ECONOMIC CHARACTERISTICS of and CHANGES in the MARKET EGG INDUSTRY

U.S. DEPARTMENT OF AGRICULTURE • ECONOMIC RESEARCH SERVICE • MARKETING RESEARCH REPORT NO. 877

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ABSTRACT

The market egg industry has changed considerably since World War II. The small producer has given way to large, integrated complexes, and the Midwest has given way to new centers of production in the South and West.

This report describes the present characteristics of the market egg industry in the United States. It discusses the changes in location of production since the mid-1950's, in marketing channels, and in the number, unit sizes, and practices of producers, assembler-packers, feed suppliers, and hatcheries. The role of production density, spatial costs, operating efficiency, integration and coordination, and alternative uses for employing economic resources are evaluated in relation to locational and structural changes in the market egg industry.

Explanation for the changes in the industry lies among several factors, including: efficiency of operations; egg quality; input prices; returns from alternative industries; availability of capital and credit; and established related industries.

Keywords: Eggs, Marketing, Interregional competition, Industry structure, Egg-marketing practices

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PREFACE

This is the second report resulting from research on interregional competition in the U.S. market egg industry. The first report, entitled "Competitive Position of the Midwestern Egg Industry" and published as MRR-784, February 1967, discussed the problems faced by the Midwestern egg industry as a result of growth and development of the industry in competing regions. The present report brings together the results of a nationwide survey of egg packers, producers, hatcheries, and feed suppliers conducted during 1964-66, and presents other information from published and unpublished sources. The report describes the present status of the market egg industry in various regions and some of the changes which occurred during the 1950's and 1960's.

Gene F. Miller, formerly with the Economic Research Service (ERS) at Brookings, S. Dak., helped collect and analyze data obtained in the national survey. Steve Biggs, formerly a cooperative agent with ERS, Athens, Ga., aided in the collection of data in the Southern region under a cooperative agreement. Under a similar agreement, Carole Drury, a graduate student at Washington State University, Pullman, helped in the collection of Pacific coast data. Fred Yamada, formerly with ERS, developed the computer program for analyzing data on qualities and sizes of eggs delivered by producers to egg-packing plants. Pearl Williams and Pearl Hart, ERS, aided in compiling and analyzing of data from the national survey.

Members of three divisions of ERS--Marketing Economics Division, Economic and Statistical Analysis Division, and Farm Production Economics Division--participated in the planning and conduct of various phases of the research.

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HIGHLIGHTS

The market egg industry underwent rapid and sometimes unanticipated changes in the second decade after World War II. Out of change has emerged a modern industry, which in many regions, bears little resemblance to that which existed in earlier decades.

One result of change has been a marked shift in the regional distribution of egg production. The Midwest (East and West North Central regions) has lost ground in terms of total egg production and share of U.S. output. The North Atlantic region's share of U.S. output has also declined, even though actual volume has fallen off less drastically. The Southern (South Atlantic and South Central) and Western (Pacific and Mountain) regions have increased their total output and their shares of U.S. production.

Among the factors generating changes in the market egg industry are: (1) concentration of production, input-supplying, and marketing into fewer but larger units; (2) increased efficiency of operations; (3) shorter and more direct marketing channels; (4) improved egg quality; (5) increased coordination of production, input-supplying, and marketing functions; (6) relative returns from other agricultural enterprises; and (7) the tendency of nonfarm wage rates relative to farm wage rates to make employment opportunities outside agriculture more attractive. These factors have not been equally significant in all regions, as is shown in the relative competitive positions of individual regions and States. Some firms in particular regions have been much more responsive to efficiency-related factors than others have. Such individual variations tend to be obscured by the general statements about each region which follow.

Egg-producing units average smallest in the Midwest and largest on the Pacific coast. Production density is lowest in the Midwest and Mountain regions and highest in the Northeast and Pacific regions and many areas of the South. The average quality of eggs (delivered to plants by producers) is lowest in the Midwest and highest in the Northeast and on the Pacific coast. Production efficiency is highest on the Pacific coast and in the Northeast and South.

Feed mills average largest in the Pacific, Northeastern, and South Atlantic regions. The rate of utilization of mill capacity is highest in the South, Northeast, and Pacific areas. Mill margins are lowest in the North Atlantic and highest in the Mountain region; some of the lowest individual mill margins are in New England and California. Costs of feed ingredients average lowest in the Midwest, yet published series indicate producers there generally pay more for feed. But some commercial egg producers in the Midwest do pay

feed prices reflecting the advantage of lower cost ingredients. Average hatchery size is above or close to the U.S. average in the Northeast, South, and Pacific regions and is lower than the U.S. average in the Midwest and Mountain regions. Hatchery margins and prices paid by producers for chicks are highest in the Midwest.

In the Midwest, egg-marketing channels tend to be longer and more complex, and marketing costs are higher. Marketing costs average lower in the West, South, and Northeast. Volume of eggs handled and plant labor efficiency are lower in the Midwest than in other major egg-producing areas. Although many Midwestern producers are as close to packing plants as producers in other areas are, poorer egg quality and smaller average flock sizes are a deterrent to more efficient packing and assembly operations.

Coordination of production, input-supplying, and marketing functions is more characteristic of the South and West than of the Midwest. Egg, chicken, and turkey enterprises are all attractive alternatives in the South and West. While income from major crops has declined or stabilized in the South, in the Midwest and Plains areas it has risen, making eggs a less desirable alternative there. In the South, lower wage rates still exist, and large supplies of labor are still available. These latter factors help give the South an advantage over many other areas in egg production.

Projections of recent trends suggest continued growth of egg production in the South and West and further relative declines in the Midwest and Northeast. But new developments could alter these projections.

ECONOMIC CHARACTERISTICS OF AND CHANGES IN THE MARKET EGG INDUSTRY

by George B. Rogers and Robert M. Conlogue, 1/
Agricultural Economists, and Ruth J. Irvin,
Economic Assistant, Marketing Economics
Division, Economic Research Service

INTRODUCTION

Centers of egg production have shifted drastically since World War II, particularly in the second decade of the postwar era. The Midwest, long the most important producer, has given way to new centers of production in the South and West. 2/

In the mid-1950's, the Midwest produced almost 48 percent of the Nation's eggs, the South less than 22 percent, the West over 12 percent, and the Northeast over 18 percent. In contrast, by 1968, the Midwest's share of U.S. output had declined to less than 29 percent, whereas the South's share had risen to almost 41 percent. The West produced over 16 percent and the Northeast less than 14 percent (table 1).

The purpose of this report is to describe the results of a study of interregional competition in the Nation's market egg industry. The report notes the changes that have taken place in the industry over the last few years, and attempts to explain them in terms of eight factors affecting their direction and magnitude: (1) size, efficiency, and geographical concentration of producing units; (2) efficiency of assembling, packing, and distributing operations; (3) size and quality of eggs produced; (4) prices paid by producers for such major production inputs as feed, chicks or pullets, and hired labor; (5) degree of coordination of producing, input-supplying, and marketing functions; (6) returns from alternative employment opportunities within and outside agriculture; (7) availability of capital and credit; and (8) experience with and external benefits from successfully established related industries.

Changes in the relative importance of egg production result from the unique combination of these various factors to be found in each region.

1/ Conlogue retired in April 1968.

2/ As used in this report, the Northeastern region includes the New England and Middle Atlantic States; the Southern region, the South Atlantic and South Central States; the Midwestern region, the East and West North Central States; the Western region, the Mountain and Pacific States.

Table 1.--Egg production by region as a percentage of U.S. total, 1955-68

Region	1955	1956	1957	1958	1959	1960	1961
				Percent			
North Atlantic	18.47	18.52	18.16	17.71	17.01	16.34	15.81
East North Central	19.64	19.55	18.78	18.76	18.00	17.57	16.65
West North Central	27.86	26.97	27.13	26.63	25.54	24.59	23.78
South Atlantic	9.32	9.80	10.37	10.79	12.03	13.15	13.83
South Central	12.34	12.84	13.10	13.26	14.23	14.30	15.29
West	12.37	12.32	12.46	12.85	13.19	14.05	14.64
United States	100.00	100.00	100.00	100.00	100.00	100.00	100.00

	1962	1963	1964	1965	1966	1967	1968
				Percent			
North Atlantic	15.35	15.51	15.30	15.25	14.73	14.09	13.95
East North Central	16.47	15.76	14.98	14.77	14.31	14.08	14.14
West North Central	22.36	20.09	19.09	18.11	16.83	16.11	14.65
South Atlantic	14.59	16.11	16.77	17.30	18.38	19.03	19.59
South Central	16.15	17.16	18.25	18.91	19.83	20.74	21.21
West	15.10	15.37	15.61	15.66	15.92	15.95	16.46
United States	100.00	100.00	100.00	100.00	100.00	100.00	100.00

SOURCES OF INFORMATION

Although numerous State and regional studies have dealt with one phase of the egg industry at a particular point in time, none of these have been broad enough to furnish a comprehensive picture of the industry during one time period. Moreover, these individual studies have often been oriented toward one segment of the industry, such as producers or egg packers, and usually toward only a few phases of that segment such as sources, outlets, egg quality, or some particular practice. Hence, it was decided to carry out a sample survey on a national basis, during a reasonably homogeneous time period, and with extensive coverage of the industry.

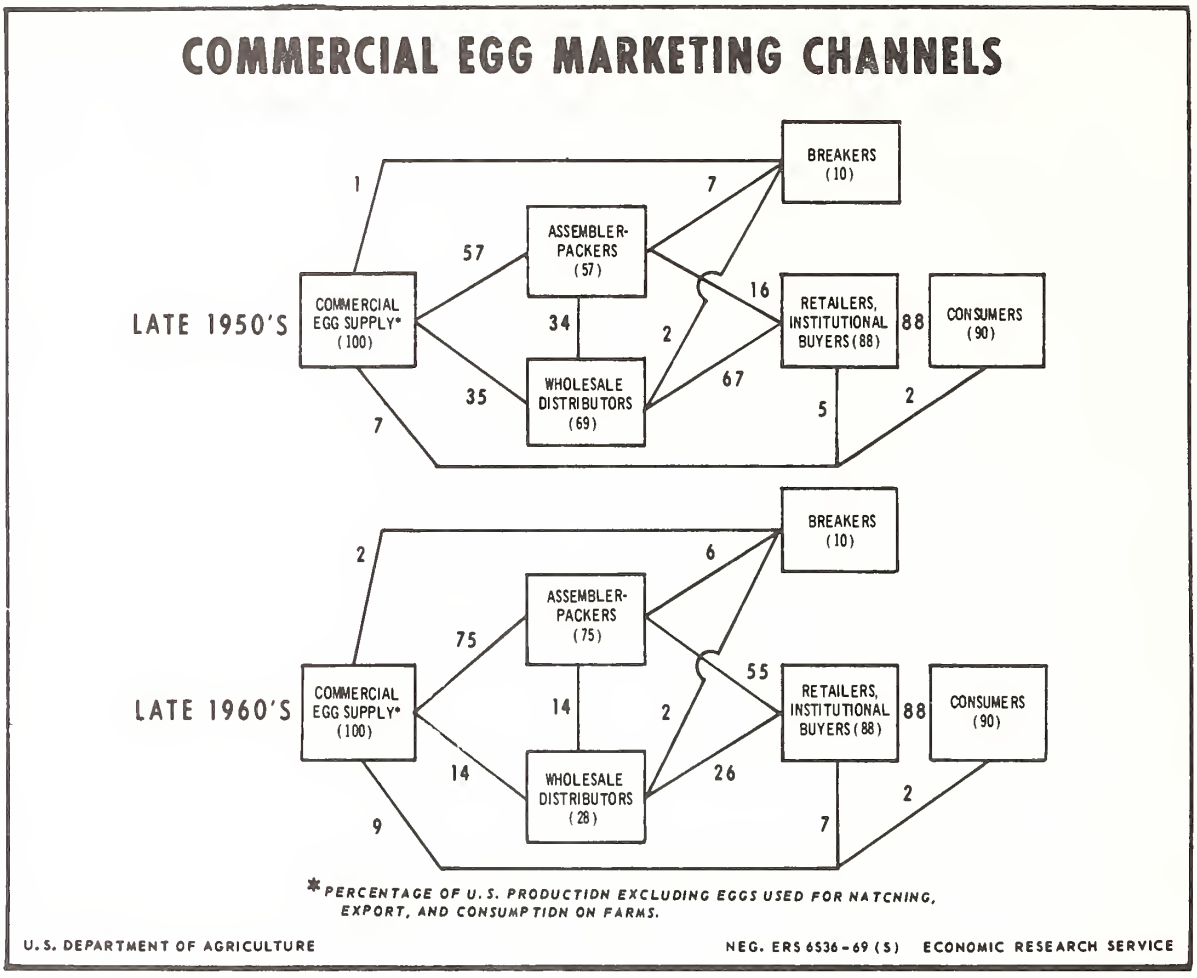
Since information was generally lacking on the interrelationships of producing, marketing, and input-supplying segments, it was further decided to include producers, commercial egg-packing plants, and suppliers of major inputs--hatcheries and feed suppliers. A stratified random sample of 101 commercial egg-packing plants was drawn from 716 firms furnishing data to the U.S. Department of Agriculture for use in the Commercial Egg Movements Report during 1964-65. The sample included plants in all regions and size groupings. Each plant surveyed was asked to provide a list of typical producers selling eggs to that plant. A sample of producers was then drawn so data could be obtained on grades and sizes of eggs delivered to the plant during a recent year. In addition, these producers were surveyed regarding production and marketing practices. Each producer was asked to name his principal supplier of chicks (or pullets) and feed. A random sample of hatcheries and feed suppliers in each region was then drawn from those named.

Schedules which were usable, at least in part, were obtained from 101 egg-packing plants, 483 producers, 104 hatcheries, and 97 feed suppliers. These schedules furnished much of the original data summarized later in this report.

Information from other research reports was used, along with some from the continuing margins work carried out by the Poultry Group, Marketing Economics Division, ERS. Statistics from other published and unpublished sources were also used to provide quantitative evidence on the present economic characteristics of the market egg industry and on changes during the last two decades.

EGG-MARKETING CHANNELS

This section is mainly concerned with marketing channels for commercial eggs. Data on commercial channels exclude eggs used for hatching, those consumed on farms where they are produced, and to a small extent, some local and direct-to-consumer trade. Figure 1 excludes exports and imports also, since net exports accounted for less than 1 percent of total egg production in 1957-67. Commercial storage holdings are also excluded from figure 1. Yearend storage holdings of shell eggs and egg products vary somewhat from year to year, but on the average, less than 1 percent of the domestic supply of commercial market eggs is cycled into and out of storage. These eggs are handled primarily by assembler-packers, wholesale distributors, and breakers.



Egg-breaking plants handle about 10 percent of the domestic supply of commercial market eggs. Egg breakers now get about 60 percent of their egg supplies from assembler-packers. Producers and wholesale distributors supply about 20 percent each. Once broken, the liquid eggs are eventually sold to firms using liquid, frozen, or dried eggs in manufactured products. These products reach ultimate consumers through retail or institutional outlets.

Market egg producers sell the bulk of their output to assembler-packers; wholesale distributors are the second most important buyer. Smaller quantities go directly to egg breakers or circumvent the major marketing channels and go directly to retailers, consumers, and institutional outlets.

During the past two decades, there was a drastic realignment of major marketing channels for shell eggs. Decentralization of grading and cartoning operations toward country points has been accompanied by expansion of direct deliveries to retail warehouses and stores by assembling and packing firms. The latter development has meant that wholesale distributors in city market areas have been increasingly bypassed.

In a decade, the share of the commercial market egg supply passing through the hands of wholesale distributors has been cut in half. However, receipts of assembler-packers from producers and deliveries of assembler-packers to retailers have increased substantially. These changes in egg-marketing channels have been underway in all regions of the United States, although not to the same extent.

Farm-to-retailer price spreads illustrate the overall efficiency of the shell egg marketing systems in various regions (table 2). From the mid-1950's to the late 1960's, the average farm-to-retailer price spread for large eggs, Grade A or better, for all cities included fell from about 16 to 12 cents a dozen. In no region did the price spread (in cents per dozen) widen during this period. While wage and salary rates and costs for other inputs rose, increased operating efficiency and more direct marketing methods kept prices low.

Current farm-to-retailer price spreads are below or about equal to the U.S. average in New England, the South, and the West. In these regions, marketing systems are either relatively direct, or there are substantial supplies of eggs nearby. In the Midwest and Middle Atlantic region, where more complex marketing systems still predominate, price spreads are above the U.S. average. But in recent years, farm-to-retailer price spreads in the Middle Atlantic region and Midwest have begun to narrow, suggesting some progress is being made.

While the proportion of commercial market eggs going to egg-breaking plants has increased only slightly during the past decade, breaking activity has shifted significantly among various regions.

For many years, the egg-breaking and drying industries were heavily concentrated in the Midwest, because of two major factors. A large surplus production existed there, and production was more highly seasonal than in most other regions. Due to the latter factor, breaking activity was heaviest in the late winter and spring, a factor that helped to absorb the Midwest's large springtime surplus of eggs. When storage of shell eggs during the spring months for later use was more important than it is now, a large share of these storage eggs also came from Midwestern production.

Egg breaking has increased in the new surplus-producing areas as production has become less seasonal and as the Midwest's share of total output has declined. Table 3 illustrates the growth in numbers of breaking plants under Federal inspection, particularly in the South, and the decline in numbers of such breaking plants in the Midwest. No comparable shift in the distribution of egg-drying plants has yet occurred, since drying is more closely tied in with manufacturing of premixes, in which eggs are not always a major ingredient.

Egg breakers are increasingly being regarded as a direct secondary outlet. Thus, areas of surplus egg production are likely to develop and maintain a large commercial breaking industry. In deficit areas, breaking activity is more likely to be a convenience for salvaging undergrades and disposing of seasonal surpluses of smaller sizes of eggs.

Table 2.--Comparison of farm-to-retailer price spreads for large eggs, Grade A or better, by region, 1955-68

Year	New England		Middle Atlantic		E. North Central		W. North Central	
	Price spread per dozen eggs	As percentage of U.S. average	Price spread per dozen eggs	As percentage of U.S. average	Price spread per dozen eggs	As percentage of U.S. average	Price spread per dozen eggs	As percentage of U.S. average
	Cents	Pct.	Cents	Pct.	Cents	Pct.	Cents	Pct.
1955	10.5	65.6	17.9	111.9	19.2	120.0	20.0	125.0
1956	10.5	66.5	17.6	111.4	19.1	120.9	19.7	124.7
1957	10.2	65.8	17.5	112.9	19.0	122.6	20.3	131.0
1958	10.3	67.8	17.2	113.2	18.4	121.1	19.8	130.3
1959	12.2	81.3	16.5	110.0	17.4	116.0	19.4	129.3
1960	10.6	72.6	16.0	109.6	17.8	121.9	19.2	131.5
1961	10.1	70.1	16.7	116.0	17.7	122.9	19.3	134.0
1962	11.0	77.5	16.4	115.5	17.7	124.6	19.4	136.6
1963	11.4	82.6	15.2	110.1	16.8	121.7	19.0	137.7
1964	10.6	79.1	14.2	106.0	16.5	123.1	18.2	135.8
1965	10.0	76.9	13.7	105.4	16.1	123.8	17.2	132.3
1966	10.2	76.1	14.4	107.5	15.3	114.2	18.2	135.8
1967	10.6	80.9	13.8	105.3	14.5	110.7	18.2	138.9
1968	10.6	87.6	13.3	109.9	13.7	113.2	14.7	121.5

Year	South Atlantic		South Central		West		United States	
	Price spread per dozen eggs	As percentage of U.S. average	Price spread per dozen eggs	As percentage of U.S. average	Price spread per dozen eggs	As percentage of U.S. average	Price spread per dozen eggs	As percentage of U.S. average
	Cents	Pct.	Cents	Pct.	Cents	Pct.	Cents	Pct.
1955	16.2	101.3	15.3	95.6	12.8	80.0	16.0	100.0
1956	16.0	101.3	15.0	94.9	12.5	79.1	15.8	100.0
1957	16.2	104.5	13.0	83.9	12.2	78.7	15.5	100.0
1958	15.8	103.9	12.1	79.6	12.5	82.2	15.2	100.0
1959	14.5	96.7	11.6	77.3	13.2	88.0	15.0	100.0
1960	13.0	89.0	13.2	90.4	12.5	85.6	14.6	100.0
1961	11.0	76.4	12.4	86.1	13.6	94.4	14.4	100.0
1962	10.9	76.8	11.1	78.2	13.1	92.3	14.2	100.0
1963	11.0	79.7	10.8	78.3	12.5	90.7	13.8	100.0
1964	10.6	79.1	11.5	85.8	12.4	92.5	13.4	100.0
1965	10.1	77.7	11.2	86.2	12.4	95.4	13.0	100.0
1966	10.7	79.9	12.9	96.3	12.2	91.0	13.4	100.0
1967	10.9	83.2	12.0	91.6	11.7	89.3	13.1	100.0
1968	10.6	87.6	12.3	101.7	9.8	81.0	12.1	100.0

Source: Based on margins data for selected major cities, gathered by Poultry Group, Mktg. Econ. Div., Econ. Res. Serv., U.S. Dept. Agr. These series include both locally produced eggs and eggs shipped in from other regions.

Table 3.--Plants producing frozen and dried eggs under Federal inspection and grading programs, by region, 1960, 1965, and 1967-69

Product and region	Number of producing plants					As percentage of U.S. total				
	1960	1965	1967	1968	1969	1960	1965	1967	1968	1969
	No.	No.	No.	No.	No.	Pct.	Pct.	Pct.	Pct.	Pct.
Frozen eggs:										
Northeast	2	2	5	3	8	1.9	2.1	5.9	3.4	8.6
South	8	23	17	19	24	7.5	24.0	20.0	21.8	25.8
Midwest	92	63	51	52	49	86.8	65.6	60.0	59.8	52.7
West	4	8	12	13	12	3.8	8.3	14.1	15.0	12.9
Total	106	96	85	87	93	100.0	100.0	100.0	100.0	100.0
Dried eggs:										
Northeast	0	0	0	0	0	---	---	---	---	---
South	1	2	3	3	3	6.2	9.5	12.5	13.6	11.5
Midwest	14	16	19	17	20	87.5	76.2	79.2	77.3	76.9
West	1	3	2	2	3	6.3	14.3	8.3	9.1	11.5
Total	16	21	24	22	26	100.0	100.0	100.0	100.0	100.0

Source: List of Plants Operating Under USDA Poultry and Grading Programs. AMS-15, U.S. Dept. Agr., Agr. Mktg. Serv., Dec. 1960, and C&MS-SRA-184, U.S. Dept. Agr., Consumer and Mktg. Serv., Mar. 1965, June 1967, and Apr. 1969.

During the 1960's, the number of egg-breaking plants under Federal inspection increased most in the South, followed by the West. During this period, plant numbers declined substantially in the Midwest. In addition to the plants producing frozen eggs under Federal inspection, there are a substantial number that are not under Federal inspection or that operate salvage breaking operations. However, most of the larger commercial breakers--those accounting for the bulk of liquid egg production--are under Federal inspection.

As the number of breaking plants in the Midwest has declined, the region's share of the total liquid egg production has declined. And, as breaking plant numbers have increased in the South and West, those regions have accounted for an increasing share of total liquid egg production (table 4). These trends are likely to continue.

LONG-DISTANCE MOVEMENTS OF EGGS

Data on the surplus or deficit status of egg production in individual States illustrate how the predominant movements of eggs between regions have significantly shifted during the past decade. This shift has occurred mainly because of the rapid expansion of egg production in California and many States of the South, and relative decline of production in many of the Midwestern States.

Table 4.--Estimated production of liquid eggs by region, as a percentage of U.S. total, average 1958-62 and 1963-67

Region	1958-62	1963-67
	Percent	Percent
North Atlantic	2.0	2.5
Midwest:		
East North Central	16.0	14.5
West South Central	72.0	56.0
South:		
South Atlantic	3.0	10.0
South Central	3.0	10.0
West	4.0	7.0

Source: Based on data from selected studies on deliveries of eggs to breakers by plants reporting to U.S. Dept. Agr. Market News Service for the Commercial Egg Movements Report, and unpublished data from Poultry Div., Consumer and Mktg. Serv., U.S. Dept. Agr.

In the mid-1950's, eggs from most of the West North Central and some of the East North Central States moved in volume toward the other regions. Some East North Central States which had surpluses sent eggs to other States within the region which had a deficit. Shipments from the South to other areas were relatively small and highly seasonal. New Jersey's surplus went to nearby metropolitan areas, and surplus eggs from northern New England went to southern New England and the New York City area.

By the mid-1960's, much of the pattern had changed. Most of the declining total of surplus eggs from the Midwestern States went to the deficit Northeast. Some were shipped to adjacent States in the Mountain region, but few went very far south or to the west coast. Eggs from such South Atlantic States as Georgia and North and South Carolina moved in volume to the Northeast. South Central States such as Alabama, Mississippi, and Arkansas also sent eggs to the Northeast, as well as to the Southwest and even the Midwest. California sent eggs to the Southwest and Mountain areas, and occasionally north up the west coast. Shipments from surplus to deficit States continued within the East North Central region. Eggs were still shipped from northern to southern New England. However, New Jersey, long an important surplus producer, had become a deficit egg-producing State.

During the past decade, centers of egg production shifted to the South and West. Although New England's egg production has grown faster than population, the area still has a deficit. In the Middle Atlantic region, the deficit has increased steadily. However, the Midwest has lost the most ground. The East North Central States have gone from a slight to a heavy

deficit. The West North Central States' surplus has been cut in half, though it is still sizable. Most of the South has gone from deficit to surplus, except for the West South Central region, which has overcome its deficit to become self-sufficient. The Mountain region's deficit continues to increase. But the Pacific Coast States, largely because of California's production, have had a growing surplus--one now larger than the Mountain region's deficit (table 5).

Table 5.--Annual surplus and deficit in egg production, by region, selected years

Region	Surplus (+) or deficit (-) of egg production in-- 1/						
	1950	1955	1960	1963	1966	1967	1968
	1,000 cases						
New England	- 2,269	- 2,269	- 2,694	- 1,997	- 1,858	- 2,061	- 2,017
Middle Atlantic	-11,014	- 9,200	-11,139	-12,514	-14,108	-15,122	-15,647
East North Central	+ 1,303	- 419	- 3,444	- 5,566	- 8,283	- 8,839	- 9,028
West North Central	+37,156	+33,742	+28,469	+21,039	+16,461	+16,225	+13,242
South Atlantic	- 8,956	- 9.667	- 4,369	+ 300	+ 3,519	+ 5,369	+ 5,895
East South Central	- 1,575	- 2,336	- 250	+ 2,377	+ 4,205	+ 5,506	+ 5,619
West South Central	- 911	- 4,994	- 4,253	- 2,450	- 211	+ 953	+ 1,244
Mountain	- 406	- 1,625	- 2,389	- 2,786	- 3,050	- 3,139	- 3,136
Pacific	- 1,983	- 997	+ 1,086	+ 2,947	+ 3,825	+ 4,208	+ 4,686

1/ Assumes uniform per capita consumption in all regions.

Source: Farmer Cooperative Serv., U.S. Dept. Agr.

There is little evidence of a trend toward self-sufficiency for every State or region. While large and efficient units located close to population centers may take care of local needs in many instances, eggs are likely to continue to be moved relatively long distances from surplus to deficit areas.

The changing pattern of interregional egg movements is also reflected by data on the major States supplying eggs to cities. ERS maintains series on prices and price spreads in markets of major cities. During the late 1950's and the 1960's, the South supplanted the Midwest as the main supplier of eggs to eastern cities. They have done so in the New York metropolitan area, which nonetheless has continued to receive not quite a quarter of its eggs from New York and Pennsylvania. New Jersey's share of the New York market, however, has declined. Boston still receives the bulk of its eggs from the New England States, but the South is overtaking the Midwest as a secondary source of eggs.

In Baltimore and Washington, D.C., nearby States have lost importance as egg suppliers, and the South now supplies more than the Midwest. Virtually all of Atlanta's eggs come from local production, and receipts from the Midwest have almost disappeared.

Chicago and St. Louis are supplied almost entirely from nearby areas. Most of Cleveland's needs are met from nearby areas, but some eggs now come from the South. In Denver, much of the supply now comes from California, mainly at the expense of local areas and the Midwest. Virtually all of the eggs received in Los Angeles and San Francisco come from nearby areas. In Seattle, most eggs come from nearby areas, but some are from California and a few come from the Midwest.

Assembler-packers contacted during the 1964-66 national survey conducted by ERS were asked to indicate the areas to which they shipped eggs. Those in the Northeast supplied local areas primarily, but usually sent some eggs to major cities nearby. New England firms shipped mainly to Boston and other New England points, and some to New York. New York and New Jersey firms mainly supplied local areas and the New York market. Pennsylvania firms shipped to points such as New York, Philadelphia, Baltimore, and Washington. Maryland and Virginia firms shipped mainly to local areas, plus Baltimore and Washington.

Assembler-packers in the South supplied regional needs and shipped the surplus to States outside the region. Eggs from North and South Carolina firms were shipped to New Jersey cities, Boston, New York, Baltimore, Washington, Philadelphia, and Norfolk. Georgia firms shipped north to most of these markets and south to Florida points such as Miami. Eggs from firms in Alabama and Mississippi went to such States as Louisiana, Texas, Florida, California, Ohio, Indiana, Iowa, and New Jersey, as well as New York City, Philadelphia, Baltimore, New Orleans, Chicago, and Boston. Arkansas firms shipped to Louisiana, Mississippi, and Texas. Firms in Texas and Oklahoma shipped to Louisiana and New Mexico.

Assembler-packers in the Midwest were still shipping to outside markets in addition to local ones. Eggs from Minnesota, Iowa, Wisconsin and South Dakota moved to nearby States such as Illinois, Indiana, Ohio, Michigan, and Kentucky, and to New York, New Jersey, Pennsylvania, Maryland, Virginia, Washington, D.C., Texas, New Orleans, Florida, and Boston, as well as to the Pacific coast. Firms in Indiana, Illinois, and Ohio shipped to local markets and markets in adjacent States. Eggs from Missouri and Kansas moved to nearby States and occasionally to Northeastern and Southern markets.

Eggs from Mountain States such as Colorado, Idaho, and Montana moved to adjacent States, and occasionally to the Pacific Coast States. Eggs from Arizona and New Mexico also moved to Colorado, Texas, Utah, Wyoming, and Nebraska. Washington and Oregon eggs sold outside those States moved mainly to Alaska, and occasionally to adjacent Mountain States. California eggs moved to Arizona, Colorado, New Mexico, Texas, and the Pacific Northwest and occasionally went further toward the East.

Patterns of interregional movement of eggs have changed substantially during the past decade. However, discussions of predominant movements or major supply areas frequently overlook the many vestiges of former patterns that remain. These remain because of long-established business relationships, short-time imbalances between local supplies and needs for particular grades and sizes, and imperfect knowledge on the part of buyers and sellers. Hence, the present pattern of interregional movements does not yet approximate that which could be derived from linear programing models to minimize aggregate transportation costs. However, the operation of clearinghouse-type arrangements by private organizations is having a beneficial effect in some regions. These organizations put more buyers and sellers in contact with each other and minimize the practice of shipping to terminal markets before making advance sales arrangements.

Sample data obtained from assembler-packers in 1964-66 indicated the following costs (cents per 30 dozen eggs) for moving truckload lots from shipping to receiving points:

Maine to Boston, 30; to New York, 35-40.

Nearby areas in New York, Pennsylvania, and New Jersey to New York City, 25-30.

Southern New Jersey to New York City, 30-40.

Western Maryland to Baltimore and Washington, D.C., 30.

North Carolina to New York and Philadelphia, 40-45; to Norfolk and Washington, D.C., 25; to Boston, 55.

South Carolina to New York and New Jersey, 60.

Georgia to Miami, 37.5; to Philadelphia and Baltimore, 54; to New York and New Jersey, 60.

Alabama to New York, New Jersey, Baltimore, Philadelphia, and Miami, 60-65; to New Orleans, 35-40; to Chicago and Cleveland, 45; to Boston, 75; to California, 100.

Arkansas to cities in Arkansas, Louisiana, Mississippi, and Texas, 30.

Minnesota to the West Coast, 100-120; to Chicago, 35; to Cleveland, 60; to Detroit, 45; to Buffalo, 70; to New York City, 90; to New Orleans, Houston, and San Antonio, 65-80.

Iowa to Chicago, 30; to Washington, D.C., Baltimore, and New York City, 90.

South Dakota to Chicago, 40-50; to New York City, New Jersey, and Washington, D.C., 90; to Spokane and Seattle, 60-80; to Dallas, 60; to Buffalo, 75.

Missouri to Chicago, 40; to Detroit, 50-55; to Indianapolis, Ind., 35-40; to Nashville, 40-45; to Atlanta, 60-65; to New York City, Philadelphia, Baltimore, and Boston, 65-70.

Idaho to Salt Lake City, 15-25; to Seattle, 34; to Denver, 50.

Denver, Colo. to Wyoming, 15; to Nebraska, 30; to Seattle, 75; to Houston, 60; to Salt Lake City, 50.

Western Washington to Montana, Idaho, and Seattle, 60.

Seattle to Anchorage and Fairbanks, 210.

Los Angeles to Phoenix, 30; to Albuquerque and El Paso, 60; to Denver, 70; to Salt Lake City, 50.

Central California to Seattle, 65.

ASSEMBLER-PACKERS

Assembler-packers of eggs now occupy the key position in egg-marketing channels that was formerly held by wholesale distributors. Hence, the operations and practices of assembler-packers are outlined here in some detail. But the precise role of the assembler-packer varies from region to region, according to prevailing marketing channels. These variations help to explain the competitive positions of particular regions.

No comprehensive national survey of egg handlers has been made since 1958. In that year, the Midwest had a larger proportion of the total number of handlers than of total egg production, indicating that plants ran smaller there than in other regions. Data from firms reporting to the USDA Market News Service, in connection with the Commercial Egg Movements Report, 3/ indicate plants still average somewhat smaller in the Midwest and Mountain regions than in some other important egg areas. Nevertheless, there is a marked trend toward fewer plants in all areas, mostly resulting from a reduction in the number of smaller plants. Larger plants are handling an increasing share of the volume. Because of this trend, the Market News Service has been able to eliminate from their survey most plants handling less than 400 cases of eggs a week and many of those handling from 400 to 699 cases a week. However, the Commercial Egg Movements Report still covers about 40 percent of the eggs sold from farms.

During 1965, the average weekly volume in packing plants included in the Commercial Egg Movements Report sample was above the U.S. average in the Middle Atlantic, South Central, and Pacific regions. Average plant volume was substantially below the U.S. average in the West North Central and Mountain regions and moderately below the U.S. average in other regions (table 6).

3/ This is issued weekly by the USDA Market News Service and covers mainly firms who handle more than 400 cases a week.

Table 6.--Average weekly volume egg packers received from producers and percentage egg packers delivered to breakers, by region, spring of selected years 1/

Region	Average weekly volume received from farmers per plant				Eggs delivered to breakers as percentage of eggs received from farmers			
	1963	1965	1967 2/	1969 2/	1963	1965	1967 2/	1969 2/
	Cases	Cases	Cases	Cases	Pct.	Pct.	Pct.	Pct.
New England	1,691	1,742	2,289	2,310	1.7	2.0	2.3	4.1
Middle Atlantic	2,007	1,995	2,935	3,355	2.1	2.6	2.4	3.3
East North Central	1,493	1,715	3,186	2,934	21.7	13.7	15.1	13.1
West North Central	1,374	1,335	2,437	2,091	58.1	45.6	38.7	34.3
South Atlantic	1,593	1,884	3,026	3,413	0.2	2.8	13.5	14.3
South Central	1,659	2,177	3,169	3,711	10.0	7.8	17.4	13.3
Mountain	1,624	1,245	2,473	2,791	3.9	0.6	1.6	4.7
Pacific	3,996	4,178	6,342	8,072	10.7	5.7	8.7	7.9
United States	1,811	1,954	3,166	3,425	18.4	13.0	15.6	13.4

1/ Based on a 5-week period consisting of April and the first week of May.
2/ Most plants handling less than 400 cases a week have been eliminated from the sample.

Source: Compiled by Econ. Res. Serv., U.S. Dept. Agr., from data obtained from Market News Branch, Poultry Div., Consumer and Mktg. Serv., U.S. Dept. Agr., on respondents for Commercial Egg Movements Report.

In 1965, plants handling less than 1,000 cases of eggs a week accounted for 61 percent of the plants in the East North Central sample and 62 percent of plants in the West North Central sample. In other regions, this proportion ranged from 42 percent (South Atlantic) to 50 percent (South Central), as shown in table 7.

Table 7.--Percentage distribution of egg-packing plants in each size interval and percentage of total volume handled by plants in each size interval, by region, spring of selected years 1/

Year and region	Proportion of firms by plant size intervals (cases per week)					Proportion of volume by plant size intervals (cases per week)				
	Under 400	400-999	1,000-3,999	4,000 or more	Total	Under 400	400-999	1,000-3,999	4,000 or more	Total
	Percent									
1963:										
North Atlantic.	8	32	50	10	100	1	12	53	34	100
East N. Central	24	35	31	10	100	4	14	38	44	100
West N. Central	22	37	35	6	100	4	17	49	30	100
South Atlantic.	21	26	45	8	100	4	12	59	25	100
South Central..	17	39	36	8	100	3	17	43	37	100
West.....	9	32	42	17	100	1	6	22	71	100
United States	18	34	39	9	100	3	13	43	41	100
1965:										
North Atlantic.	8	36	45	11	100	1	12	47	40	100
East N. Central	29	32	28	11	100	3	11	34	52	100
West N. Central	26	36	30	8	100	4	18	42	36	100
South Atlantic.	15	27	46	12	100	2	9	55	34	100
South Central..	17	33	37	13	100	2	11	37	50	100
West.....	18	30	38	14	100	1	6	23	70	100
United States	20	33	36	11	100	2	11	39	48	100
1967:										
North Atlantic.		2/ 25	55	20	100		2/ 7	42	51	100
East N. Central		2/ 32	39	29	100		2/ 7	25	68	100
West N. Central		2/ 26	61	13	100		2/ 9	57	34	100
South Atlantic.		2/ 17	55	28	100		2/ 4	38	58	100
South Central..		2/ 26	54	20	100		2/ 5	34	61	100
West.....		2/ 10	57	33	100		2/ 2	20	78	100
United States		2/ 23	54	23	100		2/ 5	36	59	100
1969:										
North Atlantic.		2/ 19	56	25	100		2/ 5	39	56	100
East N. Central		2/ 34	38	28	100		2/ 8	26	66	100
West N. Central		2/ 28	62	10	100		2/ 8	63	29	100
South Atlantic.		2/ 12	59	29	100		2/ 2	37	61	100
South Central..		2/ 21	51	28	100		2/ 4	28	68	100
West.....		2/ 12	50	38	100		2/ 1	15	84	100
United States		2/ 22	53	25	100		2/ 4	32	64	100

1/ Based on a 5-week period consisting of April and the first week of May.

2/ May include a few plants handling less than 400 cases per week although virtually all of these now have been eliminated from the sample.

Source: Compiled by Econ. Res. Serv., U.S. Dept. Agr., from data obtained from Market News Branch, Poultry Div., Consumer and Mktg. Serv., U.S. Dept. Agr., on respondents for the Commercial Egg Movements Report.

Egg Assembly and Packing Efficiency

The conditions under which market eggs are procured and handled by packing plants and the efficiency with which packing operations can be performed are important determinants of returns to packers and producers. Where egg-producing flocks are small and widely dispersed, costs of obtaining eggs for packing run higher than where flocks are large and close to the packing plant. Moreover, where assembly costs are high, the least-cost combination of assembly and packing results in a smaller size of plant. It would not be feasible to greatly expand the area over which eggs would have to be procured merely to support a larger plant. Within the packing plant, small lots of eggs are more costly to handle than large lots. Egg quality also affects operating efficiency.

Several earlier reports have demonstrated that economies of scale exist in egg packing, 4/ and data from the national survey again indicated their existence in grading and packing operations (table 8).

Table 8.--Plant capacity and efficiency, by line capacity, 1964-66

Plant capacity per 8-hour shift (cases)	Proportion of--		Volume handled per day per employee on grading and packing lines
	Plants	8-hour capacity	
	Percent	Percent	Cases
Under 100	15	2	24.8
100-199	19	7	33.5
200-399	27	19	39.2
400-799	28	36	43.2
800 and over	11	36	51.8
Total and average	100	100	44.3

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Plants capable of handling less than 400 cases of eggs per 8-hour shift accounted for 61 percent of plants surveyed, but only 28 percent of the rated 8-hour capacity. Plants which could handle 400 or more cases of eggs per 8-hour shift accounted for the other 39 percent of plants surveyed and the other 72 percent of the rated 8-hour capacity. On grading and packing lines, the volume handled per employee tended to rise as plant capacity increased. Output per employee was over twice as high for the largest plants as for the smallest plants (table 8). In plants employing hand candling and grading, daily output was 25.9 cases per employee, compared with 44.8 cases per employee where mechanized lines were used.

4/ These studies are discussed and references listed in a previous study (25). Numbers in parentheses refer to Selected References, p. 70.

While plants included in the national survey tended to be larger than the average for all plants in each region, or for plants included in the Commercial Egg Movements Report sample, regional differences were still apparent. Volume handled per plant averaged smallest in the West North Central region. The figure was somewhat larger in the East North Central region but still smaller than in other major egg-producing regions (table 9).

Table 9.--Average volume, size, and efficiency of egg-packing plants, by region, 1964-66

Region	Volume of eggs handled per firm		Average shifts worked in packing line per day	Average packing line capacity per 8-hour shift	Annual use as percentage of plant capacity 1/	Daily output per employee on packing line
	Per year	Per week				
	Cases	Cases	Number	Cases	Percent	Cases
North Atlantic	141,048	2,712	1.04	498	87	44.1
East N. Central	103,224	1,985	1.38	268	89	36.6
West N. Central	78,300	1,506	1.19	315	62	38.5
South Atlantic	122,398	2,354	1.47	312	86	43.9
South Central	149,031	2,866	1.41	389	88	52.8
West	198,945	3,826	1.59	461	87	47.3

1/ Capacity based on daily rate of output of packing line, including the average number of shifts actually used, and 6 days a week.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Many egg-packing plants operate more than one shift a day, although practices vary among regions. The typical number of 8-hour shifts, the average plant capacity per 8-hour shift, and a 6-day week were used to develop estimates by region of percentages of capacity used. Plants in the West North Central region operated at a lower percentage of capacity than did those in other regions.

Egg-packing plants tended to have lower labor efficiency in the Midwest than in other regions. In the Midwest, the number of cases handled daily per employee on grading and packing lines was about 37, compared with nearly 53 in the South Central region.

The number of producers per firm averaged over 200 in the West North Central region and 88 in the East North Central region. In other regions, the number of producers per firm averaged consistently less than in the Midwest--as low as 19 in the Western region, for example (table 10).

Table 10.--Number and size of producers supplying egg-packing plants, by region, 1964-66

Region	Average number of producers per firm	Average annual volume per producer	Average flock size per producer 1/
	No.	Cases	Hens
North Atlantic ...	67	2,105	3,324
East North Central	88	1,173	1,852
West North Central	234	335	529
South Atlantic ...	32	3,825	6,039
South Central	24	6,210	9,805
West	19	10,471	16,533

1/ With egg production estimated at 228 eggs per average layer on hand during the year.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Cases of eggs received annually per producer averaged lowest--335--in the West North Central region, where flock size averaged less than 550 birds. In contrast, flock sizes elsewhere ranged from over 16,000 in the Western region to over 1,800 in the East North Central region.

More than 40 percent of plants surveyed obtained eggs from less than 20 producers. About 23 percent of the plants had 20-49 producers; 16 percent, 50-99 producers; 14 percent, 100-199 producers; and only 7 percent, all in the Midwest, 200 or more producers.

A handful of major equipment firms dominated the market for grading and packing line equipment. Two brands of equipment were used in over 60 percent of the plants. The top four brands accounted for 77 percent and the top six for 86 percent. The five remaining brands accounted for only 8 percent. Hand candling and grading were used in 6 percent of the plants.

Egg Quality

Average quality and size of eggs sold off farms have been increasing during the past two decades. Annual data from U.S. random sample tests and Canadian packing plants for the last 15 years show the proportions of large and extra large eggs rising and those of mediums, smalls and undergrades declining. Selected studies document the increase in egg quality. An ERS survey indicated that in the West North Central region, eggs delivered by

producers to packing plants were almost 89 percent Grade A or better in 1964-66. This compares with less than 67 percent in 1948, as reported in an earlier study (8).

Data collected by ERS during 1960-62 from sample packing plants indicates that deliveries from producers in the Northeast averaged 93 percent Grade A's; in the South, 88 percent; and in the Midwest, 85 percent. Another ERS survey indicates that during 1964-66, eggs delivered by producers to plants in Maine, New Hampshire, and Massachusetts averaged 95.4 percent Grade A's; in Georgia, Alabama, and Mississippi, 90.4 percent; and in Iowa, Minnesota, and South Dakota, 87.6 percent. Average egg quality increased about 2 percent in all three regions from 1960-62 to 1964-66, but the spreads between the regions remained. Differences among regions are due to the degree of enforcement of quality control standards, seasonal effects, and the relative number of small flocks supplying commercial packing plants. 5/

During 1964-66, some plants in the Midwest received eggs averaging as high a percentage of Grade A's as eggs in other regions. But in many instances, quality control standards were not effectively enforced at the farm level. Moreover, the Midwest still has many relatively small flocks, and seasonal variations in quality have been greater there than in other areas (table 11).

Table 11.--Average and seasonal variation in quality of eggs delivered by producers to egg-packing plants in selected States, 1964-66

Area	Producers in sub-sample	Annual average percentage of total eggs graded A or better	Percentage of Grade A's exceeded by 90 percent of producers	General range of seasonal variation in area quality from annual average percentage of Grade A's
	Number	Percent	Percent	Percent
Maine, N. H., Mass.	41	95.4	94.4	+1 -1
Ga., Ala., Miss.	73	90.4	85.0	+2 -2.5
Iowa, Minn., S. Dak.	52	87.6	83.0	+2 -6
Calif., Wash.	47	94.7	88.2	+1 -1

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

5/ In the 1960-62 survey, flocks delivering less than 3.6 cases a week averaged only 57 percent Grade A. For lots of 3.6 to 9.6 cases a week, eggs averaged 85 percent Grade A, and for 9.6 cases a week and above, 90 percent Grade A.

Lower egg quality increases packing costs and lowers average returns to egg producers. In the future, marketing problems may increase as it becomes increasingly more difficult to find outlets for undergrades.

Sixty-nine percent of eggs delivered to packing plants by sample producers during 1964-66 were large or better, about 21 percent were mediums, almost 5 percent were graded small, and the balance either were undergrades or went unsorted for size. Almost 93 percent of the eggs delivered were Grade A quality or better (tables 12 and 13).

Table 12.--Sizes of eggs delivered to assemblers by producers, by region, 1964-66

Region	Size categories				Total
	Large and above	Medium	Small	Unspecified	
	Percent	Percent	Percent	Percent	Percent
New England	69.5	22.1	4.7	3.7	100.0
Middle Atlantic	66.4	22.8	5.3	5.5	100.0
East North Central	68.2	21.5	5.5	4.8	100.0
West North Central	63.8	22.7	5.4	8.1	100.0
South Atlantic	62.3	23.8	6.0	7.9	100.0
South Central	57.3	27.3	9.4	6.0	100.0
Mountain	62.2	19.7	3.5	14.6	100.0
Pacific	74.5	17.0	3.1	5.4	100.0
United States	68.8	20.6	4.6	6.0	100.0

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Outlets and Types of Packs

Detailed data on the kinds of outlets to which eggs were sold were obtained from 81 plants. Regional differences existed in the relative importance of various kinds of outlets and in the proportion of eggs sold in cartoned and loose packs. Large retailers were the most important outlet in all regions except the Mountain States. In the New England, Middle Atlantic, and Pacific regions, large retailers purchased over half the volume sold by packing plants. In the West North Central region, however, wholesalers and brokers and breakers were nearly as important as large retailers. Wholesalers and brokers also were important as buyers from plants in the South. The proportions of eggs sold by packers to all retailers in each region were: New England, 72 percent; Middle Atlantic, 67 percent; East North Central, 49 percent; West North Central, 38 percent; South Atlantic, 58 percent; South Central, 53 percent; Mountain, 42 percent; and Pacific, 83 percent (table 14).

Table 13.--Percentage of eggs in various grade categories delivered to assemblers by producers, by region, 1964-66

Region	Grade categories					Total
	A and AA	B and C	Checks and cracks	Unsized and ungraded	Discards	
	Percent	Percent	Percent	Percent	Percent	Percent
New England	95.9	0.4	1.8	0.6	1.3	100.0
Middle Atlantic	92.8	1.7	3.5	0.9	1.1	100.0
East North Central	92.3	3.1	2.2	2.1	0.3	100.0
West North Central	88.8	3.2	5.0	2.4	0.6	100.0
South Atlantic	90.4	1.9	5.7	1.3	0.7	100.0
South Central	91.0	3.4	4.4	0.5	0.7	100.0
Mountain	85.4	0.7	3.2	9.9	0.8	100.0
Pacific	93.7	1.0	3.8	1.2	0.3	100.0
United States	92.5	1.6	4.1	1.3	0.5	100.0

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Cartoned eggs accounted for 71 percent or more of sales by egg packers in the New England, Middle Atlantic, East North Central, and Pacific regions, and over 62 percent of sales in the South Central and South Atlantic regions. Cartoned egg sales were 48 percent or less of egg packer sales in the West North Central and Mountain regions.

Prices Received and Paid

Egg packers frequently receive 1 to 2 cents a dozen more from small retailers and institutional outlets than from large retailers. On the other hand, sales to wholesalers and brokers are typically made at prices 1 to 2 cents a dozen lower than those received from large retailers. Breakers pay still lower prices, often 5 to 10 cents a dozen below what large retailers pay (table 15). The relative importance of these various types of outlets within a region combines with other factors to determine the average prices received by packers in that region. Among these factors are the proportions sold in cartoned and loose form and the surplus or deficit status of the region.

Egg packers' selling prices averaged highest in the Mountain region and lowest in the West North Central region. Prices in other regions fell in an intermediate range (table 16). The average margin between selling prices and prices paid to producers varied among regions, depending on the particular functions performed by egg packers. A comparison of these margins with data from other sources will help to clarify these differences.

Table 14.--Sales volume and percentage distribution of total sales, various outlets of 81 egg packers, by region and by type of pack, 1964-66

Region and type of pack	Number of firms	Sales represented		Sales to types of buyers as percentage of total sales					
		Volume	Percentage of total	Large retailers	Small retailers	Wholesalers, brokers 1/	Breakers	Institutional outlets 2/	Other 3/
		1,000 doz.	Percent	Percent	Percent	Percent	Percent	Percent	Percent
New England:									
Cartoned		21,374	71.1	57.9	12.8	---	---	---	0.4
Loose		8,701	28.9	---	0.8	5.5	3.0	16.0	3.6
Total	11	30,075	100.0	57.9	13.6	5.5	3.0	16.0	4.0
Middle Atlantic:									
Cartoned		38,623	70.7	51.8	14.2	4.2	---	0.2	0.3
Loose		15,948	29.3	---	1.1	9.0	4.1	11.7	3.4
Total	9	54,571	100.0	51.8	15.3	13.2	4.1	11.9	3.7
East North Central:									
Cartoned		20,455	76.5	34.8	7.5	16.8	---	15.8	1.6
Loose		6,266	23.5	4.0	2.3	2.4	8.4	5.4	1.0
Total	8	26,721	100.0	38.8	9.8	19.2	8.4	21.2	2.6
West North Central:									
Cartoned		13,234	48.3	28.9	0.6	15.9	---	2.9	---
Loose		14,162	51.7	4.3	3.7	13.0	24.8	4.1	1.8
Total	13	27,396	100.0	33.2	4.3	28.9	24.8	7.0	1.8
South Atlantic:									
Cartoned		14,422	64.7	45.3	11.9	7.3	---	---	0.2
Loose		7,849	35.3	0.1	0.4	22.8	5.0	6.8	0.2
Total	8	22,269	100.0	45.4	12.3	30.1	5.0	6.8	0.4
South Central:									
Cartoned		34,345	62.5	40.3	10.2	5.6	---	6.4	---
Loose		20,646	37.5	1.1	1.2	24.1	4.4	6.5	0.2
Total	11	54,991	100.0	41.4	11.4	29.7	4.4	12.9	0.2
Mountain:									
Cartoned		6,318	43.6	23.6	6.3	1.8	---	11.9	---
Loose		8,154	56.4	6.1	6.4	16.0	5.3	21.8	0.8
Total	6	14,472	100.0	29.7	12.7	17.8	5.3	33.7	0.8
Pacific:									
Cartoned		71,772	75.9	58.0	14.1	2.2	---	1.6	---
Loose		22,855	24.1	8.0	2.4	1.8	2.5	9.3	0.1
Total	15	94,627	100.0	66.0	16.5	4.0	2.5	10.9	0.1
United States:									
Cartoned		220,543	67.8	47.2	11.2	5.6	---	3.7	0.2
Loose		104,580	32.2	3.5	2.0	10.2	5.8	9.5	1.2
Total	81	325,123	100.0	50.7	13.2	15.8	5.8	13.2	1.4

1/ Probably includes plant representatives from other regions buying in surplus areas.
2/ Includes restaurants, hotels, institutions, bakers, food manufacturers, military establishments.
3/ Dairies, plant retail stores, consumers, hatcheries, and unclassified.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 15.--Premiums and discounts received by egg packers when selling to buyers other than large retailers, by type of other buyer, 1964-66

Type of other buyer	Type of pack sold to--		Premium (+) or discount (-) on sales to other buyers compared with sales to large retailers	
	Large retailer	Other buyer	Amount for most sales 1/	Total range
			Cents per dozen	
Small retailers	Loose	Loose	+1 to +2	0 to +4
	Cartoned	Cartoned	+1 to +2	0 to +4
Restaurants and other institutional buyers	Loose	Loose	+1 to +2	0 to +4
	Cartoned	Cartoned	+1 to +2	0 to +4
	Cartoned	Loose	-2 to -3	-2 to -5
Wholesalers and brokers	Loose	Loose	-1 to -2	+1 to -3½
	Cartoned	Cartoned	-1 to -2	+1 to -3½
	Cartoned	Loose	-3½ to -5	-2½ to 2/-10
Breakers	Loose	Loose	-5 to 2/-10	-1 to 2/-15
	Cartoned	Loose	-10 to 2/-20	-15 to 2/-30

1/ Covers the majority of observed price premiums or discounts.
2/ Includes ungraded, unsized, and lower grades and smaller sizes in some instances.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 16.--Weighted average paying and selling prices of eggs for assembler-packers, by region, July 1964-June 1965

Region	Weighted average prices per dozen		Average margin
	Paid to producers 1/	Received from sales 2/	
	Cents		
New England	36.2	38.7	+ 2.5
Middle Atlantic	30.6	36.1	+ 5.5
East N. Central	25.8	35.5	+ 9.7
West N. Central	25.2	31.3	+ 6.1
South Atlantic	28.6	36.3	+ 7.7
South Central	27.5	34.6	+ 7.1
Mountain	31.7	43.2	+11.5
Pacific	27.1	38.3	+11.2

1/ For all grades and sizes, based on sample grade-out records, generally loose egg equivalents and mostly ungraded and unsized by producers.
2/ In loose and cartoned packs and to various types of outlets, depending on prevailing regional marketing practices.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

The low average margin shown for New England in table 16 is due more to the way data were reported than to substantive factors. Obviously, this margin does not allow for much expense beyond transfer costs from country points to city markets, and as such, cannot include all plant or carton costs. However, the 2.5-cent spread is about equal to the difference between the average price paid to New England egg producers and the Boston wholesale price during the time period involved.

The margin for plants in the Middle Atlantic region is slightly wider than the farm-to-receiver price spread from ERS continuing margins data for New York City. Thus, the margin observed in the survey probably did not include all carton costs, but did reflect some sales above the wholesale-receiver level. The margin for the East North Central region is higher than the farm-to-retailer price spread for loose eggs delivered to receivers in major Ohio cities, as determined from Market News data. The margin observed was also less than the farm-to-city spread for cartoned eggs delivered to major Ohio cities. It was wider than the farm-to-receiver spread for Cleveland as shown in ERS continuing margins data. Thus, it may be concluded that egg packers in the East North Central region were supplying a mixture of loose and cartoned eggs to city buyers.

The margin observed for egg packers in the West North Central region was about equal to the difference between an average of prices paid to producers in Iowa for 70 percent Grade A's and prices paid for A's under quality incentive programs and the average shipping point selling prices of plants in Iowa, Minnesota, and Wisconsin. The low margin then reflects the heavy emphasis on loose sales and sales to breakers and to wholesalers and brokers, as well as the problems of disposing of a great number of low-quality eggs.

The observed margins for the South Atlantic and South Central regions run somewhat less than farm-to-retailer spreads from ERS margins or Market News data, but above farm-to-receiver spreads. This best reflects the combination of local, direct selling to retailers and wholesalers with outshipments to deficit regions, where some eggs go to packing plants and others to wholesalers or retailers.

The margin observed for the Mountain region (table 16) approximates the spread between farm prices and prices to retailers in many smaller cities. However, the margin is substantially below the farm-to-retailer price spread for Denver as shown in ERS continuing margins data, and reflects a variety of practices including local selling, longer and complex marketing channels, and a moderate volume of eggs of lower quality to be sold. The margin observed for the Pacific Coast region was about equal to the farm-to-retailer price spread for Los Angeles in the ERS continuing margins data, and slightly less than farm-to retailer price spreads at San Francisco or Seattle. The margin reflects shorter marketing channels and high average quality.

Average prices paid to producers also vary among the regions. These prices are affected not only by marketing practices of egg packers and the surplus or deficit position of the region, but vary significantly by the average qualities and sizes of eggs delivered by producers.

Of 100 packing plants, only 37 had regular premium and discount schedules for determining exact prices to be paid to producers. Where such schedules were used, they were most frequently related to differences in quantities furnished by various producers, as is shown in the following tabulation derived from the national survey:

Area and plan	Percentage of firms
	Percent
Firms with no regular premium-discount schedule:	
New England	62
Middle Atlantic	44
East North Central	44
West North Central	36
South Atlantic	93
South Central	64
Mountain	90
Pacific	63
United States	63
	Number
Kind of premium-discount schedule:	
Premium or discounts on farm pickup or delivery	2
Premiums to key producers	3
Premiums and discounts on quantity only	22
Premiums and discounts on quality only	6
Premiums and discounts on quantity and quality combined	4
United States	37

EGG PRODUCERS

Egg production has changed significantly in many respects during the past two decades. Improvements in breeding, feeding, and disease control have increased production efficiency. Mass-production techniques have been widely applied, and the resulting economies of scale have led to fewer but larger flocks. Increased attention to possible cost savings in assembling and packing has reinforced this trend. Cage management has displaced floor management to a considerable extent. These developments, which have not occurred at the same rate in all regions, have contributed to making egg production a better alternative in some regions than in others.

Number and Sizes of Flocks

The number of farms reporting chickens on hand 4 months old and over declined from 3.4 million in 1954 to 2.2 million in 1959 and 1.2 million in 1964. Most of the decline in flock numbers occurred on farms with less than 100 chickens, and much of the remaining decrease was in the 100-3,199 group (table 17). Each region showed a decline in the number of flocks in these two size groups in 1954-64.

The number of flocks of 3,200-9,999 chickens increased for the United States as a whole in 1954-59, but decreased slightly in the next 5 years. This pattern prevailed for the North Atlantic and Western regions. In the Midwest and South, the number of such flocks increased in 1954-64.

In all regions, the number of flocks with 10,000 and more chickens increased in 1954-64 (table 17).

In the same period, the proportion of total numbers of chickens on hand 4 months old and over in flocks of less than 3,200 decreased for all regions. In the same period, the proportion of flocks in the 3,200-9,999 interval increased for the United States and all regions but two. In the North Atlantic and Western regions, the proportion of chickens in the 3,200-9,999 interval rose in 1954-59, but declined over the next 5 years (table 18).

Although the number of flocks larger than 3,200 is small compared with the total number of flocks, such flocks accounted for 62 percent of all chickens by 1964. However, the proportion of the total number of flocks in this size interval differs in various regions, ranging from 88 percent in the Western region to 79 percent in the South Atlantic region, 73 percent in the North Atlantic and South Central regions, 48 percent in the East North Central region, and only 16 percent in the West North Central region. Smaller flocks are thus still important in the commercial egg industry, particularly in the Midwest (table 18).

Flocks of 50,000 and over, though few in number, are growing in importance in all regions--particularly the West, South, and Northeast. The 1964 Census of Agriculture reported 138 flocks of 100,000 and over in the United States, and the number of such flocks is believed to have increased by 50 to 100 percent since 1964.

Volume of eggs sold off farms is also an indication of average flock size. It is used here as a basis of discussion on 1959 and 1964 sizes and then to make projections beyond the 1964 Census data, to 1966 and 1968.

A comparison of figures for 1959 and 1964 confirms the tremendous expansion of output in such States as Georgia, Alabama, Mississippi, Arkansas, North Carolina, and California. More modest increases are shown in such major egg-producing States as New York, Pennsylvania, Maine, Texas, Washington, Indiana, Ohio, Michigan, and South Dakota. Other States, such as Iowa, Minnesota, Nebraska, Illinois, and New Jersey, show a decline.

Table 17.--Estimated number of farms with specified flock sizes reporting chickens on hand 4 months old and over, by region, 1954, 1959, and 1964

Region and year	Farms with flock size of--						
	Under 100	100-3,199	3,200-9,999	10,000-19,999	20,000-49,999	50,000-99,999	100,000 and over
	Number						
North Atlantic:							
1954	122,900	68,122	3,538	254	2/8	---	---
1959	66,016	43,284	4,226	440	130	3/13	---
1964	32,516	20,135	2,748	756	275	48	15
East North Central:							
1954	297,600	242,693	136	56	2/8	---	---
1959	189,003	150,679	1,118	108	55	3/5	---
1964	102,583	70,779	2,272	471	165	20	8
West North Central:							
1954	292,800	400,008	61	36	2/3	---	---
1959	228,728	281,414	551	21	22	---	---
1964	151,753	155,862	1,012	166	50	9	6
South Atlantic:							
1954	583,400	46,140	521	71	2/8	---	---
1959	331,746	32,301	2,145	356	120	3/20	---
1964	174,701	15,289	2,667	919	379	88	20
South Central:							
1954	1,036,900	95,075	263	31	2/6	---	---
1959	598,101	98,793	2,068	212	125	3/22	---
1964	371,820	24,188	2,911	764	324	82	32
West:							
1954	184,600	40,866	1,914	140	26	3/10	---
1959	113,603	20,881	3,146	574	200	3/39	---
1964	62,830	8,893	1,263	642	377	93	57
United States 1/:							
1954	2,518,300	892,804	6,433	588	2/69	---	---
1959	1,527,197	627,352	13,254	1,711	2/652	3/99	---
1964	896,203	300,912	12,873	3,718	1,570	340	138

1/ 48 States.
2/ 20,000 and over.
3/ 50,000 and over.

Source: Econ. Res. Serv., U.S. Dept. Agr., estimated from published regular and sample Census of Agriculture data and other published and unpublished sources.

Table 18. Estimated percentage distribution of total chickens on hand 4 months old and over by flock size and region, 1954, 1959, and 1964

Region and year	Farms with flock size of--						
	Under 100-	100- 3,199	3,200- 9,999	10,000- 19,999	20,000- 49,999	50,000- 99,999	100,000 and over
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
North Atlantic:							
1954	7.0	60.6	27.4	4.5	0.3	3/0.2	---
1959	3.6	41.6	38.0	9.1	6.3	1.2	0.2
1964	1.9	24.9	29.3	18.6	15.0	5.9	4.4
East North Central:							
1954	18.3	79.5	1.0	0.8	0.3	3/0.1	---
1959	12.1	73.4	9.3	2.2	2.5	3/0.5	---
1964	6.9	44.7	23.4	11.3	8.9	2.4	2.4
West North Central:							
1954	12.8	86.4	0.3	0.4	2/0.1	---	---
1959	10.1	86.0	2.9	0.3	0.6	3/0.1	---
1964	8.5	75.6	8.5	3.3	2.1	0.9	1.1
South Atlantic:							
1954	45.4	44.8	6.9	2.1	0.5	3/0.3	---
1959	19.9	36.4	24.3	9.1	7.4	2.5	0.4
1964	7.1	14.0	25.7	20.2	18.6	9.4	5.0
South Central:							
1954	59.7	36.9	2.3	0.7	0.2	3/0.2	---
1959	32.3	36.0	18.5	4.4	6.2	1.9	0.7
1964	13.9	13.5	22.2	12.7	14.6	9.7	13.4
West:							
1954	12.6	54.8	25.5	4.2	1.1	3/1.8	---
1959	7.5	17.5	38.9	17.1	12.7	4.4	1.9
1964	3.2	8.5	14.6	17.1	21.6	11.7	23.3
United States 1/:							
1954	23.3	65.7	8.6	1.8	0.3	3/0.3	---
1959	13.9	53.7	19.4	5.9	5.1	1.5	0.4
1964	7.3	30.7	21.0	14.0	13.1	6.3	7.6

1/ 48 States.
2/ 20,000 and over.
3/ 50,000 and over.

Source: Econ. Res. Serv., U.S. Dept. Agr., estimated from published regular and sample Census data and other published and unpublished sources.

While the number of farms selling eggs declined about 50 percent across the country in 1959-64, the rate of decline tended to be higher in those States where total output expanded than in those where total output declined. For example, the number of farms selling eggs decreased by about 41 percent in Iowa, by 54 percent in Mississippi and Arkansas, and by 60 percent in California (table 19).

Table 19.--Number of eggs sold off farms, number of farms selling eggs, and volume sold per farm, selected States, 1959 and 1964

State	Eggs sold off farms			Number of farms selling eggs			Eggs sold per farm selling eggs		
	1959	1964	Percentage of change	1959	1964	Percentage of change	1959	1964	Percentage of change
	Mil. doz.	Mil. doz.	Pct.	Thou.	Thou.	Pct.	Thou. doz.	Thou. doz.	Pct.
Iowa	266.2	229.8	- 13.7	105.5	61.9	-41.3	2.5	3.7	+ 47.3
Minnesota	229.4	184.7	- 19.5	74.8	39.1	-47.7	3.1	4.7	+ 51.6
South Dakota	74.2	82.2	+ 10.8	36.1	23.4	-35.2	2.1	3.5	+ 66.7
Missouri	71.8	73.0	+ 1.7	59.8	28.3	-52.7	1.2	2.6	+116.7
Nebraska	87.8	76.3	- 13.1	52.4	32.4	-38.2	1.7	2.4	+ 41.2
Illinois	117.1	109.3	- 6.7	62.0	29.4	-52.6	1.9	3.7	+ 94.7
Indiana	137.1	184.6	+ 34.6	44.0	18.3	-58.4	3.1	10.1	+225.8
Ohio	129.9	166.9	+ 28.5	49.7	23.2	-53.3	2.6	7.2	+176.9
Michigan	74.2	96.8	+ 30.5	29.8	12.2	-59.1	2.5	7.9	+216.0
Pennsylvania	204.9	228.5	+ 11.5	36.2	18.5	-48.9	5.7	12.3	+115.8
New York	116.5	160.4	+ 37.7	17.0	7.4	-56.5	6.9	21.8	+215.9
New Jersey	156.2	103.4	- 33.8	5.2	2.2	-57.7	30.0	46.5	+ 55.0
Maine	51.7	68.5	+ 32.5	3.2	1.4	-56.2	16.3	48.9	+200.0
Georgia	110.1	280.7	+155.0	12.3	6.0	-51.2	9.0	46.5	+416.7
Alabama	58.9	147.1	+149.7	13.9	6.2	-55.4	4.2	23.6	+461.9
Mississippi	50.1	127.2	+153.9	16.5	7.6	-53.9	3.0	16.7	+456.7
North Carolina	90.9	154.8	+ 70.3	31.0	14.2	-54.2	2.9	10.9	+275.9
Arkansas	43.2	139.6	+223.1	14.0	6.4	-54.3	3.1	21.8	+603.2
Texas	136.5	177.9	+ 30.3	49.6	23.2	-53.2	2.8	7.7	+175.0
California	357.1	541.0	+ 51.5	8.9	3.6	-59.6	40.4	151.3	+274.5
Washington	60.8	68.0	+ 11.8	8.1	3.0	-63.0	7.5	22.4	+198.7

Source: Preliminary State summaries of the 1964 Census of Agriculture.

In many leading egg-producing States in the South, flocks averaged 400 percent larger in 1964 than in 1959. In the Northeast and Lake States, and in other major States such as California, flock size had doubled during the 5-year period. In contrast, flocks in Iowa, Minnesota, and New Jersey averaged only about 50 percent larger in 1964 than in 1959.

On the basis of these figures, as well as those from other sources, it appears that flock size is changing much faster in some other areas than in the West North Central region, for example. Thus, with the economies of scale existing in egg production and the inefficiencies of servicing numerous small flocks, some areas of the Midwest actually lost ground between 1959 and 1964.

The average size of flocks producing eggs has been increasing in all regions. In 1954-64, eggs sold increased from 1,600 to 8,100 dozen per reporting farm for the United States as a whole--a fivefold increase. Using this same measure, flocks averaged four to five times larger in 1964 than in 1954 in the East North Central region and two to three times larger in the West North Central region. Flocks in the Northeast were almost four times larger, those in the South Atlantic region 15 times larger, those in the South Central region 17 times larger, and those in the Western region over seven times larger (table 20). However, average flock sizes in the Midwest are still much smaller than in other regions, and the gap has steadily worsened during the past decade.

Table 20.--Eggs sold per farm reporting in each region and U.S. average, selected years

Region	Eggs sold per farm in--					As percentage of U.S. average				
	1954	1959	1964	1966 1/	1968 1/	1954	1959	1964	1966 1/	1968 1/
	1,000 doz.	1,000 doz.	1,000 doz.	1,000 doz.	1,000 doz.	Pct.	Pct.	Pct.	Pct.	Pct.
North Atlantic	5.3	9.3	20.7	26.6	33.9	340	298	254	253	249
East North Central	1.3	2.3	5.8	7.7	10.3	84	75	71	73	79
West North Central	1.4	2.0	3.3	4.2	5.7	90	66	40	40	42
South Atlantic	1.1	3.7	15.1	21.6	29.5	70	119	186	206	217
South Central	0.5	1.9	8.5	12.0	16.2	33	62	105	114	121
West	4.0	9.7	29.7	40.8	53.0	256	310	366	389	390
United States	1.6	3.1	8.1	10.5	13.6	100	100	100	100	100

1/ Estimated by projecting from Census of Agriculture data for 1954, 1959, and 1964.

Volume of eggs sold per farm increased an estimated 68 percent in 1964-68. By region, the increases were: North Atlantic, 64 percent; West North Central, 73 percent; East North Central, 78 percent; South Central and South Atlantic, 91 and 95 percent, respectively; and West, 78 percent. Nevertheless, it is estimated that by 1968 the volume of eggs sold per farm in the Western region was about 4 times as large as the U.S. average; in the North Atlantic region, 2½ times; in the South Atlantic region, almost 2¼ times; and in the South Central region, almost 1¼ times. But in the East North Central and West North Central regions, the volume of eggs sold per farm in 1968 was about 80 and 40 percent, respectively, of the U.S. average (table 20).

Production Practices

Hatchings of egg-type chicks and egg production have become less seasonal since the 1950's. For the United States during 1955-59, 85 percent of egg-type chicks were hatched in January-June, compared with 70 percent for the same months in 1964-68. In 1955-59, 54 percent of annual egg production occurred during January-June, compared with 51 percent for these months during 1964-68. Differences among regions in the amount of seasonal variation still remain, although they are less extreme than formerly.

During 1964-68, over three-fifths of the annual volume of egg-type chicks were hatched during the first 6 months of the year in the Western and Southern regions. The January-June hatch accounted for over two-thirds of the annual total in the North Atlantic and East North Central regions, and over 86 percent in the West North Central region.

Total farm egg production is more nearly equal in the first and second 6 months of the year than chick hatchings. Chick hatchings are affected by weather conditions, old hens being carried over, and the varying lengths of laying years for egg-type and broiler-type hens. In the Western region, production during January-June is slightly less than in July-December. For the North Atlantic and South Atlantic regions, production is almost equal during the first and second half of the year. For the South Central region, January-June production is only slightly more than July-December production. But in the East North Central region and West North Central region, January-June production is about 51.5 and 53.5 percent of annual output, respectively (table 21).

The number of lots started per year per farm also reflects the seasonality of hatchings and production in various regions. In a sample of 350 farms, 587 flocks were started--an average of 1.68 per farm. Almost 61 percent of the farms started only one lot a year; about 21 percent, two lots a year; and over 9 percent each, three and four or more lots a year. The number of lots started per year varied greatly from region to region, as is shown in the following average numbers started per farm in each region: North Atlantic, 1.40; East North Central, 1.34; West North Central, 1.07; South Atlantic, 1.76; South Central, 2.08; Mountain, 1.44; and Pacific, 2.51. In the fastest growing commercial egg regions, the practice of starting several lots a year is most common.

Table 21.--Seasonality of hatchings of egg-type chicks and total farm egg production, by region and total U.S., 1964-68 averages

Region	Percentages of total annual hatchings of egg-type chicks during--		Percentage of total annual farm egg production during--	
	January-June	July-December	January-June	July-December
	Percent	Percent	Percent	Percent
North Atlantic	67.4	32.6	50.2	49.8
East North Central	68.7	31.3	51.3	48.7
West North Central	86.2	13.8	53.6	46.4
South Atlantic	63.7	36.3	50.2	49.8
South Central	63.4	36.6	50.5	49.5
Western	61.5	38.5	49.4	50.6
United States	69.9	30.1	50.8	49.2

Source: Statis. Rptg. Serv., U.S. Dept. Agr., regular series.

Thirty-six different strains of laying hens were represented in 659 lots of birds on which information was supplied. The two leading strains accounted for over 45 percent of the flocks; the top five strains for almost 66 percent; and the top 10 strains for about 84 percent.

In each region, a few strains accounted for the bulk of the flocks. Usually one to five strains accounted for 70-100 percent of the flocks. In all regions except the Northeast, the leading strains were either light-type hybrids or White Leghorns. In New England, brown-egg strains predominated.

Rations fed varied somewhat from region to region. Laying mash used by sample producers averaged 16.5 percent protein, 3.3 percent fat, and 5.1 percent fiber for the country as a whole.

Chick starter feeds averaged 20.3 percent protein, 3.7 percent fat, and 4.6 percent fiber. Growing mash averaged 16 percent protein, 3.1 percent fat, and 6.5 percent fiber. (Table 46)

Producers' Outlets for Eggs

Although the producers surveyed were selected from lists supplied by assembler-packers, many of these producers were selling to other types of outlets. About three-fifths of the producers sold almost all their eggs to assembler-packers. With few exceptions, assembler-packers were also the major outlet for the remaining producers. Retailers were the second most important outlet in all but the West North Central region, where egg breakers ranked second.

Assembler-packers received 85 percent of the eggs of sample producers who sold to them. This proportion ranged from 76 percent in the Pacific region to 92 percent in the South Atlantic region. Retailers accounted for less than 8 percent of egg sales, ranging from 1.4 percent in the West North Central region to 13.9 percent in the Pacific region. Breakers accounted for 2 percent, and were relatively unimportant as buyers except in the West North Central region, where they took 6.4 percent. Wholesalers obtained less than 1.5 percent and were relatively unimportant except in the Northeast, where they accounted for about 6 percent. Other outlets accounted for less than 4 percent, ranging from 1 percent in the West North Central region to over 9 percent in the Pacific region (table 22).

Table 22.--Percentage distribution of sales to outlets for 351 producers selling eggs to selected plants, by region, 1964-66

Region	Producers	Assemblers and packers 1/	Retailers	Breakers	Wholesalers and institutions	Others 2/	Total
	Number	Percent	Percent	Percent	Percent	Percent	Percent
New England	27	82.3	8.3	---	5.7	3.7	100.0
Middle Atlantic	23	78.7	10.9	---	6.1	4.3	100.0
East N. Central	32	90.6	5.6	1.6	0.6	1.6	100.0
West N. Central	92	90.7	1.4	6.4	0.5	1.0	100.0
South Atlantic	41	91.7	4.1	1.2	0.5	2.5	100.0
South Central	26	89.0	7.4	1.3	0.4	1.9	100.0
Mountain	25	83.0	13.8	---	0.8	2.4	100.0
Pacific	85	75.9	13.9	0.2	0.8	9.2	100.0
United States	351	85.1	7.6	2.1	1.4	3.8	100.0

1/ Includes some eggs delivered to assemblers in cartons by producers, and eggs graded and sized by producers where such services were widely offered.
2/ Dairies, hatcheries, sales to consumers at farms or on retail routes, and unspecified.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

From the standpoint of assembler-packers, sales by producers to other outlets raise some uncertainties about the volume which may be expected in a particular week. This uncertainty compounds the problems of assembler-packers in supplying their regular outlets. But from the producer's standpoint, other outlets, with the exception of breakers, generally pay higher prices than do

assembler-packers. However, to obtain these higher prices, producers typically offer additional services--such as delivery and credit--and perform additional functions--such as grading, sizing, and cartoning. Frequently, these alternative outlets involve small firms and local tradesmen who pay more than large retailers would.

Some of the premiums and discounts received by producers when they sell to outlets other than assembler-packers are summarized in table 23.

Table 23.--Premiums and discounts received by producers when selling to buyers other than assembler-packers, 1964-66

Type of other buyer	Type of pack sold to--		Premium (+) or discount (-) on sales to other buyers compared with sales to assembler-packers	
	Assembler-packer	Other buyer	Amount for most sales 1/	Total range
			Cents per doz.	
Local consumers at farms or on routes	Cartoned	Cartoned	+ 5 to +10	+ 2 to +15
	Loose	Cartoned	+10 to +15	+10 to +25
Retailers, restaurants	Loose	Loose	+ 5 to + 8	+ 2 to +10
	Cartoned	Cartoned	+ 5 to + 8	+ 2 to +10
	Loose	Cartoned	+ 9 to +12	+ 8 to +20
Breakers	Loose	Loose	2/- 4 to - 7	2/- 3 to -14
	Cartoned	Loose	2/- 7 to -18	2/-15 to -20

1/ Covers the majority of observed price premiums or discounts.
2/ Includes ungraded, unsized, and lower grades and smaller sizes in some instances.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Prices Received by Producers

Table 24 compares average prices received for eggs by assembler-packers and producers. The ERS survey data were obtained during 1964-66, but June 1964-July 1965 was selected for the comparison since data were most complete for that period. Operations of assembler-packers and producers surveyed were larger than the average.

Prices received by sample producers for all market egg sales averaged well below midmonth prices received by farmers (SRS series) in New England and the South. In these regions, large volumes of hatching eggs were included in the midmonth price series; these eggs sell at substantial premiums over market eggs. In the Middle Atlantic, West North Central, and Mountain regions, prices received by sample producers for all market eggs averaged somewhat above the midmonth price series. Sample producers in these regions were larger and were

Table 24.--Comparison of prices received by assembler-packers and producers, by region, July 1964-June 1965

Region	Prices per dozen received by--				Price differences	
	Assembler-packers 1/	Producers for all market egg sales 1/	Producers from assembler-packers 1/	Farmers USDA midmonth farm prices 2/	All producer sales of market eggs less prices paid by assembler-packers	USDA midmonth farm price less prices received by producers for all market eggs
	Cents					
New England	38.7	38.0	36.2	45.0	+ 1.8	+ 7.0
Middle Atlantic	36.1	36.0	33.1	35.0	+ 2.9	- 1.0
East North Central	35.5	29.0	28.0	29.0	+ 1.0	0.0
West North Central	31.3	25.4	25.2	23.7	+ 0.2	- 1.7
South Atlantic	36.3	29.0	28.6	38.1	+ 0.4	+ 9.1
South Central	34.6	28.9	27.5	36.8	+ 1.4	+ 7.9
Mountain	43.2	33.9	31.7	32.9	+ 2.2	- 1.0
Pacific	38.3	28.7	27.1	29.1	+ 1.6	+ 0.4

1/ Data from Econ. Res. Serv., U.S. Dept. Agr., national sample survey of assembler-packers and of producers who sold to them.

2/ Simple average of monthly prices for all eggs sold to all outlets, Statis. Rptg. Serv., U.S. Dept. Agr.

associated with marketing channels more direct than those available to many other producers. Moreover, in the West North Central region, sample producers were probably selling fewer eggs to breakers--a low-priced outlet--than many other producers were.

Sample producers received a lower average price for their sales to all outlets than did assembler-packers, primarily because they sold the bulk of their eggs to assembler-packers. But in the Northeast, in particular, sales to other outlets brought substantial premiums, allowing producer's prices there to average almost as high as assembler-packers' prices. Moreover, many producers there sized and weighed eggs on the farm, and like those in the East North Central region, did some cartoning at the farm for assemblers as well as other buyers.

In all regions, prices received by sample producers for all sales exceeded prices received from assembler-packers. But the price differential varied among regions, reflecting the kinds of other outlets prevalent and the amount of sales to these outlets. Thus, the difference in price ranged from only 0.2 cent a dozen in the West North Central region to 2.9 cents a dozen in the Middle Atlantic region. In the former region, sales to breakers tended to offset higher prices on sales to retailers, consumers, and other buyers. In the latter region, amounts sold to breakers were negligible and substantial premiums were obtained from other outlets over prices received from assembler-packers.

A comparison by region is presented below to show the relationships between prices received by sample producers and assembler-packers and prices in the regular price series from the USDA Market News Service. Assembler-packer prices will be included here because they help explain some of the producer prices and because returns to assembler-packers often lie between prices at farm level and prices of cartoned eggs delivered to retailers.

In New England, prices received by sample producers for sales to assembler-packers approximated New England farm prices from Market News sources. Prices received by sample producers for all sales and prices received by sample assembler-packers were about halfway between prices in the Market News series for New England farm prices and prices paid by Boston retailers.

In the Middle Atlantic region, average prices received by sample producers from assembler-packers approximated the average New York wholesale egg price as reported by Market News for a minimum of 10 percent AA's and 65 percent A's. Prices received by sample producers for all sales and prices received by sample assembler-packers were about halfway between the Market News series prices for wholesale eggs at New York and prices paid by New York City retailers.

In the East North Central region, average prices received by sample producers from sales to assembler-packers were between Ohio-Indiana farm prices and prices paid for eggs delivered to Detroit, as reported by Market News. Prices received by sample producers for all sales were slightly higher. Prices received by sample assembler-packers approximated average prices received by Ohio plants, as reported by Market News, for loose and cartoned eggs delivered to Ohio cities, Detroit, and Pittsburgh.

In the West North Central region, prices received by sample producers for all sales and sales to assembler-packers approximated the average of Market News prices received by Iowa producers for eggs under incentive programs and those for "other" eggs. Sample assembler-packers received prices approximating the Market News series prices for consumer grade eggs at Iowa-Minnesota shipping points.

In the South Atlantic region, sample producers received prices near the average of Market News farm price series for Georgia and North Carolina. Prices received by sample assembler-packers were about 2 or more cents a dozen below the average of Market News series prices to Atlanta, Jacksonville, and North Carolina retailers.

In the South Central region, prices received by sample producers from sales to assembler-packers were slightly below, and prices from sales to all outlets slightly above, the average of Market News series farm prices in Mississippi and Kentucky and prices paid on delivery in St. Louis. Sample assembler-packers received prices 4 or more cents a dozen below the average of Market News retail prices in markets like Jackson, Miss., and the ERS margins series prices to retailers in St. Louis.

In the Mountain region, prices sample producers received from sales to assembler-packers about equaled those that Market News reported received at Denver. Prices received by sample producers for all eggs were about 2 cents a dozen above Denver prices. Sample assembler-packers received prices between the Market News prices for AA and those for A-grade eggs delivered to Colorado retailers.

In the Pacific region, sample producers received prices from sales to assembler-packers approximating the Market News average for farm prices in the Fresno and Modesto, Calif., and Portland, Oreg., areas. Prices received from all sales were somewhat higher. Sample assembler-packers received prices about equal to or slightly under the average Market News prices to Los Angeles, San Francisco, Portland, and Seattle retailers.

Efficiency and Returns in Market Egg Production

This section examines many of the factors that determine the relative efficiency of egg production in each region and that affect the returns producers receive (table 25).

Hours of labor required per hen or pullet declined about one-third between 1955 and 1968 for the United States as a whole. Rates of decline have been somewhat greater in the South (table 25). Hours of labor per hen or pullet in egg-laying flocks are lowest in the Western and the North Atlantic regions, and highest in the West North Central region. Labor per bird is below 1 hour annually in the Northeast, Southeast, and Pacific areas and above 1 hour elsewhere. The Pacific area is down to almost 45 minutes annually per bird.

While farm wage rates have been rising throughout the country since the late 1940's, they have increased most in the South. But wage rates are still much lower there than in other areas (table 25). A combination of labor per

Table 25.--Farm-level factors affecting efficiency of and returns from market egg production, by region, selected years

Factor	Years	Unit	Region					
			North Atlantic	East North Central	West North Central	South Atlantic	South Central	West
As percentage of U.S. average:								
Hours of labor per hen or pullet 1/	1966	Pct.	85	104	112	102	102	84
Farm wage rate per hour without room and board 2/	1966	Pct.	111	105	104	78	77	114
Prices paid by farmers for layer feed and scratch grain 2/	1966	Pct.	98	104	103	106	100	93
Prices paid by farmers for corn and soybean meal 2/	1966	Pct.	117	89	96	108	103	110
Prices paid by farmers for egg-type chicks 2/	1966	Pct.	99	111	110	100	91	94
Average commercial flock size 3/	1964	Pct.	209	64	36	285	199	429
Prices per dozen for all market eggs sold 4/	1964-65	Pct.	124	98	86	98	98	100
Eggs produced per average layer 2/	1966	No.	217	221	220	216	211	223
Grade A eggs delivered by producers to assembler-packers as percentage of all eggs delivered 4/	1964-66	Pct.	93.8	92.3	88.8	90.4	91.0	92.6
Price per pound received for fowl as percentage of West N. Central average 5/	1964-66	Pct.	161	127	100	130	134	114

1/ Compiled from data from Farm Production Economics Division, Econ. Res. Serv., U.S. Dept. Agr.
2/ Compiled from data from Statistical Rptg. Serv., U.S. Dept. Agr.
3/ Compiled from 1964 Census data, excluding flocks of less than 100 birds.
4/ National survey data, Econ. Res. Serv., U.S. Dept. Agr.
5/ Compiled from data from Market News Branch, Poultry Div., Cons. and Mktg. Serv., U.S. Dept. Agr., and Econ. Res. Serv., U.S. Dept. Agr., national survey.

layer and farm wage rates suggests that labor costs per hen or pullet are lowest in the South and highest in the Midwest. Labor cost per hen also seems to depend partly on the average flock sizes that characterize the various regions. Flock sizes average largest in the Western region and smallest in the West North Central region, where they are slightly smaller than in the East North Central region.

Egg production per bird has risen in all regions in the last decade. Regional differences are less significant now than in 1955 (table 25). Egg production per laying hen is now roughly equal in all regions, particularly when allowance is made for the substantial number of broiler-hatching flocks included in the averages for the South and Northeast. Well-bred birds with high production potential are equally available to all market egg producers. However, due to regional differences in flock size and production practices, the average quality of eggs delivered to egg-packing plants is lowest in the West North Central region and highest in the North Atlantic region.

Published series on prices paid by farmers for layer feed and scratch grains suggest that prices are lowest in the Western region, followed by the North Atlantic region. Prices in the South and Midwest are roughly comparable, but higher than in the Western and North Atlantic regions. However, prices for major feed ingredients like corn and soybean meal are lowest in the Midwest and highest in the North Atlantic and Western regions. Thus, egg producers in the Midwest have not, on the average, fully benefited from the advantage they should have on feed prices. Prices paid by farmers for egg-type chicks have also been higher in recent years in the Midwest than in other major egg-producing regions.

Feed consumption per dozen eggs has been trending downward across the United States as better laying strains and improved feeds have become available. Feed conversion rates are below the U.S. average in the Western, South Atlantic, and East North Central regions, and about average in the South Central region. They are above the U.S. average in the North Atlantic and West North Central regions. The North Atlantic figures include a large proportion of brown-egg flocks where, apparently, average bird size has not yet come down enough to reduce average feed conversion rates substantially.

Prices received by market egg producers average highest in the North Atlantic region and lowest in the West North Central region. Fowl prices, too, are highest in the North Atlantic region and lowest in the West North Central region. In the Western region, fowl prices are somewhat above those in the West North Central region, and they are even higher in the other regions. Fowl prices may be used as a rough indication of flock depreciation, an important item in the cost of producing eggs.

FEED SUPPLIERS

Feed is by far the most costly item in egg production. Depending on the region, size of flock, feed prices, and strains used, feed cost ranges from 50 to 60 percent of the total cost of producing a dozen eggs. Thus, if only because feed costs are a major portion of the producer's total outlay, a study of the market egg industry should consider the characteristics and efficiency

of feed-supplying firms. Moreover, with the recent trends toward integration and coordination of the various phases of the egg industry, feed suppliers often make decisions or share in the making of decisions affecting production and marketing.

The United States has about 10,000 feed mills and several times that many feed stores and dealers. Less than 1,100 mills are estimated to manufacture more than 80 percent of the mixed feeds for livestock and poultry. However, many small feed-mixing units still operate independently or in conjunction with elevator operations. Many feed mills now specialize in the production of feeds for certain classes of livestock or poultry. They do so either because one species predominates where the mills are located or because of the growing tendency for mills to be associated with integrated organizations. Many mills thus become highly specialized in the production of feeds for egg-laying flocks and replacements, broilers and broiler-type breeders, or market turkeys and turkey-breeding flocks.

A 1968 survey by the American Feed Manufacturers Association included 96 companies producing somewhat less than half the formula feeds manufactured in the United States. Many of the larger firms were included, and some of the integrated poultry businesses. Poultry feeds accounted for an important share of the total feed volume of these companies. Starter-grower feeds and feeds for layer-breeder chickens accounted for 23 percent of the 22.1 million tons produced by the companies in 1968. Broiler feeds accounted for 16 percent and turkey feeds for 4 percent. In 1958, a similar survey gave these portions as 32, 20, and 5 percent of total volume, respectively. The decrease in the percentage of total volume going to these feeds may be due to the increase in production by specialized mills that had taken place by 1968.

Size, Number, and Volume of Sample Mills

From information furnished by egg producers included in the 1964-66 national survey by ERS, 97 feed-supplying mills were selected for surveying. These mills accounted for 6 to 7 percent of the total volume of formula feeds manufactured in the United States, and much higher percentages of the formula feeds manufactured for egg production.

About 49 percent of feed produced by these mills was sold for use by egg-producing flocks. The proportion ranged from 22 percent in the West North Central region to 74 percent in New England. In the sample, sales per mill averaged largest in the Pacific and Northeastern areas and smallest in the Mountain, South Central, and Midwestern areas (table 26).

In the sample surveyed, the Pacific, New England, Middle Atlantic, and South Atlantic regions had relatively more large mills than other regions did. The rate of utilization of capacity was highest in the South, Northeast, and Pacific areas (table 27). Other studies have indicated that there are economies of scale in feed manufacturing (6,38). Nevertheless, many mills with smaller capacity were able to offset economies of scale by using their capacity to better advantage. Table 28 suggests smaller mills were being utilized more fully than larger mills. In some areas, large mills were older and had been built before the shift toward specialized units associated with vertically integrated complexes or before the development of satellite mills designed to

Table 26.--Volume of feed sold, estimated total and per mill sales, and percentage of total sold to egg-producing flocks, 97 sample feed mills, by region, 1964-66

Region	Mills	Estimated total sales	Sales per mill	Percentage of feed sold for egg-producing flocks
	Number	1,000 tons	1,000 tons	Percent
New England	9	355.0	39.4	74.2
Middle Atlantic	7	275.0	39.3	50.4
East North Central	11	225.0	20.5	45.2
West North Central	16	295.0	18.4	22.3
South Atlantic	19	677.5	35.7	55.6
South Central	9	147.5	16.4	48.6
Mountain	10	127.5	12.8	42.6
Pacific	16	827.5	51.7	60.7
United States	97	2,930.0	30.2	49.1

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 27.--Volume of sales and volume as a percentage of capacity, sample feed mills, by region, 1964-66

Region	Mills with annual sales of--		Volume sold as percentage of capacity 1/
	Less than 25,000 tons	25,000 or more tons	
	Number	Number	Percent
New England	5	4	77.3
Middle Atlantic	4	3	88.5
East North Central	8	3	65.9
West North Central	12	4	69.2
South Atlantic	11	8	99.3
South Central	7	2	89.4
Mountain	8	2	62.4
Pacific	4	12	79.2
United States	59	38	80.7

1/ Total tons sold by sample mills in relation to annual mill capacity based on 305 8-hour production days. Based on data from 77 mills.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 28.--Mill capacity and utilization, 77 sample feed mills, 1964-66

Rated mill capacity per 8-hour day (tons)	Mills	Average daily mill capacity	Percentage of capacity used 1/
	Number	Tons	Percent
40 or less	16	29.4	95.9
41-80	19	58.1	96.6
81-160	19	110.8	89.2
161-240	12	204.8	84.0
241 and over	11	402.1	69.3

1/ Total tons sold by sample mills in relation to annual mill capacity based on 305 8-hour production days.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

service nearby concentrations of producing units. In other areas, large mills serviced livestock producers as well as poultry producers. In still others, they existed to serve planned expansions in egg production.

Types of Feed Produced and Sources of Feed Ingredients

The majority of mills surveyed made two or more formulas of feed for laying hens. Virtually all mills made chick starter and grower feeds also. More than half the mills in the Midwest also offered concentrates, but very few mills elsewhere did.

The top grade of laying mash sold by sample mills in all but the South Central region contained a higher percentage of protein than did the grade fed by most producers. Thus, most producers were feeding laying mashes cheaper than the top grade (generally-determined by percentage of protein) available to them. Table 47 shows the average percentages of protein, fat, and fiber contained in the top grade of laying mash sold by mills. Table 46 shows the average content of the top grade of laying mashes fed by producers.

The extent to which feeds were custom-mixed varied by region and by type of mix. Feeds for egg-producing chickens were custom-mixed more frequently than those used for starting and growing chickens or for other purposes. Custom-mixing of feed was most prevalent in the Midwest and the South Central and Pacific regions. However, the reasons for custom-mixing differed. In the Midwest, many locally produced ingredients are readily available for purchase or are grown by general farmers who also have egg-producing flocks. In the South Central and Pacific regions, some large enterprises prefer to have feeds custom-mixed rather than buy branded feeds (table 29).

Table 29.--Extent of custom-mixing of poultry feeds and manufacture of feeds other than for laying hens or growing replacements by sample feed mills, by region, 1964-66

Region	Percentage of mills custom-mixing feeds for--			Average percentage of feed custom-mixed	Percentage of mills mixing feed other than for laying hens or growing replacements
	Egg production	Chick starter and grower	Other		
	Percent	Percent	Percent	Percent	Percent
New England	11	0	0	2.2	33
Middle Atlantic	28	21	7	15.0	71
East North Central	91	32	0	64.3	36
West North Central	38	13	9	36.5	25
South Atlantic	16	8	3	8.6	63
South Central	56	28	6	42.1	33
Mountain	30	20	0	4.0	50
Pacific	50	31	12	29.8	63
United States	39	18	5	26.2	47

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Where mills custom-mixed feeds for laying hens by using concentrates, the quantity of concentrates used ranged from 250 to 750 pounds a ton, and averaged 535 pounds a ton. The quantity of concentrates used by mills custom-mixing chick starter and grower feed ranged from 400 to 800 pounds a ton, and averaged almost 600 pounds a ton.

Almost half the mills made other poultry feeds besides those for laying hens or growing-flock replacements. These feeds were mostly for turkeys, broilers, and other meat chickens. By region, the proportion of mills making such feeds ranged from 25 percent of those in the West North Central region to 63 percent of those in the South Atlantic and Pacific regions.

Prices paid for ingredients used in formulating feeds for egg production and replacement rearing varied among regions and among mills in the same region. These latter variations reflected differences in supply sources, quantities purchased, and seasons of the year during which most purchases were made. It is evident that mills in feed-deficit areas that can buy in quantity at an advantage and store in supply areas or at mill locations can reduce ingredient costs substantially. Some of these mills were taking advantage of this opportunity. But mills in feed-surplus areas have continuing opportunities to buy at lower costs. Hence, average prices paid for most feed ingredients by sample mills were lowest in feed-surplus areas.

The relative prices of feed ingredients and items most commonly reported as purchased by mills suggest considerable opportunity to use programing techniques to formulate least-cost rations. The information obtained did not reveal how much this was being done at the time of the survey.

Feed ingredients are generally obtained from local sources, when there are local sources, or from the nearest surplus region. Thus, since most ingredients are in surplus in the central regions of the country, prices paid tend to rise as one nears coastal areas. Some exceptions, such as fish byproducts and molasses, are cheaper nearer coastal areas.

Tables 49 and 50 show the main sources of feed ingredients for various regions and the average prices paid for these ingredients by sample mills.

Delivery and Credit Practices

Charges for delivery of feed varied with volume delivered for about 42 percent of mills surveyed. In addition, 4 percent of firms varied delivery charges on the basis of distances from mill to farms. Delivery charges were typically higher for bagged feed than for feed delivered in bulk. The many types of delivery charge schedules showed wide variation even within each region (table 30).

Over 50 percent of mills had no feed picked up at the mill by producers. The practice of pickup of feed at mills was more common in the Midwest than elsewhere. The total quantity of feed picked up in this way was probably not much over 5 percent of total sales of all mills in the sample. Producers who

Table 30.--Characteristics of feed delivery operations of 97 sample feed mills selling to egg producers, by region, 1964-66

Region	Percentage of total mills--					Bulk deliveries as percentage of total deliveries
	Whose prices do not vary with volume delivered	Reporting no feed picked up at mill	Reporting no arrangements made at time of delivery for future deliveries	Delivering-- All feed in bulk	Delivering-- 90 percent or more of feed in bulk	
	Percent	Percent	Percent	Percent	Percent	Percent
New England	33	78	89	44	67	91.2
Middle Atlantic	29	43	86	0	14	56.4
East North Central	45	36	91	0	36	72.3
West North Central	62	37	87	6	12	51.5
South Atlantic	32	47	84	21	37	61.2
South Central	11	89	89	33	44	59.2
Mountain	30	60	60	0	10	40.2
Pacific	81	56	87	12	62	88.0
United States	42	51	85	14	36	65.3

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

picked up feed at the mill usually got discounts from the list price from mills that did not charge for delivery or paid the list price to those mills which charged extra for delivery. Discounts were larger for pickup of bulk feed than for pickup of bagged feed.

Over 65 percent of feed sold by sample mills was delivered in bulk. This percentage varied from about 90 percent in the New England and Pacific regions to 40 to 50 percent in the Mountain and West North Central regions, respectively. Minimum quantities delivered in bulk varied, but were as high as 12 tons. In the Northeast, minimums averaged 3 to 3.5 tons, in the South 2.5 to 3.0 tons, in the Midwest 1 to 1.5 tons, and in the West about 3.5 tons. About 86 percent of mills surveyed offered delivery of bulk feed.

Separation of sales by feed mills to egg producers into those for cash and those under short-term and long-term credit arrangements is difficult. The difficulty stems from the widespread differences in the credit terms offered by mills and in the time periods to which these terms are applicable. Of 97 mills surveyed, 25 indicated all sales were for cash. An additional 26 had no long-term credit arrangements and made no distinction between sales for cash on delivery and those accounts settled within a prescribed time period, usually from 7 to 30 days. At the other extreme, some mills had prices which depended on the time to settlement. Here, for example, cash on delivery sales (or those settled in 7 to 10 days) carried the lowest prices, and short-term and long-term accounts carried progressively higher prices. Table 31 shows the relative importance, by region, of cash sales, short-term and long-term credit sales, and various kinds of cash and credit arrangements.

With very few exceptions, pricing arrangements and distances over which feed was delivered for use in turkey, broiler, and other meat chicken production were similar to those for feeds for laying hens and flock replacements.

Seven of the 97 mills were producing entirely for their own egg-producing flocks, and in many of these situations no delivery operations were needed. Other mills supplied a share of their output to their own contract producers or to contract programs operated by other firms. For contract flocks, most mills charged the same price as for cash sales, but in some instances $4 to $8 a ton was added to the cash price.

Feed Prices and Mill Margins

Prices paid by commercial egg producers for feed for laying hens varied widely in the survey among individual producers and among regions. However, average prices were lowest in the Midwest, somewhat higher in the North Atlantic, South Central, and Pacific regions, and highest in the South Atlantic and Mountain regions (table 32). Probably many of the producers in the Midwest were using homegrown grains in mixed feeds, and full commercial value of these grains was not reflected in prices reported. However, it is significant that the survey results showed many of these commercial producers in the Midwest benefiting from their natural advantage in feed ingredient costs.

Table 31.--Cash and credit arrangements of 97 sample feed mills selling to egg producers, by region, 1964-66

Region	Percentage of sales for--			Sample mills making all sales for cash	Number of mills reporting--					
					No long-term credit, but--		Cash, short-term long-term credit arrangements all alike	Cash, short-term alike, long-term credit arrangements different	Cash different, short and long-term credit arrangements alike	Cash, short-term, long-term credit arrangements all different
	Cash	Short-term credit	Long-term credit		Some similar arrangements for cash and short-term credit	Different arrangements for cash and short-term credit				
	Pct.	Pct.	Pct.	No.	No.	No.	No.	No.	No.	No.
New England	89	11	---	6	3	0	0	0	0	0
Middle Atlantic	62	25	13	2	1	0	0	1	1	2
East North Central	40	47	13	0	3	0	2	6	0	0
West North Central	47	36	17	2	3	1	2	6	0	2
South Atlantic	54	25	21	5	2	1	3	0	2	6
South Central	74	22	4	4	3	1	0	0	0	1
Mountain	54	39	7	1	6	0	2	1	0	0
Pacific	61	29	10	5	5	3	0	3	0	0
United States	58	30	12	25	26	6	9	17	3	11

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 32.--Prices paid by producers for laying feed, mill margins, and derived ingredient costs, by region, 1964-65

Region	Prices paid by producers per ton of laying feeds	Mill margins, per ton, over ingredient costs	Derived ingredient costs, per ton
		Dollars	
North Atlantic ...	71.97	9.40	62.57
East North Central	67.32	9.89	57.43
West North Central	66.95	10.30	56.65
South Atlantic ...	77.10	9.73	67.37
South Central	71.70	9.70	62.00
Mountain	76.69	12.47	64.22
Pacific	71.60	10.04	61.56
United States ..	71.90	10.22	61.68

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Data from the survey were compared with regularly published USDA series on prices of laying feeds, the cost of the poultry ration, and costs to producers for major ingredients such as corn and soybean meal. In each region, the USDA prices paid by farmers per ton of laying feed were substantially above the prices reported in the survey. The difference was probably due to quantity differentials and the use of homegrown grains and possibly to several other factors as well. In some instances, the cost of the poultry ration or a weighted average of corn and soybean prices (corn, 2; soybeans, 1), or an average of the two, closely approximated the survey prices.

In the North Atlantic region, the average of the poultry ration cost and the prices paid by farmers for corn and soybean meal was about equal to the average price paid for laying feeds by survey producers. In the South Atlantic region, the poultry ration cost was about the same as the survey price average. In the South Central region, the poultry ration cost was a few dollars below the survey price average. In the Midwest, the weighted average price paid by farmers for corn and soybean meal was close to the derived ingredient cost for mills surveyed. Corn-soybean meal prices or the poultry ration cost were several dollars above the derived ingredient cost to mills in the Mountain region. In the Pacific region, none of the USDA series approximated either the average prices paid by farmers for laying feeds in the survey or the derived ingredient costs to mills surveyed.

Data on feed mill margins over ingredient costs were averaged by region (table 32). Mill margins varied widely within regions. Margins were lowest in the North Atlantic region and highest in the Mountain region. Some of the lowest individual mill margins were observed in New England and California.

The margins charged by feed mills above ingredient costs are affected by numerous factors. These include: mill size, efficiency, and utilization of potential capacity; size and geographical distribution of producers serviced; the number of different formulations handled; extent and nature of cash-credit arrangements; systems of feed delivery; traditional practices in various areas; and degree of specialization of the mill and the mill's relationship to other producing and marketing functions.

In general, mills charged the same gross margin per ton on all items. In a limited number of cases, gross margins were higher on chick starter, chick grower, or less common layer-feed formulations than on the best selling formulas of laying feeds.

For each region, average mill margins were subtracted from average prices paid for laying feeds by survey producers. The derived ingredient costs show a similar relationship between regions to that for prices paid by producers for laying feed.

HATCHERIES

Laying hen depreciation is the second largest cost of producing market eggs. Depreciation is the difference between the cost of ready-to-lay pullets, either grown by the producer or purchased from farms specializing in pullet growing, and the return from the sale of hens at the end of the laying year. Some 10 to 30 percent fewer hens are sold for cash than are housed as pullets; birds that die and those that become worthless for slaughter account for the discrepancy. Market prices for ready-to-cook fowl have been declining, relative to prices for young chickens, for many years. The decline is reflected in the prices that slaughtering plants pay to producers per pound of live hens. Hence, flock depreciation now represents 23 to 31 percent of the cost of producing a dozen eggs. Depreciation costs vary from region to region and depend partly on whether light or heavy fowl are used for egg production. Heavier birds bring substantially more per pound. Moreover, costs of chicks or started pullets vary among regions.

From the late 1950's to 1969, the number of chick hatcheries in the United States declined from over 5,000 to less than 1,500. Much of the decline in hatchery numbers has occurred in the group that mainly hatches chicks for market egg production. It has been due, in part, to the operation of economies of scale in hatchery operation (18) and to the abandonment of hatching by market egg farms. Thus while hatchery numbers have declined, average egg capacity has increased substantially. Most of the decline in hatchery numbers has occurred in groups with a capacity of less than 500,000 eggs.

A previous study (23) compared characteristics of the hatchery industry in 1958-59 with those existing 20 years earlier. This study noted growth of contract flocks as a source of hatching eggs, more franchising of hatcheries by large breeders, and growing integration of hatching and other production and marketing functions. These trends have continued during the last decade.

From a list of hatcheries supplying chicks to a sample of egg producers surveyed in 1964-66, 104 hatcheries were selected for study. Volume and capacity data were obtained from 99 hatcheries that accounted for about 24 percent of all egg-type chicks hatched in commercial hatcheries during 1964/65. These firms hatched almost as many broiler-type chicks as egg-type chicks. However, they accounted for only 2.5 percent of all broiler-type chicks hatched in commercial hatcheries during 1964/65.

Number, Size, and Utilization of Capacity

In the survey, hatcheries averaged largest in the Middle Atlantic and Pacific regions and smallest in the Mountain and Midwestern regions (table 33).

In all regions, egg-type chick hatcheries have substantial excess capacity. "Turnover ratio" is an accepted measure of use of hatchery capacity. By repeated settings, even allowing about a week between hatches for cleaning and disinfecting, a chick hatchery can set its capacity 15 times a year. Using 15 to equal 100 percent of capacity, hatcheries in the survey were using only 37 percent of their annual capacity. This proportion varied widely by regions.

In the South, capacity was utilized more fully than elsewhere because of the substantial number of broiler-type chicks being hatched as well as the expanding egg production there. Almost the same situation existed in the North Atlantic and Pacific regions. In the Northeast, where heavy breeds predominate for brown-egg production, hatcheries were able to sell many male chicks of egg-type strains for meat production. But where light breeds predominated for use in white egg production, virtually no male chicks were sold. Male and female chicks hatched for broiler production are salable. Some cockerel chicks from heavy breed egg-type strains are also salable for broiler production. On the other hand, almost all cockerel chicks from light breed egg-type strains are destroyed.

Use of capacity was highest in the largest hatcheries--those with capacities of 200,000 eggs or over. Small hatcheries--with capacities under 60,000 eggs--were able to make somewhat better use of capacity than medium-sized hatcheries were. Because they hatched many broiler-type chicks in addition to egg-type chicks, large hatcheries sold over 70 percent of chicks hatched. The combination of these two readily marketable categories helped minimize costs per chick hatched. Medium-sized hatcheries also sold some chicks for broiler production. Consequently, over 54 percent of the chicks they hatched were sold. On the other hand, small hatcheries depended almost entirely on sales of egg-type pullet chicks (table 34).

Only 11 of the 99 hatcheries furnishing capacity and volume data were using two-thirds or more of annual capacity. An additional 24 hatcheries were using from one-third to two-thirds of their annual capacity. Forty-one hatcheries were using one-sixth to one-third of annual capacity; 20 hatcheries, one-sixteenth to one-sixth; and two hatcheries, less than one-sixth of capacity. These last two failed to fill their incubator capacity fully even once during the year.

Table 33.--Average capacity, turnover ratio, annual rate of use, and sales of selected classes of chicks as percentage of those hatched, by region, 99 sample hatcheries, 1964/65 season

Region	Hatcheries	Average chicken egg capacity per hatchery	Capacity turnover ratio 1/	Rate of use of annual capacity 2/	Sales of selected classes as percentage of chicks hatched		
					Broiler-type	Egg-type pullets	Total
	Number	Number		Percent	Percent	Percent	Percent
New England	10	347,836	3.52	23.5	27.7	50.0	77.7
Middle Atlantic	8	425,187	6.07	40.5			
East North Central	8	218,860	4.38	29.2	5.2	50.0	55.2
West North Central	15	212,173	4.13	27.5	---	50.0	50.0
South Atlantic	22	283,509	7.97	53.1	56.8	21.6	78.4
South Central	9	370,100	7.11	47.4	43.5	28.3	71.8
Mountain	10	140,600	2.92	19.5	---	50.0	50.0
Pacific	17	421,007	5.02	33.5	26.3	41.8	68.1
United States	99	302,470	5.58	37.2	34.4	36.7	71.1

1/ Chicks hatched annually divided by egg capacity.
2/ Assuming capacity could be used 15 times a year.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 34.--Average capacity, turnover ratio, annual rate of use, and sales of selected chicks as percentage of those hatched, by hatchery size, 99 sample hatcheries, 1964/65 season

Hatching egg capacity	Hatcheries	Average chicken egg capacity per hatching	Capacity turnover ratio 1/	Rate of use of annual capacity 2/	Sales of selected classes as percentage of chicks hatched		
					Broiler-type chicks	Egg-type pullet chicks	Total
	Number	Number		Percent	Percent	Percent	Percent
Under 60,000	12	37,917	5.01	33.4	---	50.0	50.0
60,000-99,999	10	77,360	3.37	22.5	4.2	50.0	54.2
100,000-199,999	27	149,310	3.92	26.1	4.3	50.0	54.3
200,000-499,999	32	346,561	5.78	38.5	31.7	39.8	71.5
500,000 and over	18	755,257	6.06	40.4	44.2	31.0	75.2
Total	99	302,470	5.58	37.2	34.4	36.7	71.1

1/ Chicks hatched a year divided by egg capacity.
2/ Assuming capacity could be used 15 times a year.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Of the 104 hatcheries surveyed, 25 were hatching and selling broiler-type chicks and six were hatching and selling turkey poults. In addition to the 99 hatcheries furnishing data on egg capacity and volume of chicks hatched, there were five other firms selling chicks to producers. However, these five firms acquired these chicks from other hatcheries. Any incubators that the five had not already disposed of were not being used.

For most of the 63 active hatcheries selling started pullets, such sales accounted for a small share of the egg-type chicks they hatched. But for seven hatcheries, started-pullet sales accounted for most or all of the egg-type chicks hatched.

Terms of Payment and Pricing Practices for Chicks Sold

Nearly 90 percent of hatcheries surveyed conducted their sales program on a cash basis--expecting full settlement within 30 days. The time period varied considerably among hatcheries, ranging from cash on delivery to the upper limit of 30 days. Approximately 11 percent of the hatcheries offered credit. Four percent extended credit without interest, and the remaining 7 percent charged interest. Interest rates and terms varied greatly, depending primarily upon financial condition of the borrower.

It was common for hatcheries to allow advance order discounts. These discounts ranged from ½ to 1 cent a pullet for orders placed 3 months to 1 year in advance of delivery. Early payment discounts--for full payment prior to delivery--ranged from ½ to 1 cent a pullet, with the amount of the discount depending on how far in advance of delivery payment was received.

Quantity discounts were prevalent. These ranged from 2 to 10 cents per pullet chick on larger orders, depending on the region and the complexity of the discount schedule. Where seasonal discounts were offered, prices charged were highest in months of peak demand--usually in late winter and early spring. They were lowest in the off-season, encompassing late summer and early fall. The range in seasonal discounts was 3 to 7 cents per pullet chick. Prices also varied among the various breeds and strains offered.

Sources and Prices for Hatching Eggs

Hatcheries obtained hatching eggs from three main sources. About 57 percent of the hatcheries indicated that the major share of their hatching eggs came from hatchery-owned flocks, primary breeders, or other hatcheries. About 43 percent of the hatcheries obtained most of their eggs by direct purchase from, or under contract production arrangements with, independent producers (table 35).

Prices paid to primary breeders and other hatcheries for hatching eggs are closely related to those paid to independent producers. The cost of eggs produced by hatchery-owned flocks is probably similar to the price paid to these sources. For the 51 hatcheries who purchased most of their eggs, two pricing plans predominated. These were: payment of a specified cents-per-dozen premium over current market egg prices; and a flat price throughout the season for hatching eggs. Table 36 shows the relative importance of these and other pricing plans.

Table 35.--Number and percentage of hatcheries obtaining eggs from specified sources, 1964-65

Source of hatching eggs	Hatcheries	
	Number	Percent
Hatchery owned flock	43	45.7
Franchiser or another hatchery	11	11.7
Independent producer	40	42.6
Total	94	100.0

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 36.--Number and percentage of hatcheries purchasing eggs under specified pricing plans, 1964-65

Pricing plan	Hatcheries	
	Number	Percent
Premium over table egg price	20	39.2
Flat price throughout season	12	23.5
Other 1/	19	37.3
Total	51	100.0

1/ Other pricing plans reported as follows:
(a) Current price of chicks.
(b) Contract price which may or may not include a premium for hatchability.
(c) Fixed price of franchisers.
(d) Prices dependent upon State hatching egg reports.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

About half of the hatcheries buying eggs from producers did not commit themselves to take all hatching eggs offerred. About one-fourth of the hatcheries surveyed had problems in disposing of surplus hatching eggs. Within this group, 88 percent indicated surplus hatching eggs were disposed of by sale into market egg channels, 8 percent sold their surplus to breakers, and the remaining 4 percent sold to other hatcheries.

Prices Received and Hatchery Margins

Average prices charged by commercial hatcheries for day-old egg-type pullet chicks were lowest in the Pacific and New England regions and highest in the Midwest. Prices in the other regions were intermediate between the 33 and 46-cent extremes in the lowest and highest price regions, and ranged from 37 to 41 cents (table 37).

Table 37.--Average selling prices for chicks and additional selected hatchery data for sample hatcheries, by region, 1964/65 season

Region	Average selling price per salable day-old pullet chicks 1/	Average cost per hatching egg	Total egg cost per salable pullet chick 2/	Margin over egg cost per salable pullet chick	Average selling price per 20-week-old pullet 3/
	Cents	Cents	Cents	Cents	Dollars
New England	33.8	6.7	17.6	16.2	1.91
Middle Atlantic	41.2	5.7	15.0	26.2	1.89
East N. Central	45.6	4.3	11.4	34.2	1.76
West N. Central	45.7	4.0	10.6	35.1	1.78
South Atlantic	37.3	5.2	13.5	23.8	1.78
South Central	40.1	5.0	13.2	26.9	1.74
Mountain	37.1	5.3	13.9	23.2	1.79
Pacific	33.3	5.6	14.7	18.6	1.75
United States	38.9	5.1	13.3	25.6	1.80

1/ Based on data from 104 hatcheries.
2/ Assumes 40 salable pullet chicks per 105 eggs received. For every 105 eggs received, five are assumed to be culled or broken prior to hatching. Hatchability assumed at 83.3 percent, with 50 percent of chicks hatched being pullets and two of the 42 pullet chicks culled or included as extras.
3/ Based on data from 63 hatcheries.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Average prices paid for hatching eggs and, consequently, the egg cost per salable pullet chick were lowest in the Midwest and highest in New England. The low to high range was 4.0 to 6.7 cents. Hatching egg prices were about 5 cents in the South and closer to 5.5 cents elsewhere.

Hatchery margins per salable pullet chick were estimated by subtracting egg cost per salable pullet chick from selling price. Margins were lowest in the New England and Pacific regions. Highest margins were taken in the Midwest. Margins in other regions ranged near the U.S. average of 25.6 cents.

Average selling prices for 20-week-old pullets showed relatively less variation among regions than prices for pullet chicks did. Started pullet prices were highest in the Northeast, in part reflecting added feed costs for heavy breeds and higher rates for some other production inputs. In other regions, started pullet prices were quite similar, ranging from $1.74 in the South Central region to $1.79 in the Mountain region.

PRODUCTION DENSITY AND SPATIAL COSTS

Numerous factors affect the costs of producing and marketing eggs. Important among these are the number, size, and geographical distribution of producing, input-supplying, and marketing units.

As noted earlier, economies of scale exist in egg production, hatchery operation, feed milling, and egg packing. Other things being equal, a gradual trend toward fewer and larger units would occur. This is happening in an overall sense, but at a faster rate in some areas than in others.

The number and sizes of egg-producing flocks are influenced by the role of egg production in the overall agricultural program of an area, as well as by the prevalent structure of the egg industry. Flocks kept as a sideline tend to be small and are often scattered. Coordination of production, input-supplying, and marketing can influence minimum flock sizes and their location. The efficiency of the input-supplying and marketing systems influences relative returns from egg production. Thus, gross and net returns are lower where flocks are small and scattered.

Per unit of volume, it usually costs more to service small accounts than large ones. Costs per unit of volume are higher where average distance to farms is greater or where production is less concentrated. An area may thus be put at a disadvantage in comparison to other areas by either or both of these factors.

For hatcheries, feed mills, or egg-packing plants, the plant size that will perform plant and transfer functions at least cost can be determined. Plant operating costs are combined with costs of distribution of chicks or feed or assembly of eggs from farms. Costs of transfer functions rise with volume because average hauling distance increases. At the same time, costs of plant operations decline because of economies of scale. The higher transfer costs are because of decreasing production density, the smaller the optimum size of unit will be and the higher will be the combined cost of plant and transfer functions. Thus, farm sizes being equal, an area with higher production density will have a larger optimum unit size and a lower combined average cost than will an area of low production density. And an area with small flocks will have higher transfer costs than one with larger flocks. Unit size will be smaller and combined average costs will be higher.

Aggregate production density for various regions can be compared by using secondary data (table 38). Some differences appear, depending on whether the measure is chicken eggs sold per acre of farmland or of cropland. However, potential production density appears highest in the Northeast, South Atlantic,

Table 38.--Total number of chicken eggs sold, and number sold per acre of farmland and cropland, by region, 1964

Region	1964		Chicken eggs sold, 1964	Chicken eggs sold per acre of--	
	Farmland	Cropland		Farmland	Cropland
	Mil. acres	Mil. acres	Mil. dozen	Dozen	Dozen
New England ...	7.7	1.9	250.4	32.33	132.57
Middle Atlantic	24.2	9.8	567.3	23.41	57.67
East N. Central	99.5	55.4	782.1	7.86	14.11
West N. Central	283.6	114.1	981.6	3.46	8.61
South Atlantic	77.0	17.5	878.0	11.41	50.05
East S. Central	64.5	14.5	452.3	7.01	31.24
West S. Central	204.8	36.5	472.5	2.31	12.94
Mountain	267.9	21.7	103.0	0.38	4.76
Pacific	76.6	15.3	728.1	9.51	47.57
United States	1105.8	286.7	5215.3	4.72	18.19

Source: Econ. Res. Serv., U.S. Dept. Agr.

East South Central, and Pacific regions. It appears lowest in the Mountain, Midwestern, and West South Central regions.

In practice, there may be substantial differences in production density in various areas within major regions. In addition, some individual firms may be more successful than others in achieving a higher "effective production density." A few firms may have relatively exclusive supply or distributing areas; others may achieve a preferential position by carefully selecting the farms they service, through contract production, or by managing their selling and procurement activities better.

In analyzing data from the national survey, producing units were identified with certain assembler-packers, hatcheries, and feed suppliers. The distances by road from producing units to these other plants were measured (table 39). When these data are examined, the relative performance in various regions is somewhat different than the aggregate data in table 38 might suggest.

Distances from producer's farms to hatcheries are not as important from a cost standpoint as distances from farms to feed mills or egg-packing plants. Distances to hatcheries matter less because chicks and started pullets are delivered to farms infrequently--no more than a few times each year. The preference for particular strains of birds often means movement over substantial distances to individual farms. In other instances, hatcheries and farms were located at or near the same point. As a result, average distances between hatcheries and farms were below the U.S. average in the West North Central, New

Table39.--Distances from producers' farms to hatcheries, feed mills, and egg-packing plants, by region, 1964-66 1/

Region	Producers buying from hatcheries	Distance, producer to hatcheries		Producers buying from feed mills	Distance, producer to feed mill		Producers selling to egg-packing	Distance, producer to egg-packing plant		Range in average distance to producers' individual packing plants
		Average	Range		Average	Range		Average	Range	
	Number	Miles	Miles	Number	Miles	Miles	Number	Miles	Miles	Miles
New England	20	66.9	5-117	20	24.3	5-100	81	75.2	5-265	18-128
Middle Atlantic	21	59.5	15-140	20	24.4	0-108	22	41.3	10-180	15-55
East North Central	39	82.2	5-428	38	13.3	0-120	50	37.9	0-135	7-95
West North Central	68	40.2	5-200	68	23.1	5-215	104	26.6	5-125	10-75
South Atlantic	43	60.1	0-174	44	41.4	0-165	53	27.0	0-200	0-113
South Central	10	135.0	18-319	9	48.9	5-320	45	34.8	0-125	0-97
Mountain	24	168.0	5-618	24	97.0	5-712	31	31.3	0-315	0-307
Pacific	110	69.2	0-240	78	30.0	0-113	79	49.6	0-174	0-79
United States	335	71.9	0-618	301	33.1	0-712	465	42.0	0-315	0-307

1/ Distances are one-way road mileages.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

England, Middle Atlantic, South Atlantic, and Pacific regions. Distances were somewhat above average in the East North Central region, and considerably above average in the South Central and Mountain regions.

Average distances from feed mills to farms were below the U.S. average in New England, the Midwest, and the Middle Atlantic and Pacific regions. Distances were above the U.S. average in the South and the Mountain region. Some individual farms were located at or close to the point where feed was milled, while in other instances, feed was hauled long distances. Costs of hauling feed from mills to farms are important because deliveries are made weekly or every few weeks.

Average distances from farms to egg-packing plants were below the U.S. average in the Middle Atlantic, East and West North Central, South Atlantic, South Central, and Mountain regions. They were somewhat above average in the Pacific region, and considerably above average in New England, where some plants located in areas formerly more important in egg production were handling eggs from newer egg-producing areas many miles away. Some individual producers were at or close to points where egg-packing plants were located. Others much further away were still selling to long-established outlets, necessitating long hauls. In all regions, many individual plants were at a minimal average distance from supplying producers.

It should be kept in mind that the data in table 39 do not reflect the importance of average flock size. Hence, in areas such as the Midwest and the Mountain region, the cost-minimizing effect of low average distance from farms to plants was at least partly offset by the cost-increasing effect of servicing small farms. Another reason for relatively low average distances from farms to plants is that supplies for smaller plants can be obtained nearby, whereas the handling of larger volumes can be achieved only by substantial increases in distances (and hauling costs).

COORDINATION OF PRODUCTION, INPUT-SUPPLYING, AND MARKETING

Structural Evolution of the Egg Industry

In the early days of the poultry industry, the poultryman performed many functions. He frequently kept a breeding flock, hatched his own chicks, grew out his own replacements, and sold live or dressed surplus cockerels, cull pullets, and fowl at the farm. He hauled eggs and poultry to local buying stations, stores, and consumers, made his own equipment, handmixed his own feed, and did considerable experimenting with feeds, strains of birds, remedies for diseases and parasites, and management. In a sense, his operations were vertically integrated. But he performed many of these functions as much from necessity as from choice, since the industry was composed mainly of small, decentralized units.

This type of industry gradually gave way to one characterized by increased specialization. Better communication and transportation developed, new methods were used and new services offered, and new technology made larger production and marketing units feasible. Breeding and hatching functions left the

individual farm, as specialized strains for meat or egg production were developed. Feedmixing passed largely to the commercial mills. Large-scale commercial equipment, feed supplement, and disease-control (remedies and vaccines) companies emerged.

Many of the producer's functions came to be performed by others. Mills and feed stores began to handle equipment, supplies, and remedies. Commercial slaughtering plants and egg-handling plants came to the farm for supplies and began to perform additional marketing functions for the farmer. Many of the organizations selling inputs to the producer and marketing his poultry and eggs were farmer cooperatives. Public agencies and private firms went into scientific research.

In the last two decades, the egg industry has entered a third stage of structural evolution. This stage has involved reintegrating various functions vertically and horizontally under an overall management. While economies of scale and the need for greater utilization of capacity have forced a general trend toward fewer and larger units, other forces have promoted a similar trend toward large-scale coordination. Among these forces are: the possibilities for accelerating the adoption of production technology; the need for increased product standardization to supply mass-merchandising outlets; the need for a way of more effectively meeting the capital requirements of a mechanized and commercialized agriculture; and the need to obtain greater bargaining power and promote more orderly marketing. Conglomerate integration has also moved into egg production, including the input-supplying segments of the industry, as a means of minimizing risk and assembling financial strength. This development is not yet as widespread in egg production as in broiler production, but it is continuing.

Following a pattern similar to developments in the broiler industry after World War II, contract production and financing of egg production by input-supplying and marketing firms increased rapidly during the late 1950's and 1960's. As with broiler production, the tendency has been for contracting to supplant looser financing arrangements, and for more contracts to stress flat-fee or production-efficiency payments rather than market prices, in determining producer returns.

Also during the 1950's and 1960's, there was an expansion of quality-control programs and marketing agreements. But these remain somewhat unique for eggs. Under quality-control programs, the packing plant establishes a list of desired practices relating to the management and feeding of layers, the strains of birds to be kept, and the gathering and holding of eggs. These practices may be required or recommended for producers; flock supervisors may visit farms at given intervals to check on compliance. With marketing agreements, the packing plant attempts to get producers to agree to sell all or a given share of their eggs to the plant. The effort is essentially one to achieve a stable volume for the packing operation. With contract production, the contractor typically handles or arranges for marketing the eggs. Thus, an element of stability in plant volume is added for the contractor's plant or the plant to whom he sells.

Specialized egg-marketing cooperatives, and other types of cooperatives that handle eggs as a sideline, have long played an important role in packing and marketing eggs for producer-members. Some of these cooperatives still handle producers eggs in the quantities and qualities that producers choose to sell through them. Other cooperatives have instituted quality-control programs and concluded marketing agreements with their producers. The pricing basis for producers under quality-control programs or marketing agreements is often different from that for those who use the cooperative to dispose of surpluses of particular grades and sizes. Cooperatives also sell major production inputs, such as feed, as well as equipment, supplies, and building materials. Some engage in financing producers and in contract production. The newer types of cooperative organizations which have emerged in recent years generally stress market information, market stabilization, and bargaining activities rather than operating functions.

A substantial number of large-scale, owner-integrated egg enterprises have been developed during the last two decades. At the highest level of integration, these enterprises combine production, hatching, feed milling, and egg packing. In others, production and one or more other functions are combined. Often these enterprises are so large and well balanced that no connection with other firms exists except in procuring raw inputs and selling the final product. At a lesser level of coordination, quasi-integration may be practiced by several large producers. Some examples of the latter include groups who buy feed in volume, are the sole suppliers to a packing plant, or jointly operate units performing other functions.

In recent years, other firms important in egg production have "gone public" and their stocks are regularly quoted. Some firms are already engaged in egg production and other activities in more than one region of the country, and others are joining this group through expansions, acquisitions, and mergers. It is also likely that, following similar developments in the poultry industry, additional egg industry firms will be absorbed by conglomerate organizations engaged in agricultural and nonagricultural activities.

The Extent of Various Kinds of Integration and Coordination

Comprehensive and continuing data series to reveal ongoing changes in various kinds of integrated and coordinated arrangements are generally lacking. However, secondary data and individual State studies do provide some measurements of these developments at particular points in time.

Census and other data indicate that contracting is much more prevalent in the South and West than in other regions (table 40). However, the extent of contracting, as well as its form, varies not only among regions but among States within a region.

In the North Atlantic region, contracting is more prevalent in Northern New England than in Southern New England or the Middle Atlantic States. In Maine, 53 percent of the commercial egg farms and 42 percent of layers were under contract production programs in 1968, compared with 35 and 28 percent, respectively, in 1963 (12). While only 15 percent of New Hampshire's commercial egg farms and 16 percent of layers on these farms were under contract in

Table 40.--Measures of integration and coordination in the market egg industry, by region

Region	Eggs sold on contract in 1964 as percentage of U.S. average 1/	Chickens on hand age 4 months or over as percentage of all chickens in flocks of 5,000 or more, 1964 2/	Eggs sold by co-ops as percentage of total eggs produced, 1962-66 average 3/
	Percent	Percent	Percent
North Atlantic	67	10.3	20
East North Central	42	4.8	14
West North Central	19	2.0	10
South Atlantic	147	14.4	16
South Central	177	23.1	8
Western	131	45.0	19
United States	100	13.9	14

1/ Estimated by Econ. Res. Serv. from Census and other data.
2/ Census data.
3/ Estimated by Econ. Res. Serv. using data from Farmer Coop. Serv. and Cons. and Mktg. Serv.

Source: Econ. Res. Serv., U.S. Dept. Agr., prepared from above series.

1964 (16), the proportions under contract have since increased. A New York survey in 1964 indicated 40 percent of layers were under contracts or agreements, but only 4.6 percent were in contract egg production. In addition, 11.4 percent were under financing agreements, 21.2 percent under egg-marketing agreements, and 2.8 percent under both of these (24, p. 5). New Jersey had virtually no contract production in 1964 (36).

Contracts and agreements are believed to be more prevalent in such States as Indiana, Michigan, and Missouri than in most others in the North Central region. Yet in total, such arrangements--particularly for contract production--are less common in this region than in other surplus regions. In 1961, about 15 percent of Indiana's layer population was involved in varying types of contractual arrangements (17, p. 1). By 1967, 19 processors, handling half of Indiana's eggs, were procuring over half their eggs through contract production (39, p. 2). In 1964, 40 to 50 percent of Missouri's eggs were produced under contracts and agreements, but most of these were marketing contracts only (36). Contract production in Iowa was about 10 percent of total production in 1967 (37).

Sample information suggests contract production accounted for one-third of Georgia's egg output in 1959-64 (10, p. 34; 36) and up to 35 to 40 percent in 1967 (37). While only 5 to 10 percent of Alabama's table eggs were produced and marketed under contract in 1959 (14, p. 6), 45 percent were under contract

by 1964 (36). By 1965-66, at least 35 percent of table egg production in Louisiana was under a contract system (40, p. 51). In Mississippi, contract production, which accounted for only 2 percent of commercial layers in 1956, accounted for one-third by 1959 (33, p. 3), and the current level is probably much higher. In Arkansas, those firms with contract growers accounted for 75 percent of all production included in a 1964 survey (9, p. 10).

While no overall direct measurements of the development of large owner-integrated complexes are available, some indication of this development can be suggested. Such units are most likely to have large flocks of laying hens. According to the 1964 Census of Agriculture, flocks of 50,000 or more birds are most common in the Western region (particularly in the Pacific Coast States and next most common in the South and the North Atlantic region. Fewer flocks are so large in the Midwest (table 40). Figures on flock size tend to support statements by many industry people and research workers that most of the large owner-integrated complexes are on the West Coast, in the South, and in the Northeast.

An enumeration of egg-marketing agencies was made in 1966 in the eight southern States of Georgia, North Carolina, Arkansas, Alabama, South Carolina, Virginia, Tennessee, and Oklahoma. The 283 firms handling 400 cases or more weekly handled about 66 percent of farm production of the eight States--nearly 16 percent of U.S. output. Over three-fourths of the firms were either producer-processors or processors, 8 percent were producers only, 7 percent contractors, and 9 percent distributors. About half the 283 firms were in other businesses besides egg production or egg handling. Forty-two percent operated feed mills, 14 percent hatcheries, 5 percent poultry-dressing plants, and 7 percent other businesses, such as selling started pullets and running retail feed stores and farm supply stores (5, p. 3). Of particular interest is the extent of integration of input-supplying with production and processing.

Data from the 1966 study were used to derive the estimates in table 41. While the estimates may be only approximate, they do suggest the large and probably growing importance of wholly owned flocks as a source of eggs for large firms. These estimates may also suggest that wholly owned flocks may be growing relatively faster than contract flocks as a supply source. In fact, such flocks may be replacing contract production in some areas.

The development and extension of large owner-integrated complexes and contract production seem to be associated with a high rate of expansion of egg production. Such a rate of expansion has occurred in the Pacific Coast States and in the South, as well as in a few States in other areas.

The relative importance of cooperatives in various regions is not as clearly identified with relative increases or decreases in regional egg production (table 40). Cooperatives sold larger shares of regional egg production in the North Atlantic and Western regions than elsewhere in 1962-66. Production in the former region has declined since the mid-1950's, while in the latter region it has risen. Thus, the effect of cooperatives in egg-handling operations has probably been overshadowed by other factors.

Table 41.--Percentage distribution of egg marketers supplies from wholly owned and contract flocks, selected States, 1966

State	Percentage of total eggs to egg marketers from--		
	Own flocks	Contract flocks	Total
	Percent	Percent	Percent
Georgia	43.9	19.2	63.1
North Carolina	39.5	16.0	55.5
South Carolina	50.8	18.4	69.2
Virginia	36.6	9.5	46.1
Tennessee	46.6	33.6	80.2
Alabama	37.4	35.5	72.9
Arkansas	40.1	37.0	87.1
Oklahoma	18.0	28.7	46.7
8 States	41.2	25.8	67.0

Source: Derived from data in Buck, J. T., "Survey of Egg Marketing Agencies in 8 Southern States," Va. Polyt. Inst., D.A.E. Res. Rpt., Feb. 1968. Numbers of firms multiplied by midpoints of frequency intervals and accumulated to derive above estimates.

Several new cooperative-type organizations were organized in the middle and late 1960's. These were mainly concerned with market information, market stabilization, and bargaining activities rather than with the more traditional packing and distributing activities in which most older cooperatives were engaged. In 1966-67, one new organization, operating in the South, represented about one-third of egg production there. Another represented about one-fourth of New England table egg production. A third organization represented 70 to 75 percent of egg production in Southern California and Arizona. These organizations, plus others like them in the East, Midwest, and Pacific areas, joined together in a nationwide federation in 1968. By mid-1969, the federated cooperative claimed to represent 35 percent of producers and 50 percent of commercial egg production in the United States. Many individuals and firm members are engaged in packing and distributing, but the overall federation is not. Rather, its functions are an extension of those that concerned the individual organizations before they joined the federation.

EXTERNAL FACTORS AND REGIONAL SHIFTS IN EGG PRODUCTION

Several external factors have affected the egg industry along with all other industries. These factors may have substantially influenced the direction and rate of development of the egg industry within various regions.

Capital Availability

To date, it has not been possible to develop any good statistical indicators on capital availability. However, it is apparent that capital must have been readily available to the egg industry in those regions where rapid expansion has occurred.

Moreover, an area like the Midwest, which decreased in importance in egg production during the 1950's and 1960's, would require substantial commitments of capital to undertake an industry modernization program. Many existing facilities might have to be written off, even though they may not yet be fully depreciated. Confidence in the profitability of egg production and supporting activities would certainly have to be increased before capital would be made available.

Investors and lenders might examine: (1) the comparative prospects of individual enterprises within an area; and (2) the area's overall future prospects for egg production or other business endeavors. The comparative performances of different regions in the recent past could be considered by lenders, making it more difficult for declining areas to obtain capital than for expanding areas to do so.

Other Poultry Industries

Examination of regional trends in cash receipts (deflated by price levels) from egg and poultry production reveal significant contrasts (table 42). Cash receipts from eggs have declined in the North Atlantic region and the Midwest and increased in the South and West.

Cash receipts from broilers and farm chickens have increased slightly in the North Atlantic region since 1955, but this reflects growth localized in a few States. Receipts have declined in the Midwest and increased moderately in the West and substantially in the South. Cash receipts from turkey enterprises have increased in all regions except the North Atlantic since 1955.

Thus egg, chicken, and turkey production have all been attractive alternatives in the South and West. In the South, experience with integrated production of broilers has been increasingly adapted to egg and turkey production. The area has also had the advantage, in expanding egg and turkey production, of external economies available from institutions involved in the large and efficient broiler industry. The rise of the West, particularly California, in egg production is based on large unit size and efficiency within the industry itself. The Midwest has evidently had a better competitive position on turkeys than on eggs or broilers. Hence, the turkey industry there has grown while the egg and broiler industries have shrunk.

Other Agricultural Enterprises

The agricultural sector has grown in all regions but the North Atlantic since 1955, based on cash receipts deflated by price levels. Major livestock enterprises have grown considerably in all but the North Atlantic and East North Central regions. Much of the growth has been in cattle and calves, in response to increased demand for beef (table 43).

Table 42.--Cash farm receipts from selected poultry enterprises, by region, selected years 1/

Product and year	North Atlantic	East North Central	West North Central	South Atlantic	South Central	Western
			Million dollars			
Eggs:						
1955	397	287	354	165	167	217
1960	361	267	317	266	234	252
1966	325	248	247	400	389	287
1967	332	256	227	440	461	303
Broilers and farm chickens:						
1955	133	80	59	263	158	59
1960	142	68	49	478	370	74
1966	142	50	40	715	681	99
1967	148	49	42	732	700	110
Turkeys:						
1955	24	36	70	36	23	68
1960	18	50	117	30	36	97
1966	22	70	154	67	70	119
1967	23	70	169	75	90	133

1/ Receipts are dollar receipts deflated by average farm prices.

In all regions, deflated total cash from crops has increased since 1955. However, the rate of increase has been less in the South than elsewhere. The reason for this becomes obvious upon consideration of groupings of major crops like corn, wheat, soybeans, cotton, and tobacco, and a few enterprises highly important to particular regions. In the South, cotton and tobacco income has been stabilizing and declining, while income for major Midwestern and Plains area crops--corn, soybeans, and wheat--has been holding up and even increasing.

Hence, the South has found egg and poultry enterprises a desirable alternative. On the other hand, the Midwest, except in the case of turkey production, has found other alternatives more attractive than eggs and poultry.

Wage Rates and Employment

Employment in manufacturing has risen a third or better in the South and West since 1955, about a fifth in the West North Central region, less in the East North Central region, and hardly at all in the North Atlantic region. During the same period, manufacturing wage rates have risen more than 50 percent in all regions. But these changes have not yet become a critical influence. Absolute gains in manufacturing wage rates were significantly less in the South than elsewhere, and Southern wage rates in manufacturing are still well below those in other regions (table 44).

Table 43.--Cash farm receipts from various enterprises, by region, selected years 1/

Type of enterprise and year	North Atlantic	East North Central	West North Central	South Atlantic	South Central	West
			Million dollars			
Major livestock enterprises:						
1955	1,260	3,329	5,030	797	1,964	2,056
1960	1,292	3,412	5,215	891	2,130	2,392
1966	1,276	3,406	6,238	930	2,707	2,883
1967	1,243	3,424	6,575	997	2,691	2,979
All crops:						
1955	704	1,838	2,307	2,030	3,042	3,088
1960	824	2,161	2,933	2,278	3,358	3,584
1966	894	3,043	3,328	2,349	3,337	4,121
1967	926	3,093	3,687	2,701	3,469	4,344
Selected major crops that are increasing 2/:						
1955	321	1,136	1,512	351	376	1,184
1960	364	1,532	2,265	413	736	1,550
1966	406	2,049	2,379	488	1,007	1,690
1967	404	2,256	3,009	717	1,183	1,575
Selected major crops that are steady or decreasing 3/:						
1955	116	35	67	1,223	2,125	---
1960	115	23	84	997	1,927	---
1966	107	22	39	866	1,971	---
1967	122	29	15	860	1,377	---
All commodities:						
1955	2,688	5,595	7,554	3,576	5,535	5,772
1960	2,706	6,018	8,683	3,952	6,209	6,774
1966	2,702	7,073	10,342	4,297	7,061	7,610
1967	2,765	7,148	11,027	4,679	7,280	8,049

1/ Receipts are dollar receipts deflated by average farm prices.

2/ Crops include: North Atlantic, potatoes, apples, greenhouse, soybeans; East and West North Central, corn, soybeans, wheat; South Atlantic, corn, soybeans, wheat, oranges; South Central, wheat, soybeans, rice; West, cotton, wheat, hay, potatoes, corn.

3/ Crops include: North Atlantic, corn, tobacco, wheat; East and West North Central and South Atlantic, tobacco, cotton; South Central, cotton, tobacco, corn.

Table 44.--Farm and manufacturing wage rates, and manufacturing employment, by region, selected years

Item and years	North Atlantic	East North Central	West North Central	South Atlantic	South Central	West	U.S.
			Dollars				
Farm wage rates per hour without board and room:							
1955	1.01	1.01	0.99	0.62	0.61	1.02	0.82
1960	1.14	1.08	1.08	0.72	0.69	1.15	0.97
1966	1.36	1.29	1.28	0.96	0.94	1.40	1.23
1967	1.48	1.38	1.34	1.06	1.07	1.47	1.33
Average hourly earnings of production workers in manufacturing:							
1955	1.85	2.08	1.83	1.46	1.61	2.11	1.86
1960	2.26	2.56	2.28	1.80	1.98	2.59	2.26
1966	2.71	3.08	2.76	2.19	2.36	3.12	2.72
1967	2.82	3.19	2.89	2.30	2.47	3.24	2.83
			Percent				
Farm wage rates as percentage of manufacturing wage rates:							
1955	54.6	48.6	54.1	42.3	37.9	48.3	44.1
1960	50.4	42.2	47.4	40.0	34.8	44.4	42.9
1966	50.2	41.9	46.4	43.8	39.8	44.9	45.4
1967	52.5	43.3	46.4	46.1	45.3	45.4	47.0
			Millions				
Number of employees on manufacturing payrolls:							
1955	5.8	4.9	1.0	1.9	1.6	1.7	16.9
1960	5.6	4.5	1.0	2.0	1.7	1.9	16.7
1966	5.9	5.2	1.2	2.5	2.2	2.3	19.2
1967	5.9	5.1	1.2	2.5	2.2	2.4	19.4

Farm wage rates have also shown material gains in all regions since 1955. The percentage increase for 1955-67 ranged from 35 percent or more in the Midwest to about 45 percent or more in the Western and North Atlantic regions. However, farm wage rates in the South rose 70 to 75 percent during the same period. The absolute gains were 35 to 37 cents an hour in the Midwest, and 44 to 47 cents an hour in other regions. Hence, farm wage rates in the South, despite the larger percentage increases, are still substantially below those in other areas and remain an advantage to the South in terms of production input costs.

By 1967, farm wage rates in the South were equal to a larger percentage of manufacturing wage rates than in 1955. In other regions, farm wage rates were equal to a lower percentage of manufacturing wage rates than they had been in 1955. Thus, farm employment in the South has not become as unattractive on a relative basis as it has elsewhere.

Rising farm wage rates, as well as more off-farm movement due to greater recognition of the spread between farm and off-farm wages, will tend to promote more mechanization and fewer and larger units in egg production. The Western and Southern industries are already further along in these respects than that in the Midwest. Thus, higher Southern wage rates would be only a partial deterrent to further expansion, unless the Midwest became equally efficient.

FUTURE DEVELOPMENTS

Based on projections of trends since the mid-1950's, further, gradual declines would be expected in the shares of total U.S. production from the North Atlantic region and the Midwest. The shares coming from the South would increase, correspondingly, but at a lower rate than since the mid-1950's. The Western region's share would increase slightly, then level off. Gains would be more noticeable in the shares that the South and the West would have of total volume of eggs going to breaking plants. The share of the Midwest would decline. These projections assume that a higher percentage of total egg output would be used for breaking in the South and West and a lower percentage in the Midwest than at present.

Under these projections, the Midwest would not recover its former position as the only major source of eggs for deficit regions. And unless there are rapid developments toward greater unit size and overall efficiency, more coordination, and more orderly marketing, the Midwest will lose more ground. So long as other agricultural enterprises offer better prospects, there will be little reason for a widespread shift to eggs in the Midwest. The Midwest surplus would go mainly toward the Northeast.

The South's egg industry, producing a larger surplus of eggs, would compete primarily with eggs from the Midwest in the Northeast, and with eggs from the West in the Southwest and Mountain areas. However, the rate of expansion in the South would decelerate. The South would have a substantial breaking industry, and except on the fringes where it borders the Midwest, would break most eggs not going to table egg outlets.

The Pacific area would take care of its own needs and fill much of the deficit needs in the Southwest and Mountain areas, with the Western industry, despite some disadvantages, remaining large, efficient, and aggressive. But some areas further east would become less important as outlets for that region.

The Northeast's production would remain deficit overall, but the region will support a substantial and efficient local industry. New England would take care of its own remaining brown-egg preference. On white eggs, however, the South and Midwest would make up the deficit.

Predictions about the future position of various regions in the egg business are hazardous at best. It is easy to locate factors which may have explained past developments, but difficult to give them precise weightings. Also, the role of individuals and institutions is difficult to appraise. The decisions and ability of entrepreneurs will be important in influencing further developments, and administrative and political decisions could have major effects. In addition, there may be new factors, as yet unidentified, which would make predictions based on past trends highly questionable. Additional studies, involving alternative sets of assumptions, may offer better indications of what the future holds.

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APPENDIX

Table 45.--Average prices received by producer for major classes of eggs sold to assembler-packers, by region, July 1964-June 1965

Region	Price per dozen for--				
	Grade A extra large and jumbo 1/	Grade A large	Grade A medium	Grade A small	Under-grades 2/
	Cents				
New England	41.3	38.4	32.0	25.0	17.5
Middle Atlantic	35.9	34.9	25.1	18.9	17.7
East North Central	30.5	28.5	23.0	16.0	15.6
West North Central	30.4	28.4	23.0	15.9	15.2
South Atlantic	33.0	32.5	25.8	19.9	15.6
South Central	32.6	31.6	25.4	19.4	14.0
Mountain	3/37.0	3/36.0	3/31.9	3/20.3	16.9
Pacific	3/31.3	3/29.5	3/23.7	3/14.5	14.0

1/ Producers in many areas are not paid premiums for extra large or jumbo sizes.

2/ Includes B's, C's, unsized, ungraded, checks, cracks, and dirties.

3/ Many called Grade AA in most States.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 46.--Composition of poultry rations fed on farms, by region and type of ration, 1964-66

Type of ration and region	Proportion of farms with rations containing--		Range in protein content of ration	Average protein content of ration	Average fat content of ration	Average fiber content of ration
	16 percent or less protein	Over 16 percent protein				
	Percent	Percent	Percent	Percent	Percent	Percent
Laying mash:						
North Atlantic	87	13	16-18	16.1	3.8	3.9
East N. Central	32	68	16-17.5	16.5	3.6	4.2
West N. Central	75	25	15-18	16.3	3.3	5.4
South Atlantic	84	16	15-18	15.9	3.2	5.5
South Central	40	60	16-17	16.6	3.7	5.5
Mountain	48	52	15-20	17.9	2.6	8.7
Pacific	44	56	16-20	16.7	3.3	4.7
United States	61	39	15-20	16.5	3.3	5.1
Growing mash:						
North Atlantic	57	43	14-20	16.1	3.6	5.0
North Central	87	13	14-17	15.8	3.0	7.2
South	83	17	13-20	15.1	2.7	7.3
West	57	43	13-20.1	16.5	3.3	6.1
United States	66	34	13-20.1	16.0	3.1	6.5
	20 percent or less protein	Over 20 percent protein				
	Percent	Percent				
Chick starter:						
North Atlantic	43	57	20-25	21.5	4.9	3.6
North Central	87	13	17-22	20.0	4.4	5.0
South	81	19	18-22	20.2	3.4	4.9
West	65	35	18-24.2	20.4	3.5	4.4
United States	71	29	17-25	20.3	3.7	4.6

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 47.--Composition of the top grade of laying mash sold by sample feed mills, by region, 1964-66

Region	Average protein content	Average fat content	Average fiber content
	Percent	Percent	Percent
New England	17.5	4.1	3.7
Middle Atlantic	18.8	4.5	4.8
East North Central	18.4	3.3	4.7
West North Central	17.7	3.3	5.7
South Atlantic	17.4	3.2	5.2
South Central	16.5	3.5	5.2
Mountain	18.7	2.9	6.3
Pacific	17.8	3.6	5.1
United States	17.8	3.5	5.2

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 48.--Ranges in analyses of feeds sold to egg producers by sample feed mills, 1964-66

Percentage level of protein content	Number of firms	Percentage of total	Range of fat content	Range of fiber content
	Number	Percent	Percent	Percent
For top grade of laying mash:				
15.0 to 15.9	4	5.3	3.0-4.0	4.0 - 5.0
16.0 to 16.9	31	40.8	2.5-8.0	2.75- 8.0
17.0 to 17.9	8	10.5	3.5-4.0	3.4 - 5.5
18.0 to 18.9	6	7.9	3.5-4.0	4.0 - 8.0
19.0 to 19.9	0	---	--- ---	--- ---
20.0 to 20.9	20	26.3	2.0-4.0	4.0 -10.0
21.0 to 21.9	4	5.3	3.4-4.0	3.7 - 4.0
22.0 to 22.9	3	3.9	2.5-3.0	5.0 - 7.0
Total	76	100.0	2.0-8.0	2.75-10.0
Other laying mash:				
15.0 to 15.9	5	12.8	2.8-4.0	3.5 - 6.5
16.0 to 16.9	21	53.8	3.0-4.5	3.0 - 6.5
17.0 to 17.9	6	15.4	3.0-4.0	3.0 - 6.0
18.0 to 18.9	3	7.7	2.5-5.0	4.5 - 7.0
19.0 to 19.9	0	---	--- ---	--- ---
20.0 to 20.9	4	10.3	2.5-4.0	6.5 - 7.6
Total	39	100.0	2.5-5.0	3.0 - 7.6
Complete mash, top grade:				
15.0 to 15.9	3	8.8	2.5-3.0	3.0 - 5.5
16.0 to 16.9	18	52.9	2.0-4.0	4.0 - 9.0
17.0 to 17.9	4	11.8	2.0-3.5	5.0 - 7.0
18.0 to 18.9	5	14.7	4.0-4.1	3.6 - 4.0
19.0 to 19.9	0	---	--- ---	--- ---
20.0 to 20.9	2	5.9	2.5-3.5	6.0 - 8.0
21.0 to 21.9	0	---	--- ---	--- ---
22.0 to 22.9	2	5.9	3.0-4.0	4.0 - 5.0
Total	34	100.0	2.0-4.1	3.0 - 9.0

Continued--

Table 48.--Ranges in analyses of feeds sold to egg producers by sample feed mills, 1964-66 --Continued

Percentage level of protein content	Number of firms	Percentage of total	Range of fat content	Range of fiber content
	Number	Percent	Percent	Percent
Other most common complete mash:				
15.0 to 15.9	3	13.6	3.0-4.0	3.0 - 5.0
16.0 to 16.9	13	59.2	3.0-4.0	3.5 - 6.0
17.0 to 17.9	3	13.6	2.0-3.8	5.5 - 7.0
18.0 to 18.9	3	13.6	3.0-4.5	3.0 - 8.0
Total	22	100.0	2.0-4.5	3.0 - 8.0
Chick starter:				
18.0 to 18.9	1	1.8	3.5	7.0
19.0 to 19.9	2	3.6	3.0-3.5	8.0 - 8.5
20.0 to 20.9	28	50.9	2.5-4.0	3.0 - 7.0
21.0 to 21.9	15	27.3	3.0-4.8	3.5 - 9.0
22.0 to 22.9	9	16.4	3.0-5.0	4.0 - 7.0
Total	55	100.0	2.5-5.0	3.0 - 9.0
Chick grower:				
13.0 to 13.9	4	5.3	2.5-4.0	9.0 - 9.5
14.0 to 14.9	7	9.3	2.5-4.0	6.0 - 8.0
15.0 to 15.9	21	28.0	2.5-4.0	4.0 - 8.5
16.0 to 16.9	13	17.4	3.0-4.2	4.3 - 7.0
17.0 to 17.9	16	21.4	3.0-6.5	3.5 - 9.0
18.0 to 18.9	7	9.3	3.0-3.5	5.0 - 7.5
19.0 to 19.9	0	---	--- ---	--- ---
20.0 to 20.9	6	8.0	2.5-3.5	4.5 - 7.0
21.0 to 21.9	1	1.3	3.5	6.0
Total	75	100.0	2.5-6.5	3.5 - 9.5

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 49.--Sources, types, and delivered prices of major feed ingredients purchased by mills, by region, 1964-66

Item and region	Main sources (U.S. region or foreign country)	Grade or type	Average delivered price paid per ton
			Dollars
Corn:			
New England	East North Central	#2 yellow, 8.5-8.8% protein	57.37
Middle Atlantic	East North Central	#2 yellow	52.62
East North Central	Local	#2 yellow, 8.5% protein	45.36
West North Central	Local	#2 yellow, 8.5% protein	41.91
South Atlantic	East North Central, Local, South Central	#2 yellow	52.72
South Central	East and West North Central, Local	#2 yellow	47.09
Mountain	Local, West North Central	#2 yellow	46.66
Pacific	West North Central, Mountain	#2 yellow, 8.5-9.0% protein	55.52
Oats:			
New England	East North Central	---	---
Middle Atlantic	East North Central, Local	---	58.12
East North Central	Local	6-12% protein	45.05
West North Central	Local	12% protein	40.51
South Atlantic	East North Central	---	49.29
South Central	Local	---	---
Mountain	Local	---	40.10
Pacific	Local, Mountain	---	54.00
Middlings:			
New England	East North Central	---	55.55
Middle Atlantic	Local, East North Central	17% protein	54.55
East North Central	Local	16% protein	48.00
West North Central	Local	15-17% protein	52.15
South Atlantic	South Central, East North Central	16-17% protein	46.30
South Central	Local	16% protein	40.65
Mountain	Local	---	48.50
Pacific	Local	---	55.00

Continued--

Table 49.--Sources, types, and delivered prices of major feed ingredients purchased by mills, by region, 1964-66--Continued

Item and region	Main sources (U.S. region or foreign country)	Grade or type	Average delivered price paid per ton
			Dollars
Milo:			
West North Central	Local	#2	38.60
South Central	Local	#2, 9.5% protein	41.90
Mountain	West North Central, Local	#2	42.37
Pacific	West North Central, Mountain, South Central	#2, 9.5% protein	50.06
Soybean meal:			
New England	East North Central	44-15% protein	88.87
Middle Atlantic	East North Central	44-15% protein	88.87
East North Central	Local	44-50% protein	84.11
West North Central	Local	44-50% protein	80.32
South Atlantic	East North Central, South Central	44-50% protein	87.48
South Central	East and West North Central	44-50% protein	79.96
Mountain	West North Central	44-50% protein	88.20
Pacific	East and West North Central	44-50% protein	91.98
Fish meal:			
New England	Canada, Local	60% protein	186.00
Middle Atlantic	Canada, Local	60% protein	186.00
East North Central	---	---	---
West North Central	---	---	---
South Atlantic	Local, Peru	60-65% protein	163.00
South Central	Local	65% protein	175.00
Mountain	Peru, Canada	50-75% protein, mostly over 65%	183.54
Pacific	Canada, Chile, Peru, Local	50-75% protein, mostly over 65%	183.54
Meat byproducts 1/			
New England	Local	47-48% protein	106.17
Middle Atlantic	Local	50% protein	105.00
East North Central	Local	50% protein	102.50
West North Central	Local, South Central	45-60% protein	92.09

Continued--

Table 49.--Sources, types, and delivered prices of major feed ingredients purchased by mills, by region, 1964-66--Continued

Item and region	Main sources (U.S. region or foreign country)	Grade or type	Average delivered price paid per ton
			Dollars
Meat byproducts 1/ --con't.			
South Atlantic	Local, South Central	50-60% protein	101.50
South Central	Local, Mountain	50% protein	101.17
Mountain	Local	50-60% protein	93.14
Pacific	Local	50-60% protein	103.33
Condemned fish solubles:			
South Atlantic	Local	---	60.00
Pacific	Local	32% protein	64.00
Alfalfa meal:			
New England	East North Central	17% protein	67.00
Middle Atlantic	East North Central	17-20% protein	69.50
East North Central	Local	17% protein	49.90
West North Central	Local	17% protein	48.00
South Atlantic	East and West North Central, Local, South Central	17-20% protein	58.18
South Central	Mountain, Local	17% protein	44.50
Mountain	Local	15-17% protein	45.37
Pacific	Local	17-20% protein	58.35
Molasses:			
New England	Middle Atlantic	---	28.49
East North Central	Local	---	28.70
West North Central	Local	---	31.00
South Atlantic	East North Central	---	25.12
Pacific	Local	---	32.00
Crab meal:			
South Atlantic	Local	---	60.00
Fat:			
South Atlantic	Local	---	180.00

Continued--

Table 49.--Sources, types, and delivered prices of major feed ingredients purchased by mills, by region, 1964-66--Continued

Item and region	Main sources (U.S. region or foreign country)	Grade or type	Average delivered price paid per ton
			Dollars
Tallow:			
Mountain	Local	---	150.00
Concentrates:			
New England	Middle Atlantic	40% protein	115.00
Middle Atlantic	Local	36-42% protein	118.24
East North Central	Local	30-42% protein	112.63
West North Central	Local	26-42% protein	100.51
South Atlantic	Local, West North Central, Middle Atlantic	36-42% protein	103.00
South Central	Local, West North Central	38-42% protein	113.55
Mountain	Local, West North Central	37-50% protein	141.25
Solubles (distillers):			
New England	South Central	---	86.00
Cottonseed meal:			
South Atlantic	South Central, Local	---	83.10
Pacific	Local	41-50% protein	77.47
Barley:			
South Atlantic	---	---	41.67
Mountain	Local	---	35.40
Pacific	Mountain, Local	#2, 9.0% protein	52.20
Wheat:			
South Atlantic	---	---	58.33
Pacific	Mountain	Feed, 15% protein	50.08
Screenings:			
South Atlantic	East North Central	---	29.50

Continued--

Table 49.--Sources, types, and delivered prices of major feed ingredients purchased by mills, by region, 1964-66--Continued

Item and region	Main sources (U.S. region or foreign country)	Grade or type	Average delivered price paid per ton
			Dollars
Wheat shorts:			
South Atlantic ...	East North Central	---	51.60
Malt sprouts:			
South Atlantic ...	East North Central	---	65.00
Bran:			
East North Central	Local	---	52.00
Mountain	---	---	46.00
Pacific	Local	Rice bran	48.00
Gluten meal:			
New England	East North Central	60% protein	151.60
	East North Central	23% protein	62.60
South Atlantic ...	East North Central	21% protein	55.60
South Central	West North Central	60% protein	---

1/ Mostly meat scraps, meat meal and tankage with a few purchases of bone meal, poultry byproduct meal, and feather meal.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

Table 50.--Sources and delivered prices of minerals, vitamins, and supplements purchased by mills, by region, 1964-66

Item	Region	Major source (region)	Unit	Average delivered price paid
				Dollars
Salt	New England	Middle Atlantic	ton	22.40
	West N. Central	Local	ton	44.40
	South Atlantic	South Central	ton	30.00
	Pacific	Local	ton	30.00
Phosphates	South	Local	ton	70.00
	Mountain	Local	ton	86.00
Lime 1/	New England	Local	ton	12.00
	South Atlantic	Local	ton	5.91
	South Central	Local	ton	7.00
	Mountain	Local	ton	14.00
	Pacific	Local	ton	14.25
Vitamin A	Various	Various	lb.	3.83
Vitamin B_{12} and Cal. Pan	Various	Various	lb.	.35
Vitamin D_3	Various	Various	lb.	.90
Vitamin K	Various	Various	lb.	.55
Riboflavin	Various	Various	lb.	.45
Vitamin D	Various	Various	lb.	2.10
Choline Chloride	Various	Various	lb.	.12
Other 2/	Various	Various	lb.	1.22
Fortifiers and premixes:				
Low	Various	Various	lb.	.17
High	Various	Various	lb.	.57

1/ Includes lime, limestone, $CaCO_3$, calcite flour, calcium, as designated by various respondents.

2/ Includes niacin, arsanilic acid, cal-com-d-path., vitamin E.

Source: Econ. Res. Serv., U.S. Dept. Agr., national survey.

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