 to $1.64 in 1984, while those for chicken boiled in bags mounted from 26 cents per package in 1972 to 41 cents in 1983. These products, in contrast to chicken pies, contain a large proportion of poultry meat, which makes their prices more volatile and more closely related to raw material (chicken) prices. Inflation also contributed to the price increases of these products in the last decade.

Table 20--Retail prices per package for selected further processed poultry products

Year	Chicken or turkey pies 1/ (8 oz.)	Chicken or turkey dinners 2/ (11 oz.)	Chicken or turkey and gravy 3/ (32 oz.)	Chicken or turkey boiled in bags 3/ (5 oz.)	Frozen fried chicken (32 oz.)	Chicken hot dogs 4/ (16 oz.)	Chicken noodle soup 5/ (10.5 oz.)
	- - Cents - -		Dollars	Cents	- - Dollars - -		Cents
1970	19.9	44.0	1.18	NA	1.88	NA	NA
1971	19.0	42.9	1.08	NA	1.76	NA	NA
1972	19.5	46.5	1.13	26.0	NA	NA	14.0
1973	22.3	42.3	1.26	26.4	NA	0.65	17.0
1974	23.8	47.7	1.20	26.0	1.90	.63	20.0
1975	23.5	50.7	1.11	27.6	1.99	.65	20.0
1976	23.6	51.4	1.10	24.3	2.02	.65	19.0
1977	25.2	54.0	1.10	26.7	1.95	.66	22.0
1978	26.2	62.0	1.30	30.0	2.11	.79	22.0
1979	27.8	61.0	1.60	38.6	2.37	.98	23.0
1980	30.2	63.0	1.56	48.7	2.36	.93	24.0
1981	33.9	74.0	1.59	42.6	2.84	.88	28.0
1982	38.4	77.0	1.58	41.5	2.92	.92	29.4
1983	37.9	82.1	1.61	41.1	2.79	.93	28.6
1984	35.9	104.3	1.64	NA	3.04	.95	35.1

NA = Not available. 1/ Prices refer to standard frozen chicken and turkey pot pies as advertised. 2/ Prices refer to standard popular priced frozen chicken and turkey dinners. Gourmet or large sizes are excluded. 3/ Frozen products. 4/ Includes chicken franks, tasty dogs, and chicken wieners. 5/ Refers to canned chicken soup.

Sources: Data for 1970-76 were derived from monthly averages of weekly advertised retail prices in 21 trading areas of the United States (55). Data for 1977-84 were derived from monthly averages of weekly retail prices for Atlanta, Georgia, market area as advertised in (2). Prices were adjusted for minor differences in package sizes where appropriate.

Frozen fried chicken is one of the oldest convenience food products in the poultry industry. Average annual prices in the 1950's and 1960's ranged from $1.41-$1.98 per package, depending on the price of RTC broiler meat and other factors (31). Since the early 1970's, prices rose substantially to the $2.80-$3.04 level in 1981-84. Retail sales of frozen fried chicken parts stabilized in the 1970's, but began to decline in the early 1980's as boneless chicken and other competitive products became more widely available.

Chicken franks are a relatively new product introduced in the early 1970's. Prices were initially around 65 cents per pound, but rose to 95 cents per pound in 1984 (see table 20). These products are made from various

combinations of deboned chicken meat; prices are not so closely related to market prices of RTC broiler meat. A relatively small number of companies produce canned chicken soup, another specialty item. Prices per can ranged from 17-18 cents in the 1960's and 1970's, but increased to 28-35 cents per can in the early 1980's.

Table 21 shows prices of some of the newer processed products and other specialty items. Chicken patties, fillets, and chunks or nuggets developed into one of the fastest growing product lines in the broiler industry in the early 1980's. Prices for breaded chicken patties ranged from $1.19 to $1.99 per pound in 1983-84 and those of breaded breast patties ranged from $2.99 to $3.59 per pound. Product prices vary depending upon merchandising practices, meat combinations, brand, and size and type of package. Frozen breast patties in 12-ounce packages averaged $2.53 per package in 1983 and $2.92 in 1984, whereas breast fillets averaged $3.24 per package. Frozen chicken chunks averaged $2.36 per package in 1983 and $2.47 in 1984. Products differ in breading formulas, combinations of chicken meat used, and form of product.

Other specialty products include sliced chicken and bologna lunch meats, fresh chicken salad, frozen chicken dumplings, and frozen sweet and sour chicken. Numerous other processed chicken products are also available in a wide range of prices.

Table 21--Retail prices for selected further processed chicken products, Atlanta metropolitan area 1/

Product type 2/	Package size	Average price per package		Price range
		1983	1984	1983-84
	Unit	- - - - - - Dollars - - - - - -		
Breaded chicken patties	1 lb.	1.42	1.62	1.19-1.99
Breaded breast patties	1 lb.	3.29	3.24	2.99-3.59
Breaded breast patties	12 oz.	2.53	2.92	2.29-3.49
Breaded breast fillets	12 oz.	3.24	3.24	2.99-3.39
Breaded chicken patties	12 oz.	2.12	2.41	1.89-2.69
Breaded chicken chunks	12 oz.	2.36	2.47	1.99-2.69
Sliced chicken meat (fresh)	2.5 oz.	.45	.37	.33-.49
Sliced chicken breast (fresh)	6 oz.	1.49	1.59	1.39-1.59
Chicken bologna (fresh)	8 oz.	.80	.79	.69-.89
Chicken and dumplings	5 oz.	.38	.41	.37-.44
Sweet and sour chicken	10 oz.	2.17	1.68	1.39-2.53
Chicken salad (fresh)	7 oz.	.94	.90	.75-1.09
Chunk white chicken (can)	5 oz.	.87	.89	.85-.95
Chunk mixin chicken (can)	5 oz.	.70	.79	.69-.85

1/ Prices derived from weekly advertised prices in the food section of an Atlanta, Georgia, newspaper (2).

2/ All products are frozen except as noted.

Processing and Transportation Costs

Total processing and transportation costs, which include assembling, processing, and long-distance transporting, increased greatly over the last 30 years, from 6-8 cents per pound in the 1950's and 1960's to about 14 cents per pound in recent years (table 22). Processing plant costs accounted for the bulk of these costs, or about 9.3 cents per pound in 1985. Assembly costs equaled 1.6 cents per pound, and long-distance transportation costs amounted to nearly 1.7 cents per pound (72, 73).

Assembly costs per unit of output declined after the mid-1950's from 1.2 cents per pound to 0.8 cent, mainly because of the shorter average hauling distances between farms and processing plants, increased volumes per load, and increased density of production within a 20-mile radius of the processing plants. Efficiency gains more than offset rising input prices associated with assembly of broilers until the mid-1960's. Assembly costs moved up gradually to 1.6 cents per pound in the early 1980's. Input prices and assembly costs increased more than efficiency gained in the 1970's, although in recent years efficiency gains nearly offset input price rises.

Total productivity in assembling broilers was substantially higher in 1965-69 than a decade earlier. Current productivity levels exceed those of 1965-69. More mechanization of broiler loading operations increased labor productivity. Larger producing units and increased density of supply areas also contributed to productivity gains. Labor accounts for the largest component of assembly costs, nearly 60-70 percent. Energy costs account for about 25 percent, while overhead costs constitute about 5-10 percent.

Processing

Cost per unit of output for broiler processing plants trended downward from the mid-1950's to the mid-1960's from 5.6 cents per pound to 4.1 cents per pound (see table 22). Increased mechanization, greater scale economies made possible by larger plants, and better use of capacity produced efficiencies that were more than sufficient to offset rising input prices. Although there have been further gains in efficiency since the mid-1960's, they were not enough to offset rising input prices in most years. Thus, costs per unit rose substantially to over 10 cents per pound in the early 1980's.

Plant productivity increased dramatically after the mid-1950's. New forms of equipment were added to broiler processing lines, reducing labor needs. But labor productivity in broiler processing failed to gain in the early 1970's, when many plants experienced higher labor turnover and labor supply problems.

Labor productivity gains in handling whole and cutup products in processing plants were substantial over the last 25 years. Overhead productivity, however, did not show this pattern because of extensive substitution of equipment for labor. The shift of most packaging functions from wholesaler and retailer to the processing plant, while it offset productivity gains associated with the use of containers and materials in processing plants, raised productivity for the total marketing system. Energy productivity declined from the mid-1950's to the late 1960's because mechanized equipment required more energy. It increased in the 1970's because of economies of scale, emphasis on energy conservation practices, and new equipment.

Table 22--Processing and transportation costs for broilers, RTC, whole equivalent 1/

Year	Assembly	Processing	Long-distance transportation	Total
		Cents per pound		
1955	1.2	5.6	1.0	7.8
1956	1.2	5.4	1.0	7.6
1957	1.1	5.2	1.0	7.3
1958	1.0	5.0	1.0	7.0
1959	1.0	4.7	1.0	6.9
1960	.9	4.5	1.0	6.6
1961	.9	4.3	1.0	6.4
1962	.9	4.2	1.0	6.2
1963	.8	4.1	1.0	6.0
1964	.8	4.3	1.0	5.9
1965	.9	4.5	1.0	6.2
1966	.9	4.6	1.0	6.4
1967	.9	5.0	1.0	6.9
1968	.9	5.3	1.0	7.3
1969	1.0	5.4	1.0	7.4
1970	1.0	5.7	1.0	7.7
1971	1.0	6.2	1.1	8.3
1972	1.0	6.7	1.1	9.0
1973	1.2	6.7	1.1	8.3
1974	1.4	7.2	1.4	10.0
1975	1.4	7.5	1.4	10.3
1976	1.1	7.8	1.3	10.2
1977	1.1	8.0	1.4	10.5
1978	1.0	8.7	1.4	11.1
1979	1.3	9.6	1.6	12.5
1980	1.4	9.8	1.7	12.9
1981	1.6	10.3	1.7	13.6
1982	1.6	10.4	1.7	13.7
1983	1.6	10.5	1.7	13.8
1984	1.6	10.8	1.7	14.1
1985	1.6	9.3	1.7	12.6
1986	1.6	9.1	1.7	12.4

1/ Data for 1955-75 are equivalent to market basket series totals. Data for 1976-86 are from cost components of marketing margins series. RTC = Ready to cook.

Sources: (63, 73).

The relative importance of various processing costs changed in recent years (63, 72, 73). Labor, still the major component of broiler processing plant costs, declined from over 60 percent of total costs in 1955 to about 50 percent of total costs in the early 1980's. Energy costs increased to 9 percent from 5 percent of the total, and overhead costs rose to 20 percent from 10 percent of the total. Container and material costs increased to about 19 percent of total processing costs in the early 1980's from 14 percent of total processing costs in the early 1970's.

Long-Distance Transportation

Long-distance transportation costs rose steadily over the years because of higher labor, energy, and overhead costs. These costs were about 1 cent per pound in the 1950's and 1960's and increased to 1.7 cents or more in the early 1980's. A number of factors affected these costs. Broiler shipments were exempted from Interstate Commerce Commission regulations, trucking all but displaced rail shipping, and interregional shifts in production affected transportation distances. Adjustments for backhauls also influenced costs. Transportation rates for broilers remained relatively steady, however, until 1974, when fuel prices rose because of the oil shortage. Only recently have moderating energy prices produced a stabilizing effect on costs.

Total productivity in long-distance transportation has shown an upward trend since the mid-1950's because of larger vehicles, improved highways, decreased travel time, and heavier gross loads. Upward trends in productivity continued as deregulation increased competition in the trucking industry.

Overhead costs in the past typically accounted for 50 percent of the total transportation costs, and energy and labor costs accounted for most of the remainder. Pre-1980 energy costs usually constituted 25-33 percent of total shipping costs, but energy costs equaled about 26 percent in the early 1980's. Labor accounted for 15-18 percent of long-distance shipping costs in most years.

Regional Costs of Processing, Assembling, and Distributing

A recent study found that broiler processing plant costs in the South were 9.07 cents per pound RTC weight in 1982-83, compared with 6.44 cents in 1973-74 (table 23). Assembly costs were 1.4 cents per pound in 1982-83 compared with 1.04 cents in 1973-74. Distribution costs in the South were 2.28 cents per pound in 1982-83, compared with 1.45 cents per pound in 1973-74. Overall processing, assembling, and distributing costs in the South were 12.75 cents per pound in 1982-83, compared with 8.93 cents in 1973-74, a 43-percent increase in nearly a decade.

Broiler processing costs in the Northeast were 10.59 cents per pound in 1980-81, compared with 7.57 cents in 1974. Northeastern assembly costs were 1.54 cents per pound in 1980-81, contrasted with 0.96 cent per pound in 1974. Distribution costs in the Northeast were 1.65 cents per pound in 1980-81, compared with 0.86 cent in 1974. The total combined costs for processing, assembling, and distributing in the Northeast increased 47 percent in 7 years, from 9.39 cents in 1974 to 13.78 cents per pound in 1980-81.

Processing plant costs in the Northeast were somewhat higher than in the South in both time periods. Costs in the Northeast were 1.13 cents per pound higher than in the South in 1973-74 and 1.52 cents higher in the early 1980's, mostly due to more expensive labor, fuel, and utilities and to higher taxes.

Table 23--Broiler processing plant costs and capabilities by major regions, selected years 1/

Item	South 2/		Northeast 3/		West Coast 4/
	1973-74	1982-83	1974	1980-81	1973-75
			Number		
Plants	16	7	11	NA	6
			Million pounds RTC 5/		
Volume processed	732	750	326	NA	232
			Percent		
Product form:					
Whole	70	NA	60	NA	55
Cut up	26	NA	34	NA	44
Further processed	4	NA	6	NA	1
			Cents per pound, RTC weight		
Variable costs:					
Plant labor	3.25	4.22	3.97	5.07	3.87
Packaging	1.10	1.70	1.44	1.76	1.28
Utilities, fuel	.34	.70	.56	.78	.41
Management, office	.52	.45	.49	.60	.59
Miscellaneous	.21	.14	.30	.18	.37
Total	5.42	7.21	6.76	8.39	6.52
Fixed costs:					
Depreciation, rent	.33	.87	.30	1.00	.87
Repairs, maintenance	.35	.22	.20	NA	.36
Taxes, interest, and insurance	.34	.77	.31	1.20	.32
Total	1.02	1.86	.81	2.20	1.55
Total variable and fixed costs	6.44	9.07	7.57	10.59	8.07
Assembly costs	1.04	1.40	.96	1.54	1.00
Distribution costs	1.45	2.28	.86	1.65	1.70
Total, all costs	8.93	12.75	9.39	13.78	10.77

NA = Not available.

1/ Costs exclude further processing operations. Data for the 1970's were obtained from surveys conducted by Georgia, Pennsylvania, and Missouri Agricultural Experiment Stations in cooperation with the Economic Research Service, USDA. Data for the 1980's were obtained from unpublished studies plus (37). 2/ South includes Alabama, Georgia, North Carolina, Arkansas, Mississippi, and Texas. 3/ Northeast includes Pennsylvania, Maine, Delaware, Maryland, and Virginia. 4/ West Coast includes California and Washington. 5/ RTC = Ready-to-cook basis.

Labor was the largest processing plant cost component in the South in recent years, 46 percent. Other cost components were packaging (19 percent); utilities (8 percent); management and office expenses (5 percent); depreciation and rent (10 percent); repairs and maintenance (2 percent); taxes, interest, and insurance (8 percent); and miscellaneous (2 percent) (see table 23). Processing plant cost variations within the South are relatively small, although wage rates and utility costs vary from State to State. Plant age and capital investment costs also vary, which can affect fixed costs. Assembly costs are similar in most broiler producing regions because most broiler processing plants obtain birds from supply areas within a 20- to 30-mile radius. Distribution costs vary considerably among regions, however, because of widely differing distances to major markets.

MARKETING

Changes in industry structure and organization, and in technology of producing, processing, and transporting have resulted in new ways of marketing broilers. Vertical integration, through direct ownership and contractual arrangements, has tied together several stages of production and marketing so that there no longer is a sales transaction at the farm level. The first point of sale is now at the wholesale level because the processed broilers are sold ready-to-cook. A strong market also has developed between various processors for whole RTC birds or for broiler meat to be used in making further processed products.

Processors' Selling Prices

Processors' wholesale selling prices trended downward in the early 1950's, remained stable in the 1960's and early 1970's, and, after rising sharply in 1973, remained at the higher level, rising again in 1983-84 but declining in 1985. Three main factors influenced processors' selling prices through 1970. The first factor was farm prices for live birds during the earlier years. The second factor was the shift of processors toward larger, more efficient operations, which pushed average production and processing costs down. The third factor was the increase in competition and quantity produced, which pushed wholesale prices down and narrowed margins. The increase in processor selling price since 1973 reflects a general upturn in input costs, resulting in higher production and marketing costs for meat products. The higher cost structure has affected the supply responses of poultry and competing products, pushing up the prices of these products. A rising general price level and higher consumer incomes have supported both the increase in broiler consumption and the price consumers are willing to pay.

A study by the National Commission on Food Marketing, which summarized pricing methods widely used by processors in the 1950's and early 1960's (49), showed that the general practice was to tie the RTC broiler price to the live price by a formula. A typical formula was the live price divided by 73 percent (the approximate yield of RTC broiler from liveweight) plus 5-7 cents to cover processing costs. The live price used was the price reported by USDA's Market News Service for one of the important Southern broiler-producing States. The resulting RTC price was used as a basis of negotiations with buyers. The price-basing point typically used was Atlanta, and incremental amounts were added to the price to cover transportation costs to various locations. As more broilers were produced under contract, there were fewer actual sales of live broilers to quote. The Market News Service then changed to "live at-farm

base valuation" and based this value on information gathered from processors. Finally, on October 1, 1965, the Market News Service discontinued the report and began expanding its coverage of RTC market prices in large metropolitan areas. This change left the broiler processor without the live price quotation needed for the traditional pricing formula. At the request of some broiler industry groups, some State departments of agriculture began live price reporting services to replace the discontinued USDA report (70, 71).

In the early 1960's, the Market News Service developed a 9-city weighted average price for RTC ice-packed broilers delivered to consuming markets for truck lot sales. Prices were published on Monday for the week's projected deliveries. The trading level was "delivered to first receiver" at terminal markets. The nine cities were Chicago, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, and San Francisco (70, 71).

The Agricultural Marketing Service replaced the 9-city report with the new 12-city composite price in May 1983 (24). The three markets added were Boston/New England, Cincinnati, and Denver. The new price represents a composite weighted average of negotiated sales in the 12 cities. The composite price is weighted by the sales of whole-carcass products in these categories: U.S. Grade A and plant-grade products that are ice-packed or CO_2-packed, branded products, chill-packed birds, and whole birds without giblets. These prices are then weighted by the population within designated regional marketing areas.

Price premiums exist in many markets for broilers from nearby areas. Premium prices are also charged on the basis of size differences, types of packs, and kinds of outlets serviced. Packing of broilers under processor brands has been increasing rapidly. Some brands are consistently sold for premium prices.

An imbalance frequently arises between the quantity of chicken parts available and demand for them. Parts prices have varied in the short term, but consumers have bid up the price of the breast, the most desired part. The New York wholesale price of fryer breasts (with ribs) increased to $1.12 per pound in 1986, a 154-percent rise over the 1970 price of 44 cents. This was triple the 42-percent rise in leg prices to 47 cents from 33 cents. Prices for whole broilers rose 119 percent in 1970-86, from 26 to 57 cents. Differences were even more pronounced during the 1980-86 period, in which whole broiler prices increased 16 percent, breast prices rose 19 percent, and leg prices dropped by 7 percent.

Marketing Costs and Margins

Annual average "farm value" for broilers varied from 35.9 to 46.3 cents per pound RTC during 1980-87, while retail price varied from 71.9 to 83.5 cents. The farm-to-consumer margin ranged from 33.2 to 40.5 cents per pound. The farm-to-retailer portion ranged between 15.3 to 19.9 cents per pound (table 24).

The farm value accounts for slightly more than one-half the retail price. Because production and marketing are so closely tied together by the integrated structure, the farmer's share of the consumer's dollar has lost its former significance as a performance measure for the broiler industry. The first point of sale is now at wholesale, and the processor is the seller. The integrator makes production and marketing decisions about the entire complex rather than for any one particular function. Even when one attempts to

Table 24--Prices and price spreads for RTC frying chicken, selected years 1/

Item	1950	1955	1960	1965	1970	1971	1972	1973	1974	1975	1980	1981	1982	1983	1984	1985	1986	1987
								Cents per pound, RTC 2/										
Prices																		
Farm value	38.2	35.4	23.8	20.4	17.4	18.7	19.2	33.9	30.0	35.7	38.2	37.6	35.9	39.6	43.9	40.2	46.3	38.0
Retailer price	NA	NA	32.5	29.5	29.8	30.9	33.0	46.8	42.3	49.4	53.5	53.8	51.5	56.0	61.5	56.2	63.1	53.1
Retail market price	57.0	54.3	41.6	40.2	41.7	42.0	42.7	60.8	57.0	64.3	71.9	73.7	71.6	72.8	81.4	76.3	83.5	78.5
Price spreads																		
Farm-to-retail	18.8	18.9	17.8	19.8	24.3	23.3	23.5	26.9	27.0	28.6	33.7	36.1	35.7	33.2	37.5	36.1	37.2	40.5
Farm-to-retailer	NA	NA	8.7	9.1	12.4	12.3	13.8	12.9	12.3	13.7	15.3	16.2	15.6	16.4	17.5	NA	NA	NA
Retailer-to-consumer	NA	NA	9.1	10.7	11.9	11.1	9.7	14.0	14.7	14.9	18.4	19.9	20.1	16.8	19.9	20.1	20.4	25.4
								Percent										
Farm share of retail price	67.0	65.2	57.2	50.7	41.7	44.4	45.0	55.7	52.6	55.5	53.1	51.1	50.2	54.4	53.9	52.7	55.5	48.4

NA = Not available. 1/ A farm cost can be estimated, but there is no longer a farm price. Farm value can be estimated; however, with vertical integration it includes some costs which could well be attributed to marketing. Consequently, neither farm-to-retail price spread nor farm share of the retail price is any longer a meaningful measure of industry performance. 2/ RTC = Ready-to-cook.

Sources: (72, 73, 74).

allocate costs, one finds that responsibilities and costs have been shifted from production to the marketing function and from the retailer to the processor. A comparison of the farmer's share of the consumer's dollar as a time series or in contrast with other commodities, therefore, could be quite misleading.

Interregional Transit

Broiler production is highly concentrated in a few areas. These production areas do not coincide with population concentrations, and broilers must be moved from the surplus production areas to deficit areas (65). Actual data are not collected on regional consumption or interregional shipments. Therefore, we estimated regional consumption by multiplying population in the region by the average U.S. per capita consumption. Using estimated regional consumption, we determined surplus or deficit conditions for each region.8/

Total U.S. population increased from 214.2 million people in 1975 to 232.5 million in 1983. Most of this growth took place in the South and West. Population, for example, grew by 10 million in the two southern regions and by 7.1 million in the Mountain and Pacific regions (excluding Hawaii and Alaska). Northeastern population remained almost the same because New England's 0.3-million increase was nearly offset by the 0.2-million decline in the Mid-Atlantic States. The North Central region gained only 1.1 million people.

The South Central and South Atlantic regions continue to increase their surplus production of broilers for shipment to deficit regions, so that fresh chicken is readily available in all regions (table 25). Different rates of population growth and production, however, affect the regional balance between supply and consumption. Despite California's expanded production, the West is becoming increasingly deficit. The West, in 1984, needed 1.75 billion pounds shipped in, compared with 1.46 billion pounds in 1980 and only 53 million pounds in 1950. One-fourth of total inshipments now go to the West, contrasted with one-fifth in 1970 and only one-tenth in 1950. The Mid-Atlantic region now accounts for about 25 percent of regional inshipments, whereas it accounted for 29 percent in 1970 and 38 percent in 1950. New England changed from a surplus area in 1950 to a self-sufficient area in 1960. But it became a deficit area by 1965, requiring nearly 600 million pounds in 1984.

Three major factors caused the increase in interregional shipment of broilers: production is becoming increasingly concentrated in the South, the Nation's population is increasing, and per capita consumption continues to rise.

Origins of receipts for a sample of 13 major cities in four different time periods help identify broiler movements and how they have changed over time (table 26). The origins of receipts for these cities are listed in order of importance and reflect the shifting patterns of supply sources. Most regions continue to receive broilers from the same producing area, although Midwestern and West Coast cities have made some minor changes in supply sources. Shifts reflect competition among broiler suppliers and buyers as production becomes more concentrated in the major areas.

8/ See (14) for more detailed methodology.

Table 25--Regional broiler production compared with consumption, selected years 1/

Region	1950	1955	1960	1965	1970	1975	1980	1981	1982	1983	1984
						Million pounds, RTC 2/					
New England	53.5	73.7	-1.9	-84.5	-194.8	-211.2	-387.7	-487.7	-550.7	-563.8	-590.7
Mid-Atlantic	-189.7	-338.4	-661.5	-939.0	-1,213.9	-1,177.6	-1,429.4	-1,481.4	-1,520.0	-1,589.5	-1,703.2
East North Central	-155.4	-317.0	-662.0	-1,016.8	-1,382.3	-1,398.3	-1,843.7	-1,914.1	-1,958.4	-2,000.7	-2,096.4
West North Central	-70.1	-131.5	-256.4	-316.0	-494.5	-497.1	-679.6	-700.6	-712.6	-733.8	-764.5
South Atlantic	419.3	682.1	1,234.7	1,592.3	2,018.3	1,998.0	2,685.5	2,857.3	3,036.8	3,143.9	3,278.1
East South Central	-32.8	81.6	506.0	863.3	1,202.2	1,190.4	1,556.8	1,626.6	1,664.6	1,780.8	1,847.8
West South Central	38.4	126.0	304.0	642.1	996.8	1,043.6	1,555.1	1,651.7	1,652.8	1,644.7	1,779.5
Mountain	-36.7	-73.6	-146.3	-210.8	-286.9	-355.5	-534.5	-570.8	-602.2	-626.4	-653.5
Pacific	-16.3	-110.6	-284.2	-455.4	-613.7	-624.3	-922.4	-980.9	-1,010.3	-1,053.1	-1,097.0

1/ Per capita consumption was assumed to be uniform in all regions. Negative numbers indicate shortages met by inshipments from surplus areas.

2/ RTC = Ready-to-cook.

Sources: (6, 38, 80, 83).

Table 26--Origin of broiler receipts for 13 major cities, selected years

City	Area of origination/year			
	1969	1975	1980	1984
Boston	Delmarva Peninsula, New England, Virginia	Delmarva Peninsula, New England, North Carolina	Delmarva Peninsula, New England, North Carolina	Delmarva Peninsula, New England, North Carolina, Georgia
New York	Delmarva Peninsula, North Carolina, Georgia	Delmarva Peninsula, North Carolina, Georgia	Delmarva Peninsula, North Carolina, Virgina, Georgia	Delmarva Peninsula, North Carolina, Georgia
Baltimore	North Carolina, Delmarva Peninsula, Georgia	North Carolina, Delmarva Peninsula, Georgia	North Carolina, Delmarva Peninsula, Georgia	North Carolina, Delmarva Peninsula, Georgia
Washington, DC	North Carolina, Delmarva Peninsula, Georgia	North Carolina, Virginia, Delmarva Peninsula	North Carolina, Virginia, Delmarva Peninsula, Georgia	North Carolina, Georgia, Delmarva Peninsula
Atlanta	Georgia, Alabama	Georgia, North Carolina	Georgia	Georgia, North Carolina
Cleveland	Georgia, Missouri, Arkansas, Ohio-Indiana	Georgia, Missouri, Arkansas, Ohio, North Carolina	Georgia, Missouri, Arkansas, North Carolina	Georgia, North Carolina
Chicago	Alabama, Georgia, Mississippi, Arkansas, Ohio-Indiana	Georgia, Missouri, Arkansas	Georgia, Missouri, Arkansas	Georgia, Missouri, Arkansas
St. Louis	Missouri-Arkansas, Alabama, Mississippi, Georgia	Georgia, Missouri, Arkansas	Georgia, Missouri, Arkansas	Georgia, Missouri, Arkansas
Minneapolis-St. Paul	Missouri-Arkansas, Minnesota, Georgia, Mississippi, Alabama	Alabama, Georgia, Missouri, Arkansas	Alabama, Georgia, Missouri, Arkansas	Alabama, Georgia, Missouri, Arkansas
Denver	Arkansas, Texas, Missouri, Alabama	Arkansas, Missouri, Georgia	Arkansas, Missouri, Georgia	Missouri, Arkansas
Los Angeles	Arkansas, Texas, California, Alabama, Louisiana, Mississippi	California, Missouri, Georgia	California, Missouri, Arkansas, Georgia	California, Georgia, Missouri, Arkansas
San Francisco	California, Texas, Mississippi, Arkansas, Alabama	California, Missouri, Arkansas, Georgia	California, Missouri, Arkansas, Georgia	California, Missouri, Arkansas
Seattle	Washington, Arkansas, California	Washington, Arkansas, California	Washington, Arkansas, California	Washington, Arkansas, California

Source: (71).

Interregional movements are limited by two factors: transportation costs and time required to ship a highly perishable product. Table 27 shows estimated costs of shipping broiler meat from major production areas to selected major markets. Both the higher cost per pound and the extra shipping time make it more difficult for distant producers to compete with nearby producers in the same market.

Table 27--Costs of trucking ready-to-cook broilers from major production areas to selected domestic consumer markets, 1982 1/

Primary production areas	Major consumer markets	Approximate distance 2/	Transportation costs 3/	
			Per mile	Per pound
	City	Miles	Dollars	Cents
Delmarva Peninsula	Philadelphia	110	2.01	1.47
(Seaford, DE)	New York City	210	1.58	1.94
	New Haven	270	1.47	2.32
North Carolina	Washington, DC	270	1.47	1.21
(Burlington, NC)	New York City	510	1.30	2.43
	Buffalo	590	1.27	2.75
North Georgia	Atlanta	50	3.10	1.03
(Gainesville, GA)	Cleveland	650	1.25	2.98
	Detroit	680	1.25	2.14
North Alabama	Birmingham	60	2.77	1.11
(Gadsden, AL)	Indianapolis	450	1.32	2.48
	Chicago	630	1.26	2.91
Central Mississippi	New Orleans	140	1.81	1.69
(Laurel, MS)	Houston	440	1.33	2.44
	Tampa	590	1.47	3.18
Western Arkansas	St. Louis	410	1.34	2.29
(Hot Springs, AR)	Minneapolis	830	1.22	3.38
	Los Angeles	1,650	1.16	6.38
Eastern Texas	Dallas	100	2.10	1.40
(Tyler, TX)	San Antonio	300	1.44	2.16
	San Diego	1,430	1.17	5.58
Central California	Fresno, CA	60	2.77	1.11
(Merced, CA)	San Francisco	120	1.93	1.54
	Portland, OR	690	1.24	3.14

1/ Data are based on shipments to typical markets from major production areas. Truckload lots were 400 boxes weighing 30,000 pounds or more without ice. 2/ Reflects one-way highway mileage. 3/ Costs are based on round-trip mileage assuming certain levels of backhaul depending on distance.

Source: Unpublished analysis of least-cost transportation rates.

The industry is aware of the importance of extra shipping costs for longer distances, and adjusts production and marketing accordingly. Table 28 depicts the distribution pattern that would minimize shipping costs given the production-consumption pattern that existed in 1982. The pattern approximates actual flows fairly closely, although it ignores differences in other costs of production and processing.

Seasonality of Processing

Broiler processors operate at a more uniform level throughout the year than was true a decade ago. Although they continue to slaughter more during the summer than winter, seasonal variability is lessening (table 29). Slaughter in the short month of February in 1980-84 was 90 percent of the monthly average but in June it was 106 percent, a range of 16 percentage points. By comparison, the range for all of 1985 was 20 points. The range during the 1975-79 period was 25 points, an improvement over the 1965-69 period when it varied by 28 points.

The processing plant serves as the focal point in supplying broilers to meet demand. The processor rather than the individual producer schedules the flow, deciding when to market the birds. Smoothing out seasonality enables the processing plant and the entire complex to produce a greater volume with a

Table 28--Interregional movements projected to minimize broiler shipping costs from primary production centers to major U.S. consuming regions, 1982 1/

Primary production area 2/	Major consuming regions						Total
	New England	Middle Atlantic	Midwest	South	Mountain	Pacific	
			Million pounds, RTC				
Central Maine	78	--	--	--	--	--	78
Pennsylvania	95	258	--	--	--	--	353
Virginia	341	171	--	--	--	--	512
Delmarva Peninsula	49	1,386	--	--	--	--	1,435
North Carolina	99	1,312	44	--	--	--	1,455
North Georgia	--	49	740	1,043	--	--	1,832
North Alabama	--	--	1,199	264	--	--	1,463
Central Mississippi	--	--	35	883	--	--	918
Western Arkansas	--	--	688	235	384	694	2,001
Eastern Texas	--	--	--	506	44	117	667
Central California	--	--	--	--	--	590	590

-- = Not applicable.

1/ Based on unpublished analysis of optimum distribution patterns that minimize transportation costs for current production.

2/ Other important production areas include Lake City, Florida, with 299 million pounds and Kelso, Washington, with 124 million pounds. Both ship to markets within their State.

Table 29--Seasonality of slaughtering broilers under Federal inspection

Item and month	1965-69 average	1971-74 average	1975-79 average	1980-84 average	1980	1981	1982	1983	1984	1985	1986	1987
						Million pounds 1/						
Monthly slaughter:												
January	460	639	750	984	962	974	934	1,021	1,029	1,155	1,211	1,276
February	406	573	665	911	873	864	902	934	984	991	1,087	1,158
March	450	633	781	1,032	920	1,011	1,052	1,106	1,069	1,082	1,116	1,298
April	469	622	767	1,032	1,009	1,027	1,018	1,054	1,052	1,197	1,250	1,277
May	510	691	832	1,064	1,007	1,026	1,006	1,096	1,184	1,222	1,229	1,261
June	524	684	834	1,068	976	1,043	1,085	1,125	1,113	1,095	1,195	1,371
July	508	662	799	1,016	936	1,037	1,029	977	1,103	1,203	1,197	1,338
August	544	708	863	1,060	914	1,004	1,057	1,113	1,210	1,198	1,181	1,257
September	514	625	798	1,019	942	1,040	1,043	1,045	1,026	1,182	1,242	1,371
October	533	685	844	1,058	997	1,034	1,010	1,038	1,213	1,252	1,256	1,381
November	434	590	716	911	796	873	930	937	1,019	998	1,050	1,177
December	468	590	747	964	940	974	971	942	995	1,094	1,252	1,337
Total	5,819	7,702	9,396	12,119	11,272	11,906	12,039	12,381	12,999	13,569	14,266	15,502
Annual monthly average	485	642	783	1,010	939	992	1,003	1,032	1,083	1,131	1,189	1,292
						Percent						
Monthly slaughter as share of average:												
January	95	100	96	97	102	98	93	99	95	102	102	99
February	84	89	85	90	93	87	90	91	91	88	91	90
March	93	99	100	102	98	102	105	107	99	96	94	100
April	97	97	98	102	107	104	102	102	97	106	105	99
May	105	108	106	105	107	103	100	106	109	108	103	98
June	108	107	107	106	104	105	108	109	103	97	101	106
July	105	103	102	101	100	105	103	95	102	106	101	104
August	112	110	110	105	97	101	105	108	112	106	99	97
September	106	97	102	101	100	105	104	101	95	96	104	106
October	110	107	108	105	106	104	101	101	112	111	106	107
November	89	92	91	90	85	88	93	91	94	88	88	91
December	96	92	95	90	100	98	97	91	92	97	105	103

1/ Certified ready-to-cook weight.

Source: (78).

given set of facilities. This practice reduces average unit costs. All production and marketing functions are coordinated to move the birds through the slaughter plants as needed. If plants had followed the same seasonal pattern in 1980-84 as did plants in 1965-69, they would have processed 676 million fewer pounds of broilers, or only 94.4 percent of the volume they achieved.

Processing Losses

Young chickens are inspected twice at processing plants. Examination of live birds is known as antemortem inspection. Examination of carcasses and entrails after slaughter is known as postmortem inspection. Condemned birds are not approved for human consumption.

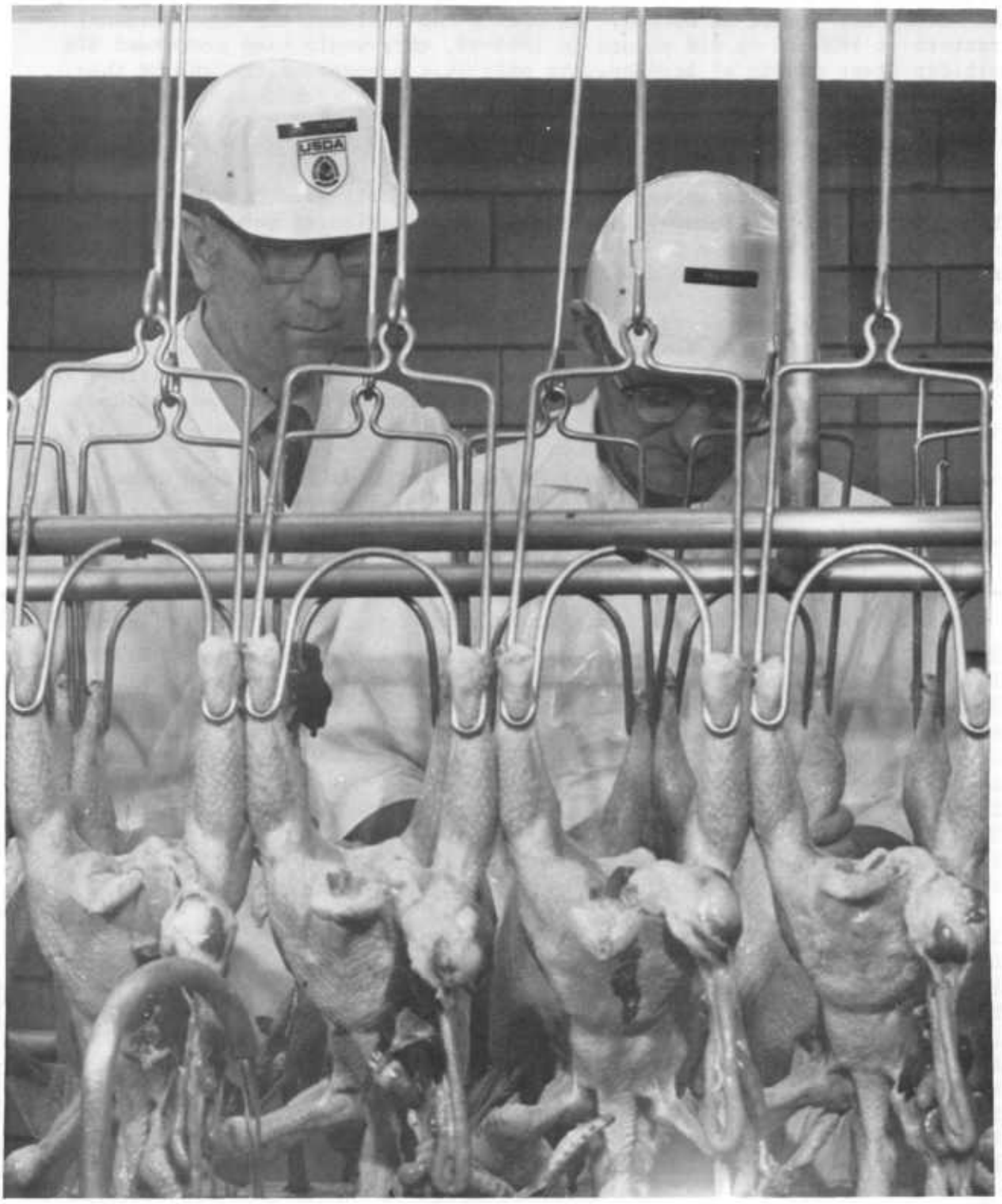
In 1987, 21.3 billion pounds of live young chickens were inspected at processing plants under Federal inspection, and 73 million pounds (0.3 percent) were condemned antemortem (table 30). Antemortem condemnations rose

Table 30--Condemnations and yields of broilers slaughtered under Federal inspection, selected years

Year	Antemortem condemnations	Postmortem condemnations	Yield 1/
	Percentage of lbs. inspected		Dress out percentage
1965	0.2	2.7	72.55
1966	.3	3.7	71.83
1967	.3	4.0	71.62
1968	.3	3.6	71.47
1969	.4	3.5	71.53
1970	.5	4.0	71.41
1971	.4	3.6	71.51
1972	.5	3.1	71.72
1973	.5	2.6	72.05
1974	.4	2.2	72.28
1975	.3	1.7	72.77
1976	.3	1.8	72.43
1977	.4	1.9	72.42
1978	.5	2.0	72.37
1979	.4	2.0	72.23
1980	.3	1.9	72.58
1981	.3	1.7	72.77
1982	.3	1.6	73.16
1983	.4	1.5	73.33
1984	.3	1.8	73.02
1985	.3	1.7	72.86
1986	.3	1.7	72.51
1987	.3	1.8	72.64

1/ Total pounds of certified ready-to-cook weight as a percentage of live weight hung on the processing lines.

Source: Compiled from (68).



Federal inspectors check broilers for wholesomeness on the processing line. Most broiler producers now have their own slaughter facilities located near their broiler-raising complexes.

from 0.2 percent in the early 1960's to 0.5 percent in the early 1970's, then fell to 0.3 percent in 1987.

After the birds are slaughtered, their blood and feathers are removed (New York-dressed). Assuming a 90-percent yield, post-slaughter weight of broilers equaled about 19.2 billion pounds in 1987. The birds are opened and Federal inspectors examine body contents, leading to some postmortem condemnations.

Postmortem condemnations are mainly due to diseases or infections such as leukosis, septicemia, air sacculitis, synovitis, and tumors. Other causes are bruises, death before slaughter, contamination, and overscald.

Federal inspectors condemned (postmortem) 349 million pounds (New York-dressed weight) of young chickens in 1987. That amounted to 1.8 percent of the broilers slaughtered (see table 30). Postmortem condemnations trended upwards from the early 1960's until 1970, then trended downward, leveling out just below 2 percent. Some of the decline in condemnations is undoubtedly due to the development and use of Marek's vaccine, which has reduced the incidence of leukosis since the early 1970's.

Reductions in postmortem condemnations also led to higher yields in recent years. The 1987 dressed-weight yield of 72.64 percent of liveweight is lower than the yields in the early 1980's but higher than the yields in the 1960's and 1970's.

Marketing Channels

Broilers move from processing to use in three markets. In 1987, 87.9 percent of product movement was through domestic food markets, which are retail grocery stores, public places, and institutions. The remainder moved through pet food and rendering markets (6.8 percent) and export markets (5.3 percent). Processors move over one-half of whole and cutup broilers directly to retail or institutional food service outlets, bypassing the traditional wholesale distributor (fig. 5). Processors increased the proportion marketed directly to retailers and institutions during the 1960's. During the 1970's and early 1980's, however, wholesalers appeared to have gained importance, especially company-owned distributors. Much of this growth in wholesaling was due to rapid expansion of further processing and to growth of fast food establishments. Both outlets tend to use selected broiler parts in ratios that differ from the natural proportion. Such outlets also require extra services, which favor purchase from a wholesale distributor.

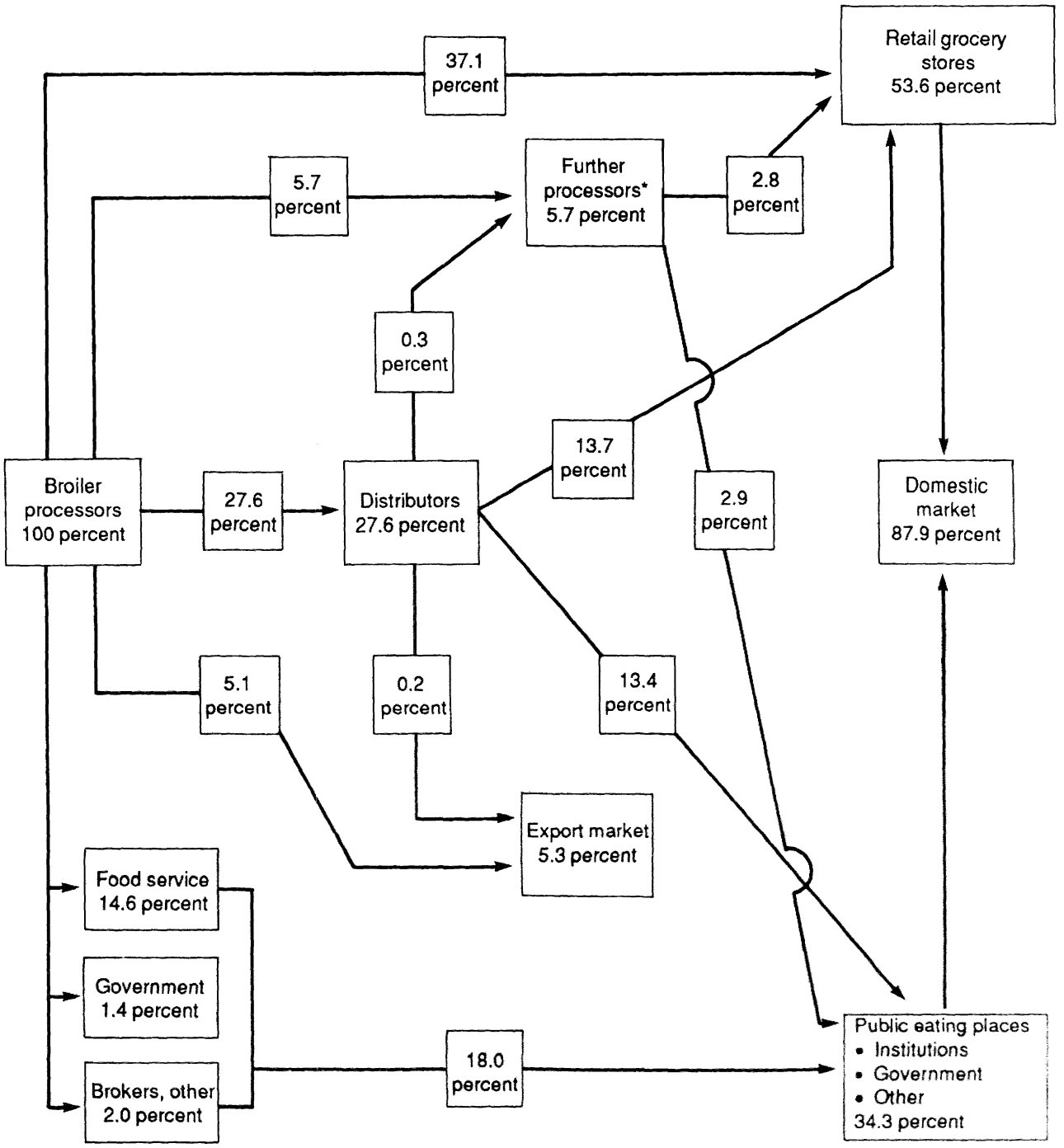
Institutional outlets (restaurants, government facilities, hospitals, and other institutions) now use 34 percent of total broiler supply (see fig. 5). Institutional use is up sharply from the 25-percent level of the early 1970's and the 12-percent level of the early 1960's (6, 48).

The proportion of broiler meat moved through further processors has increased steadily. Several of the larger further processing operations are carried out in specialized plants owned by broiler processors who regularly transfer broilers, whole and parts, from their other plants.

Time Lapse in Marketing

We trace a shipment of ice-packed broilers from a northern Georgia processing plant to a Chicago consumer to illustrate the time lapse in marketing. Live birds are hung on the processing line directly from trucks on Monday morning.

Figure 5—Broiler industry's major marketing channels, 1987



*Marketing data are unavailable for this segment. Further processors were estimated by the National Broiler Council to market 50 percent of their products to retail and food service each.

Source: Industry survey conducted by National Broiler Council.

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The U.S. Cotton Industry. By Irving R. Starbird, Edward H. Glade, Jr., W.C. McArthur, Fred T. Cooke, Jr., and Terry Townsend. Stock no. 001-019-00501-7. 180 pp. $3.75. June 1987.
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