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## B582: Competition among Areas in Supplying Broilers to the New York Market

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# Competition among areas in supplying broilers to the New York market

Bulletin 582

April 1959

Maine Agricultural Experiment Station

Poultry operations in  
New England vary in  
size from backyard  
flocks to units capable  
of housing 50,000  
birds.



## CONTENTS

	PAGE
Summary .....	5
Introduction .....	7
Method of study .....	7
Broiler production expanding .....	8
Outlook for broiler production favorable .....	9
Continued increase in per capita consumption of broilers expected .....	9
Expanding population .....	11
Broiler production in the United States may double by 1975 ..	11
Integration a factor in broiler expansion .....	13
Comparative efficiency of broiler production in three areas .....	14
Size of broiler flocks increasing .....	14
Mortality rates declining .....	15
More uniformity in weight of broilers .....	16
Time to grow broilers to a marketable age important .....	16
Better feed conversions .....	17
Summary of changes in broiler production .....	18
Comparative cost in producing broilers in the three areas .....	18
Prices of baby chicks have declined .....	19
Broiler feeds greatly improved .....	20
Increased efficiency in labor and management .....	24
Building and equipment charges lower per broiler .....	25
Cost of heating broiler houses varies with areas .....	26
Variations in other cost items .....	27
Summary of costs of producing broilers in the three areas .....	27
Comparative cost of collecting and processing broilers .....	28
Cost of collecting and transporting live broilers .....	28
Cost of processing broilers expected higher .....	29
Transportation of dressed broilers to New York City market .....	30
Summary of costs of eviscerated broilers on the New York market .....	30
Appendix .....	32

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## SUMMARY

Much interest has developed among segments of the broiler industry as to its probable future. Will it continue to expand? If so, at what rate and what areas are most favored for an expansion? These and other important questions resulted in the development of this study.

Many factors are responsible for the rapid expansion of the broiler industry in the United States from 356 million birds in 1948 to 1,452 million in 1957. Among these factors are larger units of production, greatly improved feeds, better disease control and increased consumer demand for broilers.

Leading states in broiler production are Georgia, Arkansas, North Carolina, Alabama and Texas. Each of these states produced 100 million or more broilers in 1957. The New England area, especially Maine, and the Delmarva Peninsula were important areas along the Atlantic seaboard with about 100 million broilers in New England and over 200 million in Delmarva.

With the per capita consumption at one-half the trend rate (rate from 1950 to 1958) and the median population prediction, the broiler requirement would be 3,922 million pounds for 1960, 6,063 million pounds for 1970 and 7,326 million pounds for 1975. This would represent 183 per cent increase in pounds of the broilers required for 1975.

Broiler production is highly integrated in the three areas: New England, Delmarva and Georgia. Forty-five per cent of the feed dealers, 36 per cent of the processing plants and 30 per cent of the hatcheries in the three areas have some type of contract with farmers for growing broilers.

The average size of broiler lots in New England for 1957 was 11,455 birds, Delmarva averaged 10,640 birds and the Georgia area 5,644 birds. The average mortality rates for the three areas were 2.4 per cent, 2.6 per cent and 5.7 per cent respectively.

The average live weight of broilers produced in the New England area in 1957 was 3.5 pounds as compared with 3.2 pounds in Delmarva and 3.1 pounds in the Georgia area. The age at which live broilers were sold in 1957 averaged 72 days for the New England area, 66 days for Delmarva and 63 days for the Georgia area.

Average feed conversions were estimated from information obtained from processors and feed dealers in each of the three areas for the equivalent of a 3.5 pound live broiler. In the New England area feed conversion for this weight broiler was 2.75 as compared with 2.77 for Delmarva and 2.74 for the Georgia area.

The major costs in producing broilers in the three areas are baby chicks, feed, labor, buildings, equipment and fuel. Average prices for broiler type chicks obtained from replies to questionnaires received in this study from processors, hatcheries and feed dealers were 12.9 cents per bird for the New England area, 12.0 for Delmarva and 12.4 for the Georgia area.

Using estimated cost of standardized feed ration and feed conversion rates for each of the three areas gives an estimated cost of feed to produce a 3.5 pound live broiler. In the New England area the feed cost for 1957 was 39.4 cents, Delmarva 38.7 cents and Georgia 37.9 cents. The estimated labor cost for a 3.5 pound broiler was 5.6 cents in the New England area, 5.0 cents in Delmarva and 4.5 cents in the Georgia area. The cost of buildings and equipment averaged 4.6 cents, 3.9 cents and 2.9 cents respectively for the three areas.

The estimated fuel cost was based on two-floor houses in the New England area and one-floor buildings in the other two areas. On this basis the cost per 3.5 pound broiler in New England was 2.5 cents, 2.4 cents in Delmarva and 1.3 cents for the Georgia area. Total cost of producing a 3.5 pound broiler in the New England area was 67.3 cents as compared with 64.3 cents in Delmarva and 61.3 cents in the Georgia area.

The estimated average cost of collecting and transporting live broilers from farms to dressing plants was .7 cent per pound in the New England area, .8 cent in Delmarva and .9 cent in the Georgia area.

On the basis of very limited information, the cost of eviscerating 100 per cent of the broilers received by a processor is expected to be about 5.2 cents per pound and 25 per cent of the cost of production for shrinkage between live weight and eviscerated weight (based on the equivalent of eviscerated 3.5 pound live broiler). It is impossible with present information to show the variations in costs by areas.

The average cost of transporting dressed broilers to New York City from central Maine was reported at .70 cent per pound, from Delmarva .45 cent and from Georgia 1.92 cents.

The combined estimated costs of producing, processing and transporting eviscerated broilers to the New York City market per pound (3.5 pound equivalent live weight) are 32.4 cents for the New England area, 31.2 cents for Delmarva and 31.6 cents for the Georgia area.

Wholesale prices reported on the New York City market for the same period were 34.2 cents per pound for Maine broilers and 31.9 cents per pound for broilers from other areas.

## BULLETIN 582

# COMPETITION AMONG AREAS IN SUPPLYING BROILERS TO THE NEW YORK MARKET

ELWOOD R. LITTLEFIELD AND CHARLES H. MERCHANT<sup>1</sup>

### INTRODUCTION

The broiler industry in the United States has shown phenomenal growth and development especially during the last ten years. According to government reports,<sup>2</sup> the number of broilers produced in this country has increased from 356 million in 1948 to 1,452 million in 1957. Thus, the number of broilers produced has increased four fold in a period of ten years. The increase in numbers has been more pronounced in certain areas where broiler production has become highly specialized. In other areas broiler production has shown little increase or has declined.

Coinciding with the increase in the number of broilers produced in the United States, equally important developments have taken place in the efficiency of production. Units of production have been greatly increased in the highly commercial areas. Heavier broilers are being produced in a shorter period of time than lighter broilers a decade ago. Much better feed conversions are obtained by use of better feeds, improved breeding and lower rates of mortality.

Revolutionary changes have occurred in the processing and marketing of broilers during this period of rapid expansion in production. Large modern processing plants have been built in areas of heavy concentration of production to improve efficiency and to provide for large volumes of uniformly high quality product. A rapid change has taken place from New York dressed to eviscerated broilers. At present some plants are packaging part of their output as cut-up birds and broiler parts. Likewise wholesale and retail distribution have shown drastic changes with the increase in large self-service retail stores with their wholesale counterparts. Refrigerated trailer trucks are making broilers from one commercial area highly competitive with another.

### METHOD OF STUDY

Information for the appraisal of the future competitive position of the broiler industry in the more important producing areas in supplying

<sup>1</sup> Temporary Assistant in Agricultural Economics, and Head, Department of Agricultural Economics, respectively.

<sup>2</sup> Agricultural Statistics, 1949 to 1956, U.S.D.A.

Chickens and Eggs, Commercial Broilers by States, 1956-57, Crop Reporting Board, A.M.S., U.S.D.A., April 1958.

the New York market was assembled from three sources: (1) material published by the United States Department of Agriculture, state experiment stations and magazine articles, (2) information obtained through personal interviews with well-informed individuals who were operating businesses associated with the broiler industry and (3) from questionnaires returned by feed manufacturers, hatcherymen and processors.

### BROILER PRODUCTION EXPANDING

The record of 1,452 million broilers produced in the United States in 1957 represented an increase of 8 per cent over 1956, 52 per cent over 1953 and 308 per cent over 1948 (table 1 appendix). In 1957, Georgia ranked first among the states with a production of 261 million broilers followed by Arkansas with 110 million, North Carolina with over 106 million, and Alabama with 104 million.<sup>3</sup> These four states produced 30.2 per cent of the United States broiler crop.

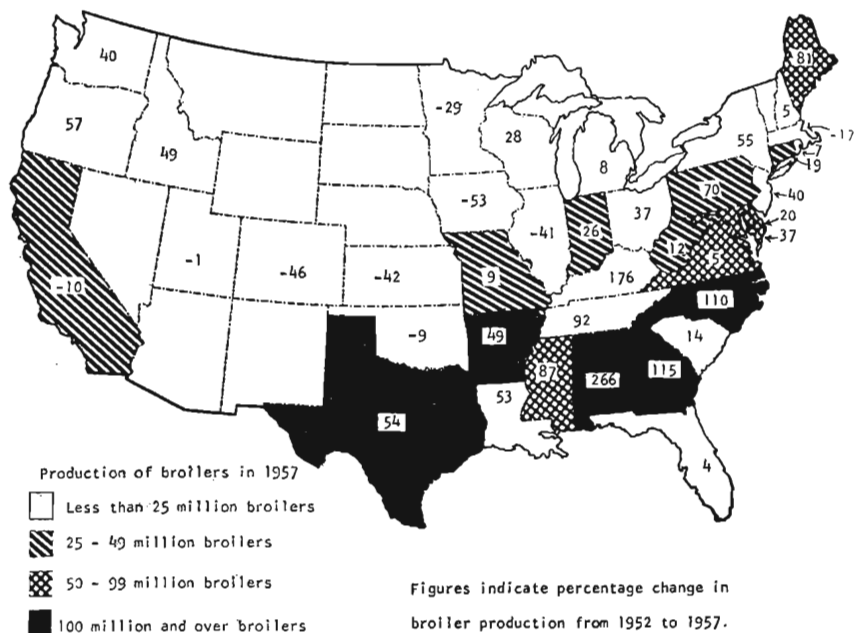


FIG. 1. Broiler production in the United States in 1957. The heaviest concentration of broiler production (indicated by shading) is in the south and southwest with Maine and Delmarva ranking second. Percentage changes in broiler production by states during the five year period, 1952-1957, are indicated in figures in the states. No percentage change is given for states with less than one million broilers in 1957. Alabama had an increase of 266 per cent while Illinois production declined 41 per cent.

<sup>3</sup> Chickens and Eggs, Commercial Broilers by States, 1956-57, Crop Reporting Board, A.M.S., U.S.D.A., April 1958, p. 17.



The three areas considered in this study—New England, Delmarva and Georgia<sup>4</sup>—produced 594 million broilers or 40.9 per cent of the United States production in 1957. Of this number of broilers, Georgia supplied 44.0 per cent or nearly half, Delmarva 38.6 per cent and New England the remaining 17.4 per cent.

The states with the largest increase in production during the past five years are Alabama with 364 per cent, Georgia with 113 per cent, North Carolina with 106 per cent, Mississippi with 86 per cent and Maine with 79 per cent (fig. 1).

The states showing the largest decrease in production for the past five years are Nebraska with 59 per cent, Iowa with 53 per cent, Colorado with 46 per cent, Kansas with 42 per cent and Illinois with 41 per cent.

### **OUTLOOK FOR BROILER PRODUCTION FAVORABLE**

The broiler industry, like any other industry, must not only consider the present but prepare for the future. There are two major factors that give some indication of the probable future of the industry. They are the expected number of persons in the country and the per capita consumption of broilers in the future. All estimates indicate an increase in population. Also, per capita consumption of broilers is expected to continue upward. These two factors, population and per capita consumption, favor further expansion of the broiler industry.

Certain economic factors will influence the location of the expected expansion in broiler production. The present commercial broiler areas have an advantage not only because they are established and have market outlets but because of the factors that favored their location in their present development. In the final analysis much of the expansion may be expected in the areas with the lowest cost of production, processing and marketing and the least opportunity for alternative enterprises.

#### **Continued Increase in Per Capita Consumption of Broilers Expected**

Consumption of all poultry has been irregularly upward for the past 17 years. In 1940 per capita consumption of poultry meat was 14.1 pounds per person for the entire country as compared with 28.5 pounds in 1958 (table 1). During this same period broiler consumption per

<sup>4</sup> New England area gives emphasis to the northern New England states, especially Maine, Delmarva to eastern shores of the states of Delaware, Maryland and Virginia, sometimes referred to as the Delmarva Peninsula, and Georgia includes the states of North Carolina, South Carolina and Georgia with emphasis to Georgia.

capita has shown a phenomenal increase from 2.0 pounds in 1940 to 21.7 pounds in 1958. This is an increase of over ten fold during the 17 year period. Also, it should be noted that the increase has been most rapid since 1948.

In estimating future broiler requirements, the authors have set up three projections of per capita consumption of broilers. One projection uses the 1958 rate of consumption of 21.66 pounds per capita. Another is based on one-half the 1950-58 trend rate of 1.539 pounds increase per year. The third projection uses the full trend rate (table 1).

The projection at one-half the present trend rate would give 22.06 pounds per capita in 1960, 29.75 pounds in 1970 and 33.60 pounds in 1975. Using the full trend rates the per capita consumption would be 23.59 pounds in 1960, 38.98 pounds in 1970 and 46.68 pounds in 1975. It is obvious that the upward trend in per capita consumption of broilers cannot continue indefinitely, and at some point it is expected to level off

TABLE 1  
Per Capita Consumption of Broilers in the United States  
1940 to 1958 and Projected Consumption on Three Levels  
from 1960-1975 (Five Year Periods)<sup>1</sup>

Year	Estimated Per Capita Consumption		
	All poultry (pounds)	Broilers (per cent)	Estimated (pounds)
1940	14.1	14	1.97
1941	15.4	18	2.77
1942	17.7	18	3.19
1943	23.0	18	4.14
1944	20.4	19	3.88
1945	21.6	23	4.97
1946	19.4	21	4.07
1947	18.1	24	4.34
1948	18.3	30	5.49
1949	19.6	36	7.06
1950	20.6	42	8.65
1951	21.7	48	10.42
1952	22.1	53	11.71
1953	21.9	56	12.26
1954	22.8	60	13.68
1955	21.4	65	13.91
1956	24.6	71	17.47
1957	25.6	76	19.46
1958	28.5 <sup>2</sup>	76	21.66

Projected Trend of Per Capita Consumption of Broilers

Year	At present rate	One-half present trend	Full present trend
1960	21.66	22.06	23.59
1965	21.66	25.91	31.29
1970	21.66	29.75	38.98
1975	21.66	33.60	46.68

<sup>1</sup> The Poultry and Egg Situation, 1959 Outlook Issue, PES-198, November 1958.

<sup>2</sup> Preliminary.

and become fairly constant. Perhaps this point may be reached before 1975.

Certain areas of the country are known to consume more broiler meat than other areas. This situation may be expected to continue favoring areas with heavy concentration of population partly because of the shrinking industrial work week.

### Expanding Population

The Bureau of the Census of the United States Department of Commerce enumerates the population each decennial year and makes estimates for the intervening years. Also the Bureau has projected population estimates from 1960 to 1975 by 5-year periods at three levels; low, median and high.<sup>5</sup> The median projection indicates a population for the country of 177.8 million for 1960, 190.3 million for 1965, 203.8 million for 1970 and 218.0 million for 1975. The low projection is about 5 per cent lower and the high projection about 5 per cent higher than the median for 1975 (table 2).

TABLE 2  
Estimated Population in the United States on Three  
Levels for 1960 to 1975 by Five Year Periods

Year	Projected Population		
	Low	Median	High
	(Thousands)		
1960	176,500	177,800	179,400
1965	186,300	190,300	193,300
1970	196,400	203,800	209,400
1975	206,900	218,050	228,500

### Broiler Production in the United States May Double by 1975

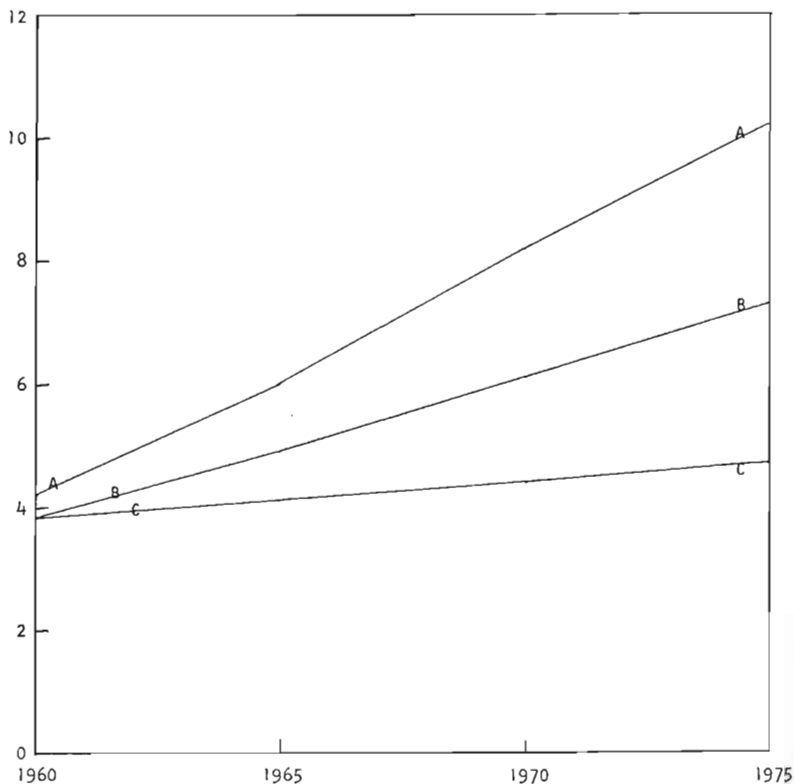
Using the estimated per capita consumption trends for broilers in the country and the estimated population increases gives a basis for predicting future broiler requirements. Three estimates of broiler requirements have been made using three levels of consumption per capita with three levels of population increases.

With the present rate of broiler consumption per capita and the median prediction for population, broiler requirements would be 3,851 million pounds for 1960, 4,414 million pounds for 1970 and 4,723 million pounds for 1975. This would represent an increase of 25 per cent in broiler requirements by 1975 without any increase in per capita con-

<sup>5</sup> Current Population Reports, Population Estimates, Series P-25, No. 123, October 20, 1955.

sumption. However, with the per capita consumption at one-half the trend rate (rate from 1950 to 1958) and the median population prediction, the broiler requirement would be 3,922 million pounds for 1960, 6,063 million pounds for 1970 and 7,326 million pounds for 1975. Similarly for the full trend rate in per capita consumption and high population estimates the broiler requirements would be 4,232, 8,162 and 10,179 million pounds, respectively for 1960, 1970 and 1975 (fig. 2).

Billion Pounds



AA = Present Trend of Consumption Times High Estimate of Population.

BB = One-half Present Trend of Consumption Times Median Estimate of Population.

CC = Present Consumption Rate Times Median Estimated Population.

FIG. 2. Future requirements for broilers in the United States. This will depend on two factors, per capita consumption and the population. At the median level of projected population and the three levels of consumption, broiler requirements in 1975 would be 4,723 million pounds at present rate of 21.66 pounds per person, 7,326 million pounds at one-half of the present upward trend and 10,179 million pounds at the full rate of increase.

The broiler requirements for the last assumption would appear too high and the second estimate at this time appears more realistic. This would give 183 per cent increase in pounds of broilers required for 1975.

### INTEGRATION A FACTOR IN BROILER EXPANSION

The present status of the broiler industry may be credited in part to the degree to which it has been integrated. The future of the broiler industry may well depend on the success of this integration and further developments that take place.

In recent years various forms of integration have developed in several types of farming. Probably the most outstanding is that in commercial broiler production. It has been developed rapidly by processors to assure them a dependable supply of birds to process and to market, by feed suppliers to obtain an outlet for their feeds and by hatcheries to provide markets for their baby chicks. In some cases the integration has included all phases of the industry: production, processing and marketing of broilers. Many producers of broilers have accepted integration as it enables them to grow larger flocks with increased labor and capital efficiency.<sup>6</sup>

Information obtained from replies to mail questionnaires sent to feed dealers, processors and hatcheries along the Atlantic seaboard indicate that 45 per cent of the feed mills, 36 per cent of the processing plants and 30 per cent of the hatcheries have some form of contractual agreement with farmers for growing broilers (table 3).

All processing plants in the New England area had some type of financial agreement with growers, while 14 per cent had similar arrange-

TABLE 3

Feed Dealers, Processors and Hatcheries Along the Atlantic Seaboard  
Having Contractual Agreement with Producers of Broilers, 1957

Contractor	Number replying to questionnaires				Per cent contracting with growers			
	New England	Delmarva	Georgia	Three areas	New England	Delmarva	Georgia	Three areas
Feed Dealers	13	32	30	75	23	56	43	45
Processors	10	7	12	29	100	14	17	36
Hatcheries	22	57	56	135	22	23	42	30
Total or Avg.	45	96	98	239	40	32	37	36

<sup>6</sup> Saunders, Richard F., Contract Broiler Growing in Maine, Me. Agr. Exp. Sta. Bul. 571, May 1958.

Withers, Charles C., Some Business Guides to Success in the Broiler Industry, An address given before the Directors of The National Broiler Council, Poland Springs, Maine, July 28, 1958.

ments in the Delmarva region and 17 per cent in the Georgia area. In Delmarva 56 per cent of the feed mills had contracts with growers while only 23 per cent of the hatcheries reported contracting. Georgia had 42 per cent of the hatcheries and 43 per cent of the feed suppliers contracting with growers.

Many variations were observed in the contractual arrangements in the three areas. These variations in agreements consisted of input factors (such as feed, chicks, litter, fuel, service and others) in producing either on a straight cash basis per week per bird or on a lower cash payment and a share in the profits. Some contracts carry an incentive clause based on efficiency, usually feed conversion.

### **COMPARATIVE EFFICIENCY OF BROILER PRODUCTION IN THREE AREAS**

Broiler production has become highly competitive within and between commercial producing areas. Certain economic factors have been responsible for the present situation and these factors may be expected to continue, in some cases with increased intensity. The breeding of a faster growing broiler with a higher proportion of meat on breasts and legs; improved broiler rations giving better feed conversion ratios without proportional increases in prices; and better management practices with increased efficiency in labor and capital investments are all possibilities in the future.

Where will expansion in broiler production take place? The question faces the entire industry as to where feed mills should be enlarged or new ones established, where hatchery capacities should be increased and dressing plant outputs enlarged. The final answers to these questions will rest with time, but the industry must make decisions now based on the best information available. The projection of recent trends should be helpful in the planning of the future production of the broiler industry.

#### **Size of Broiler Flocks Increasing**

Studies during the past ten years indicate the phenomenal increase in the number of broilers produced per grower. Lots of 5,000 birds a few years ago were considered large but with present day standards 20,000 to 50,000 broilers are fairly common in commercial areas. With automatic feeders and waterers in a conveniently arranged house a grower with some family help can handle 50,000 birds or more per lot. Capital investment may be more of a limiting factor in the size of operation than push button mechanization. A conservative estimate of the size of the broiler lots of the future would be from 20,000 to 100,000 birds per lot with five lots per year.

Replies from questionnaires sent to processing plants, feed dealers and hatcheries in 1957 provide information on the size of broiler lots in New England, Delmarva and Georgia areas. The average size of 869 broiler lots in New England was 11,455 birds, in Delmarva for 1,949 lots the average number of birds was 10,640 and for the Georgia area based on 2,759 lots the average size was 5,644 birds (table 4).

TABLE 4  
Average Number of Broilers Per Lot in the New England,  
Delmarva and Georgia Areas, 1957

State	Number of farmers	Number of birds	Average no. birds per lot
New England	869	9,954,167	11,455
Delmarva	1,949	20,738,147	10,640
Georgia	2,759	15,572,155	5,644
Total or Average	5,577	46,264,469	8,296

There were wide variations in the size of flocks in each of the three areas. These variations are the result of a number of economic and physical factors pertaining to the individual grower.

### Mortality Rates Declining

Mortality rates have been and will continue to be an important factor in commercial production of broilers. The rates of mortality have shown a rapid decline because of improved medication, improved feeds and better management practices. Information from previous studies shows that mortality rates in Maine<sup>7</sup> in 1944 were 11.5 per cent, in Delmarva<sup>8</sup> 8.3 per cent in 1947 and in Georgia<sup>9</sup> 5.6 per cent in 1953.

Mortality rates for the three areas in 1957 as shown by this study were 2.4 per cent for New England, 2.6 per cent for Delmarva and 5.7 per cent for Georgia. With the exception of Georgia, the mortality rates have declined substantially from previous studies.

There will be some casualties in growing broilers under the most favorable conditions and it does not appear at this time that the percentage can be reduced much below two per cent. Areas which have a

<sup>7</sup> Perry, Alvah L. and Dow, George F., Costs and Returns in Broiler Production, Me. Agr. Exp. Sta. Bul. 441, Dec. 1945, p. 74.

<sup>8</sup> Delmarva and Its Poultry Industry, Georgetown, Delaware; Delmarva Poultry Industry, Inc., Oct. 1957, p. 2.

<sup>9</sup> Harper, W. W. and Hester, O. C., Influence of Production Practices on Marketing of Georgia Broilers, Georgia, Georgia Exp. Sta. (a co-operative study) Bul. N.S. 18, March 1956, p. 33.

low mortality rate have a distinct advantage over those areas with relatively high mortality.

### **More Uniformity in Weight of Broilers**

The average weight of broilers produced in the United States for the past 10 years has remained fairly constant ranging from 3.0 to 3.2 pounds per bird (table 2 appendix). Throughout the 10-year period there has been much variation in the weights of broilers produced in different states. In the early part of the period New England produced a heavy broiler as compared with states in the south and west. However, today there is more uniformity in the weight of broilers produced in the different areas. Maine and the other New England states are producing slightly lighter broilers than formerly, and Georgia, Alabama and other southern states are producing a slightly heavier broiler than they did ten years ago. The changes have occurred because of market demands, improved feed conversion ratios and shorter time to produce marketable broilers. Information obtained from the questionnaires used in this study for 1957 gave the average weight of New England broilers as 3.5 pounds, those in Delmarva 3.2 pounds and in Georgia 3.1 pounds.

From the information available it would appear that broilers of tomorrow will be in the range of about 3.5 to 4.0 pounds live weight. This weight is slightly heavier than the average now produced for the New York market. A much heavier bird would probably mean price resistance at the retail level, feed conversion would be lower and the disease factor more of a problem.

### **Time to Grow Broilers to a Marketable Age Important**

Today broilers are being produced in less time and on less feed than ever before. In 1944, 102 days were needed to raise a broiler in Maine<sup>10</sup> as compared with 72 days in 1957. This represents a decrease of 30 days in 13 years or an average decrease of about two days per year. Similar trends have taken place in Delmarva and Georgia. Delmarva<sup>11</sup> in 1947 marketed its birds when they were 91 days old and in 1957 they were marketed in 66 days. This gives an average decrease of a little more than two days per year. In 1951 broilers were marketed in Georgia<sup>12</sup> at the age of 77 days as compared with 63 days in 1957. In

<sup>10</sup> Perry, Alvah L., and Dow, George F., Costs and Returns in Broiler Production, Me. Agr. Exp. Sta. Bul. 441, Dec. 1945, p. 96.

<sup>11</sup> *Ibid.*, footnote 8.

<sup>12</sup> Harper, W. W., Marketing Georgia Broilers, Georgia Exp. Sta. Bul. 281, July 1953, p. 30.



this 6-year period there was an average yearly decrease of a little more than two days.

The question arises, how much more progress can be made and how rapidly? Test lots of birds in Maine<sup>13</sup> have been grown to slightly better than 3 pounds in 50 days. This would seem to indicate that commercial broilers weighing 3.5 pounds live weight may be produced in the near future in 7 to 8 weeks.

### Better Feed Conversions

Feed conversion is the number of pounds of feed required to produce one pound of broiler live weight. Feed conversions have greatly improved during recent years with improved feed, better broiler crosses, lower mortality and better management practices. It is well known that feed conversion rates increase as broilers increase in weight. It has been possible to estimate feed conversion rates for the equivalent of a 3.5 pound live broiler in each of the three areas from information obtained in this study, various published reports and growth curves of birds on tests in several areas. As Delmarva and Georgia grow most of their broilers to an average weight of slightly over 3 pounds, the feed conversion values for these areas are based more on the approximation of the probable feed conversion than for the New England area where the average weight of live broilers is about 3.5 pounds.

In the New England area feed conversion for a 3.5 pound broiler was 2.75 as compared with the estimate of 2.77 for Delmarva and 2.74 for Georgia.

It was possible from the information obtained to show seasonal

TABLE 5

Seasonal Variation of Feed Conversion of Broiler Lots in New England, Delmarva and Georgia, October 1956 to September 1957

Month and year	Seasonal variation		
	New England	Delmarva	Georgia
1956 October	100	98	100
November	103	100	102
December	105	102	100
1957 January	102	102	104
February	104	103	105
March	102	104	100
April	100	103	102
May	98	100	100
June	98	99	98
July	97	96	97
August	95	96	96
September	96	96	96

<sup>13</sup> Maine Production and Broiler Tests, Division of Animal Industry, Maine Dept. of Agr., State House, Augusta, Me. 1946-47 to 1948.

variation in feed conversion for each of the three areas (table 5). There is a definite seasonal variation in feed conversion. As expected, feed conversion was slightly improved during the warm months of the year in contrast to the winter months. The energy from the feed was utilized less in meat production and more in maintaining body temperature during the colder part of the year. However, the differences shown in this study are rather small and need further study.

The goal of the broiler industry is to reach the so-called "2.0 pound barrier." This would mean raising a 3.5 pound broiler on seven pounds of feed. This has been accomplished on experimental trials, and all indications are that this mark will be reached and perhaps exceeded at the commercial level in the very near future.

### **Summary of Changes in Broiler Production**

In summary, it may be stated that the size of broiler flocks has greatly increased in the last five years, mortality rates have declined, weight of birds has become somewhat more stabilized throughout the country, feed conversion ratios are much better and the time required for growing broilers to marketable weights has been declining at the rate of about two days per year.

The important question the industry is asking is, "What is the future?" It is reasonable to expect the following: doubling and tripling the size of flocks for maximum labor efficiency and capital investment, mortality rates of about 2 per cent, weight of broilers averaging about 3.5 to 4.0 pounds, feed conversions for this weight bird around 2.2 and the length of time to produce such a broiler about 50 to 55 days. While some may call this crystal gazing, it certainly is in the realm of possibility, and it is merely an extension of our present trends.

### **COMPARATIVE COST IN PRODUCING BROILERS IN THE THREE AREAS**

The present locations of commercial broiler production areas are the result of the interrelationship of economic and physical factors. Among these factors are facilities for financing production and the construction of dressing plants and hatcheries; the availability and costs of feeds, market outlets and transportation charges for dressed broilers; and the relative returns of the industry as compared with alternative opportunities. The future of the broiler industry in a given area will depend on these same factors.

A brief discussion will be presented on the major costs in producing broilers in the three areas, New England, Delmarva and Georgia.

### Prices of Baby Chicks Have Declined

The price of baby chicks represents an important cost in producing broilers. Prices of baby chicks as reported by the United States Department of Agriculture show an irregular downward trend from 1950 to 1957 in each of the three production areas. This downward movement has been more rapid in New England than in the Georgia and Delmarva areas. The variations in the downward trend of baby chick prices in the three areas make for a more competitive situation as there was less than one cent difference in price per chick in 1957. The price of baby chicks in New England was 12.0 cents each as compared with 11.6 cents in Delmarva and 11.1 cents in Georgia (table 6).

TABLE 6

Average Prices Reported for Baby Chicks for New England, Delmarva and Georgia Areas from 1950 to 1957<sup>1</sup>

Year	New England	Delmarva	Georgia
		(Cents)	
1950	17.1	13.0	13.9
1951	17.7	14.6	16.3
1952	17.8	14.2	15.7
1953	17.7	14.8	16.4
1954	17.5	13.2	14.4
1955	15.0	14.0	15.1
1956	14.9	13.9	13.7
1957	12.0	11.6	11.1
1957 <sup>2</sup>	12.9	12.0	12.4

<sup>1</sup> Monthly figures obtained from issues of Agricultural Prices published by the United States Department of Agriculture. Simple averages were computed to give yearly averages.

<sup>2</sup> Data computed from questionnaires received from processors, hatcheries, and feed suppliers in the three areas.

Information on prices for broiler type baby chicks obtained from questionnaires shows a slightly higher average price in 1957 than for all types of baby chicks as reported by the United States Department of Agriculture. The New England area had an average price of 12.9 cents as compared with 12.0 cents in Delmarva and 12.4 cents in Georgia.

The decline in the price of baby chicks (fig. 3) may be the result of increased capacity of hatcheries, bringing about a greater efficiency in both labor and capital investment. With the present price level, it is rather doubtful if further economies may be made in the near future. Building costs, wages and managerial costs may be expected to increase slightly in the future which may be partly or entirely offset by increases in efficiency of plant operations because of larger volume of business. Also, the cost of hatching eggs as well as the hatchability are factors in the price of baby chicks.

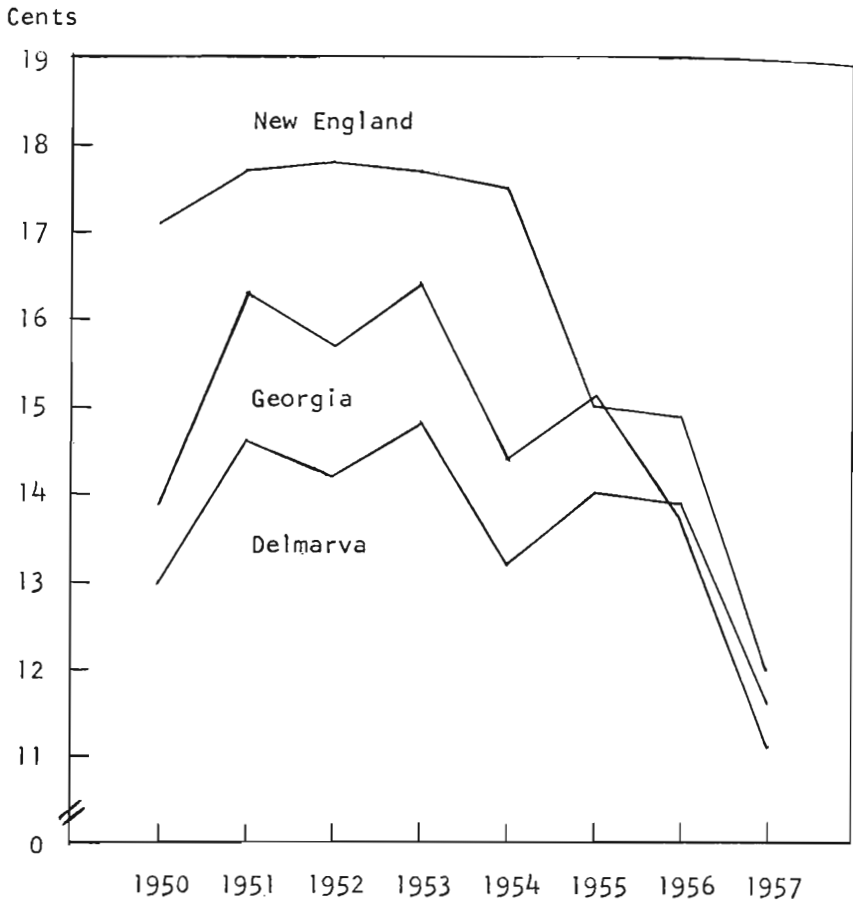


Fig. 3 - Average Prices Reported for Baby Chicks for New England, Delmarva and Georgia from 1950 to 1957.

### Broiler Feeds Greatly Improved

Broiler feeds have undergone many technological changes and developments within recent years. In the last few years high-energy feeds have been developed and recently high-fat feeds were introduced. These changes in the composition of broiler feeds have enabled growers to produce a pound of broiler meat on fewer pounds of feed.

Feed represents the most important cost item in producing broilers amounting to over 50 per cent of the total cost. To compare feed costs in the three areas the New England College Conference Board broiler

formula was used.<sup>14</sup> This ration consists of approximately 78 per cent by weight of corn and soybean meals. As these two feeds represent the

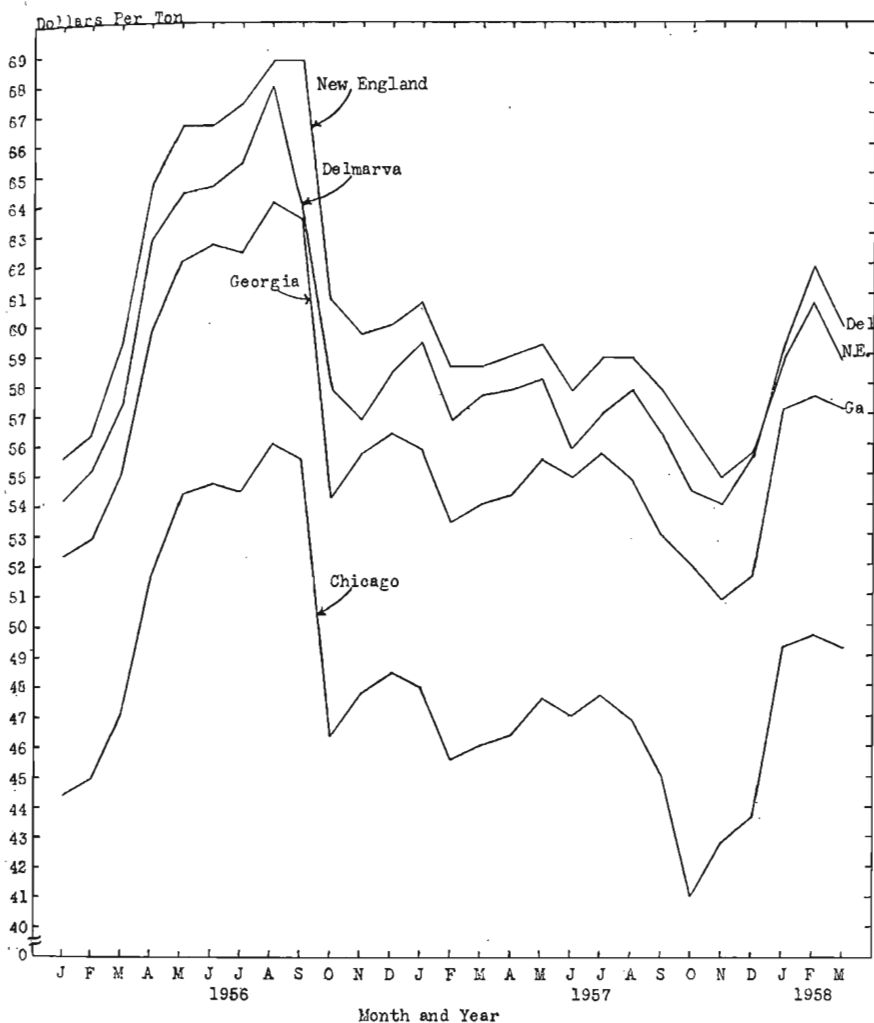


FIG. 4. Cost of #2 yellow corn to feed manufacturers in the New England, Delmarva and Georgia areas as related to prices in Chicago for the years 1956 and 1957.

<sup>14</sup> Poultry and Turkey Rations, 1958. The latest formulas as recommended by the New England College Conference Board, Poultry Department, University of Maine, Orono, Maine (October, 1957). A broiler ration consists of ground yellow corn, soybean oil meal, corn gluten meal, fish meal, stabilized animal fat, dried corn distillers solubles, alfalfa meal, dicalcium phosphate, ground limestone, iodized salt, manganese sulfate, antibiotic supplement, dl-methionine, butylated hydroxytoluene, organic arsenical supplement, coccidiostat and vitamin supplements.

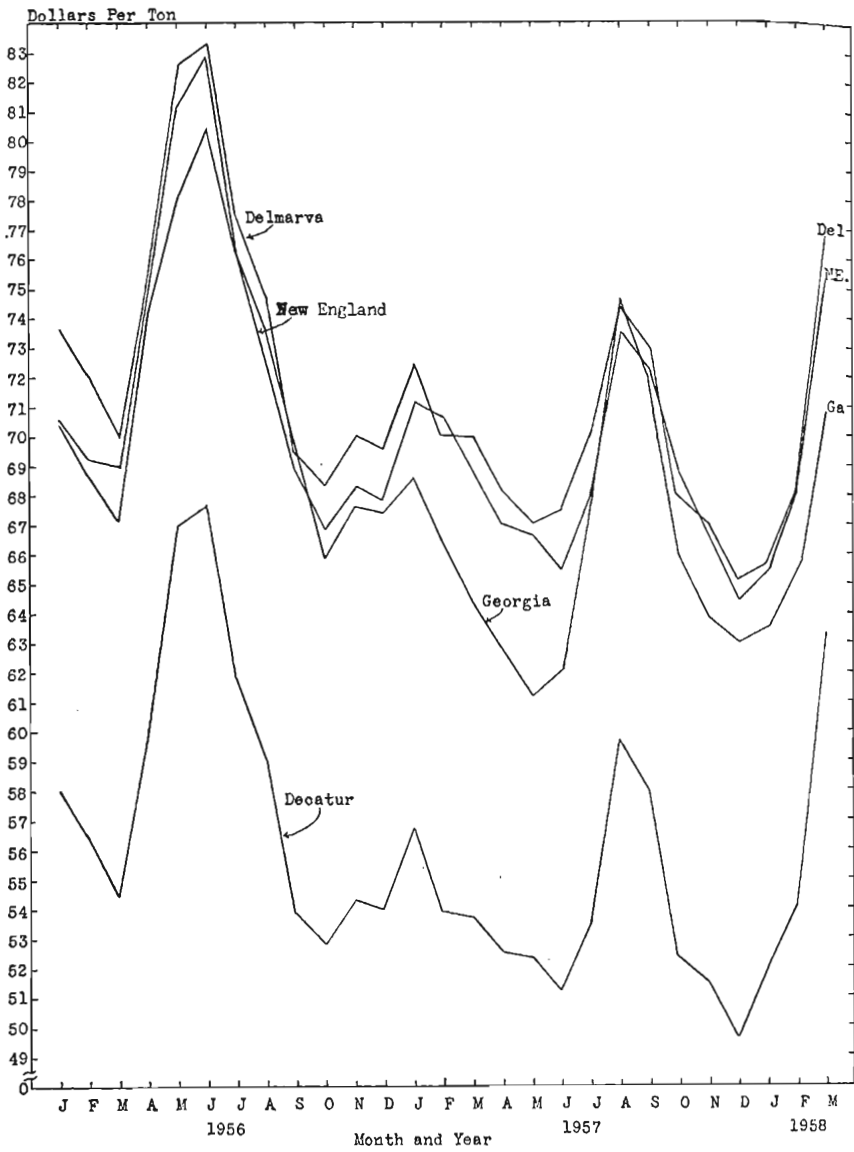


FIG. 5. Cost of 50% soybean meal to feed manufacturers in the New England, Delmarva and Georgia areas as related to prices in Decatur, Illinois, for the years 1956 and 1957.

major part of the broiler ration, detailed information has been obtained on the cost of these two ingredients to feed manufacturers in the New England, Delmarva and Georgia areas.

Price of No. 2 yellow corn to feed manufacturers in the three areas followed closely the fluctuations of corn prices at Chicago from January 1956 to March 1958. The differentials in price for the most part represent the variations in transportation and marketing charges. Corn prices in the New England area were consistently higher than in the Delmarva area and prices in the Georgia area were the lowest of the three (fig. 4 and appendix table 3).

Prices of soybean meal showed much the same relation for the three areas as corn prices. However, the spread in soybean meal prices between the three areas for most of the period considered was much less than corn prices (fig. 5 and appendix table 4).

The cost of corn and soybean meals in the New England College Conference standard ration represents about 58 per cent of the total cost of the ration in each of the three areas. The remaining 42 per cent of the cost of the ration is made up of 24 per cent for other ingredients and over 17 per cent of miscellaneous items such as processing, mixing and bagging (table 7). The average cost per ton (in 100 pound sacks) of this broiler ration for 14 months, October 1956 to November 1957 in the New England area was estimated at \$81.81, in Delmarva area

TABLE 7

Relative Importance of Major Ingredients of the New England College Conference Board Broiler Formula Based on One Ton Feed, October 1956-November 1957

Item	Weight of ingredient (Per Cent)	Price of ingredients			
		New England	Delmarva	Georgia	Average for three areas
Corn	54.6	39.2	39.0	37.6	38.6
Soybean	23.4	19.6	20.4	19.6	19.9
Other ingredients	22.0	24.1	23.1	25.1	24.1
Miscellaneous	—	17.1	17.5	17.7	17.4
Total	100.0	100.0	100.0	100.0	100.0

\$79.87 and in the Georgia area \$79.01. These prices are somewhat lower than those reported by the Agricultural Marketing Service, Crop Reporting Board of the United States Department of Agriculture. The government prices are based on reports by farmers and included various services such as credit, purchases in small lots and delivery. However, there is a very close relationship between the two series of prices for each of the three areas.

Using feed conversion rates<sup>15</sup> and the estimated feed cost of the standard ration (appendix table 5), the feed cost of growing a 3.5 pound bird in the New England area was 39.4 cents, in Delmarva 38.7 cents and in Georgia 37.9 cents. These figures indicate little difference in the present feed costs for producing broilers in the three areas.

The future costs of corn and soybeans, the two most important ingredients in the broiler ration, will depend upon the production of these crops, demand for the products and marketing charges from production areas. Considerable interest has developed and many forecasts made as to the impacts of the St. Lawrence Seaway on the cost of transporting corn and other grains from Chicago to points along the Atlantic seaboard. From the many reports the cost of transportation of grain from the cornbelt may be somewhat lower in the next few years assuming the general price level remains reasonably stable.

### **Increased Efficiency in Labor and Management**

Labor and management represent another major cost in growing broilers. It is also one of the more difficult items to appraise because of the many variations in broiler contracts and the allocation of operators' time if broiler growing is on a part time basis.

In comparing labor cost in different areas there is a question of wage rates and the productivity of the labor. Managerial cost has always been difficult to estimate even by the growers themselves. Thus, it is understandable that there is very little information available on which to base labor and management cost.

The Agricultural Marketing Service of the United States Department of Agriculture makes available farm wage rates for each state. Using the rates for New England, Delmarva and Georgia will give comparative costs of farm labor in the three areas (appendix table 6).

The composite farm wage rates per hour in 1957 were 95 cents for the New England area, 78 cents for Delmarva and 50 cents for the Georgia area. Assuming farm labor works about a 56 hour week on the broiler enterprise, this would give weekly rates of \$58.80 for New England, \$48.16 for Delmarva and \$30.80 for the Georgia area. These rates probably are sufficient to include compensation for managerial ability. With slightly over four lots of broilers raised a year, it would mean a labor charge of 11-12 weeks per lot (about 9 to 10 weeks for growing the birds and about 2 weeks between lots). Further assuming one full-time man needed to handle 10,000 to 15,000 broilers and a man

<sup>15</sup> For discussion of feed conversion rates, see previous section.

<sup>16</sup> Saunders, Richard F., Contract Broiler Growing in Maine, Me. Agr. Exp. Sta. Bul. 571, May 1958.



three-fourths time for 5,000 to 6,000 birds, the estimated average labor cost of growing a 3 to 4 pound live broiler would be 5.6 cents in the New England area, 5.0 cents in Delmarva and 4.5 cents in the Georgia area (table 8). The 5.6 cents per 3.5 pound broiler for New England compares with 5.7 cents found in a Maine study by Saunders in 1954-55.<sup>16</sup>

The future outlook in respect to labor and managerial costs depends on supply of farm help and operators and the general price level. It may be possible to assume that increased efficiency in use of labor may more than offset any expected advance in wage rates.

TABLE 8

Estimated Labor Costs of Producing Broilers in New England,  
Delmarva and Georgia Areas in 1957

Item	New England	Delmarva	Georgia
Composite Labor Rates Per Hour <sup>1</sup>	\$ .95	\$ .78	\$ .50
Amount for 56 Hour Week	\$ 58.80	\$ 48.16	\$ 30.80
Amount for 11 Weeks	\$ 646.80	\$ 529.76	\$ 338.80
Av. No. of Birds Per Farm	11,455	10,640	5,644
Man Equivalent	1	1	$\frac{3}{4}$
Estimated Cost Per Bird	\$ .056	\$ .050	\$ .045

<sup>1</sup> Taken from appendix table 6.

### Building and Equipment Charges Lower Per Broiler

Capital investments in buildings and equipment are increasing per farm because of better building construction, more automatic feeding facilities, larger units of operation and a somewhat higher price level. However, with an increasing number of broilers per farm, housing efficiency has increased and represents a contributing factor in lowering the cost of producing broilers. The cost of housing and equipment for broilers differs among production areas largely because of variations in construction to meet differences in climatic conditions and size of operations. The estimated costs of buildings and equipment are based on limited published material and on personal visits to the areas. In New England the building and equipment cost is estimated at 4.6 cents for the equivalent of a 3.5 pound broiler,<sup>17</sup> 3.9 cents for the Delmarva area<sup>18</sup> and 2.9 cents for the Georgia area.<sup>19</sup> On a pound basis the estimated costs are 1.3 cents for New England, 1.1 cents for Delmarva and .8 cent for Georgia.

<sup>17</sup> Saunders, Richard F., Contract Broiler Growing in Maine, Me. Agr. Exp. Sta. Bul. 571, May 1958. pp. 20-21.

<sup>18</sup> Estimated from unpublished data of William G. Langston, Univ. of Maryland.

<sup>19</sup> Computed from Harper, W. W. and Hester, O. C., Influence of Production Practices on Marketing of Georgia Broilers, Georgia Agr. Exp. Sta. Bul. 18, March 1956.

These costs for the next few years are expected to show some increase per farm in each of the three areas. However, the expected increase in the size of flocks may offset the increase in the cost of housing and equipment per broiler.

### **Cost of Heating Broiler Houses Varies with Areas**

The cost of fuel is associated with construction of buildings and the outside temperature conditions in the area. More fuel is used and will continue to be used in the New England area than in Delmarva or Georgia. Also, the cost of fuel may be expected to be higher in the New England area than in either of the other two areas.

The average daily temperature for the 30-year period 1921 to 1950 was 44.5° F. for Portland, Maine, 57.1° F. for Baltimore, Maryland, and 62.0° F. for Atlanta, Georgia (appendix table 7). For a basis of comparison it is assumed the broiler houses are maintained at a minimum of 65° F. This would mean the New England area would need heat 10 months of the year, Delmarva and the Georgia areas 7 months. On the average, the New England area would require 20.9 degrees of heat, Delmarva 11.2 degrees and Georgia 6.5 degrees.

The fuel cost was computed for a broiler house of 10,000 square feet of floor space of wood construction for each of the three areas. In New England broiler houses are usually two or three floors while in Delmarva and Georgia, one-floor houses predominate. There is less heat loss per square foot of floor space in a multiple floor house than in a one-floor house. In computing heat requirements allowance was made to change the air every two hours. The heat required for two-floor houses of 10,000 square feet of floor space in New England is estimated at 146 thousand BTU per hour, for a one-floor house with the same amount of floor space in Delmarva 157 thousand BTU per hour, and for a similar broiler house in Georgia 91 thousand BTU per hour.<sup>20</sup>

The lower heating value of fuel oil is 133,300 BTU per gallon. The cost of fuel oil was estimated at 13.7 cents per gallon in New England, 12.4 cents in Delmarva and 11.5 cents in Georgia. Using the above estimates the average fuel cost for raising a broiler in New England is about 2.5 cents, in Delmarva 2.4 cents and in Georgia 1.3 cents. Assuming the fuel costs would be the same for a given period regardless of the weight of the broiler produced, the approximate cost per pound for a 3.5 pound live broiler would be .7 cent for New England, .7 cent for Delmarva and .4 cent for the Georgia area.

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<sup>20</sup> Courtesy of Walter Carpenter, Assistant Agricultural Engineer, Maine Agricultural Experiment Station.

Saunders<sup>21</sup> reported the cost of fuel and electricity at .7 cent per pound or 2.45 cents for a 3.5 pound bird in 1955. Likewise, Harper and Hester<sup>22</sup> gave a .3 cent per pound or .8 cent per bird as the average cost of fuel used in growing a broiler in 1951 in Georgia. Increases in fuel oil prices from 1951 to 1957 may account for the difference in the fuel cost per bird as reported by Harper and Hester and that computed in this study.

Any increase in the cost of fuel oil in the next few years may be more than offset by efficiencies possible by growing larger flocks. The relationship as to cost between the three areas will probably remain fairly constant. It will widen if transportation charges are increased for fuel.

### **Variations in Other Costs Items**

The more important of the other cost items are litter, medicine, electricity, insurance, water and service charges. Collectively these cost items represented 3 to 5 per cent of the total cost of producing broilers in each of the three areas.

It is expected that many of these costs will increase as materials become less plentiful and salaries of servicemen increase. However, the cost of these items will continue to represent a relatively small part of the cost in growing broilers with none of the three areas having much of an advantage over the other.

### **Summary of Costs of Producing Broilers in the Three Areas**

Detailed studies are necessary to show the exact cost of producing broilers in each area. For this report it was considered sufficient to use readily available material and estimates based on personal observations. Conditions are changing rapidly in the cost of growing broilers, but these estimates should be sufficient to aid in long-time planning of the various segments of the industry in the three areas.

In order to have comparability between areas, the costs are based on the equivalent of a 3.5 pound broiler live weight. The total cost in the New England area is 67.3 cents as compared with 64.3 cents in Delmarva and 61.3 cents in Georgia (table 9). On a per pound basis, it gives New England 19.2 cents, Delmarva 18.4 cents and for the Georgia area 17.5 cents.

The cost of producing a 3.5 pound broiler in New England is 3.0 cents higher than that of Delmarva and 6.0 cents higher than Georgia. Certain charges such as labor, buildings and equipment, fuel and miscel-

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<sup>21</sup> *Ibid.*, footnote 17.

<sup>22</sup> *Ibid.*, footnote 19.

TABLE 9

Estimated Costs of Producing Broilers in New England,  
Delmarva and Georgia, 1957

Cost Item	3.5 pound equivalent			Per pound equivalent		
	New England	Delmarva	Georgia	New England	Delmarva	Georgia
Chick	12.9	12.0	12.4	3.7	3.4	3.5
Feed	39.4	38.7	37.9	11.2	11.1	10.8
Labor	5.6	5.0	4.5	1.6	1.4	1.3
Buildings and equipment	4.6	3.9	2.9	1.3	1.1	.8
Fuel	2.5	2.4	1.3	.7	.7	.4
Miscellaneous <sup>1</sup>	2.3	2.3	2.3	.7	.7	.7
Total	67.3	64.3	61.3	19.2	18.4	17.5

<sup>1</sup> Includes insurance, litter, taxes, medicine, veterinarian and other minor items.

aneous items do not change directly with the weight of the broiler produced.

### COMPARATIVE COST OF COLLECTING AND PROCESSING BROILERS

The collection of the birds at the farms and the processing of broilers for the market have undergone revolutionary changes in recent years. The processing phase is most outstanding. A few years ago broilers were New York dressed (killed, blood drawn and feathers removed). In recent years increasing quantities of broilers have been eviscerated. The Federal Poultry Products Inspection Act<sup>23</sup> has among its provisions the requirement that all broilers must be eviscerated at the plant prior to shipment to market after January 1, 1959. Therefore, there is very limited information available on the probable cost of eviscerating broilers on a 100 per cent basis in the three areas under consideration.

#### Cost of Collecting and Transporting Live Broilers

There are several factors which account for the variations in the cost of picking up live birds at farms and transporting them to the dressing plants. Among these factors are the equipment used, weight of the birds, distance hauled, labor rates and the productivity of the labor. The equipment used, especially the crates, may have an influence on the cost of picking up the birds and also in handling and feeding them if they are held at the plant before dressing. Also the handling methods used and the care taken in picking up the birds at farms will influence the quality of the dressed broilers.

<sup>23</sup> Questions and Answers on the Poultry Products Inspection Act, A.M.S., U.S.D.A., AMS-208, September, 1957.

Information obtained from limited sources gives approximate average costs of collecting and transporting live broilers from farms to dressing plants in the three areas. The estimated cost is .7 cent per pound in the New England area,<sup>24</sup> .8 cent in Delmarva<sup>25</sup> and .9 cent in Georgia.<sup>26</sup>

### The Cost of Processing Broilers Expected Higher

Information obtained from 25 processing plants of which 6 were located in the New England area, 7 in the Delmarva area and 12 in the Georgia area indicated the average line speed ranged from 3,400 birds in New England to 4,000 birds per hour in Delmarva. Georgia's average line speed was intermediate with about 3,500 birds per hour (table 10). These line speeds were for the most part for a combination of New York dressed and eviscerated birds and the speeds may not be representative for operations with 100 per cent evisceration. In each area these line speeds were operated from 80 to 85 per cent maximum capacity.

TABLE 10  
Capacity of Poultry Processing Plants in New England,  
Delmarva and Georgia, 1957

Area	Number of processing plants	Avg. maximum capacity per hour	Avg. operating capacity per hour
New England	6	4,350	3,400
Delmarva	7	4,837	3,968
Georgia	12	4,031	3,525
Total or Average	25	4,333	3,619

Relatively few plants have operated for a sufficient length of time on 100 per cent evisceration in each of the three areas to estimate accurately the full impacts that the provisions of the federal poultry act will have on processing costs. However, it is reasonable to expect that operating costs may be increased on the basis of information from a few plants. From this limited information, the cost of eviscerating broilers is expected to be about 5.2 cents per pound. This cost includes both fixed and operating charges but does not include an estimated 25 per cent shrinkage between live and eviscerated broilers. It is impossible with present information to show the variations in costs by areas. However, not much variation in cost may be expected between producing areas after a short period of adjustment.

<sup>24</sup> Jewett, Lloyd, Maine Agr. Exp. Sta., Orono, Maine, unpublished material.

<sup>25</sup> Estimated by authors from personal interviews.

<sup>26</sup> Gayvert, Robert A., Univ. of Georgia, unpublished material.

## TRANSPORTATION OF DRESSED BROILERS TO NEW YORK CITY MARKET

Nearly all the dressed broilers are transported to the New York City market by refrigerated van trucks from the three areas, New England, Delmarva and Georgia.

The United States Department of Agriculture in its Research Report No. 224<sup>27</sup> indicates that the decision of the Supreme Court in exempting poultry from the motor carrier act of 1935 may have resulted in lower rates and improved service. This report gives the truck rates per 100 pounds for fresh and frozen poultry from Maine, Maryland and Georgia to their principal markets. The average cost of transporting dressed broilers to New York City from central Maine is reported at 70 cents per 100 pounds, from Maryland 45 cents and from Georgia \$1.92 (table 11).

TABLE 11

Truck Rates Per 100 Pounds of Fresh and Frozen Poultry from  
Maine, Maryland and Georgia to Principal Markets, 1957<sup>1</sup>

Area	Boston	New York	Philadelphia	Chicago
Maine	.36	.70	.70	1.70
Maryland	.87	.45	.41	1.05
Georgia	2.05	1.92	1.68	1.33

<sup>1</sup> Ibid., footnote 27.

Any increase in transportation charges (truck rates) would favor the areas nearer to market. Likewise, a decrease in transportation charges would favor the more distant production areas. With continued improvement in highways and trucks, transportation charges are probably more likely to show some decline than a rise. This is assuming that the general price level remains practically unchanged in the future.

### SUMMARY OF COSTS OF EVISCERATED BROILERS ON THE NEW YORK MARKET

Cost of producing, processing and transporting eviscerated broilers to New York City has been presented for the three areas, New England, Delmarva and Georgia. It is desirable to summarize these costs for each of the three areas to indicate the relative competition between areas. The estimated cost of production and delivery of a 3.5 pound live broiler to processing plants in New England was 67.3 cents as compared with

<sup>27</sup> Snitzler, James R. and Byrne, Robert J., Interstate Trucking of Fresh and Frozen Poultry under Agricultural Exemption, Marketing Research Division, A.M.S., U.S.D.A. Marketing Research Report No. 224, March, 1958.

64.3 cents for Delmarva and 61.3 cents for Georgia. The approximate cost of dressing and eviscerating a 3.5 pound live broiler was 5.2 cents per pound based on the net weight of 2.625 pounds after evisceration. Transportation charges from production areas varied with distance hauled. The total cost of producing, processing and delivering eviscerated broilers to New York City per pound was 32.4 cents from New England, 31.2 cents from Delmarva and 31.6 cents from Georgia (table 12).

TABLE 12

Summary of Cost of Producing, Processing and Transporting to New York City  
2.625 Pound Eviscerated Broiler from 3.5 Pound Live Bird Produced in New  
England, Delmarva and Georgia, November 1956 to October 1957

Cost Item	New England	Delmarva	Georgia
	(Cents)	(Cents)	(Cents)
Production of 3.5 Pound Broiler	67.3	64.3	61.3
Farm pickup & transporting to plant	2.4	2.8	3.2
Processing including evisceration	13.6	13.6	13.6
Transportation of eviscerated broiler— 2.625 pounds to New York City	1.8	1.2	5.0
Total cost for 2.625 pound <sup>1</sup> eviscerated broiler in New York City	85.1	81.9	83.1
Cost per pound	32.4	31.2	31.6

<sup>1</sup> Estimated dressing percentage at 75.

Prices received for Maine broilers on the New York market during the period November 1956 to October 1957 was 34.2 cents per pound.<sup>28</sup> This price compares with 31.9 cents per pound for broilers from other areas during the same period. This gives Maine a premium of 2.3 cents per pound (appendix table 8).

Information has not been reported for a sufficient length of time to show either trends in wholesale prices of broilers or seasonal variation. It may be expected that with increased efficiency in production, broiler prices may be slightly lower in the future. Also, it is reasonable to expect a rather definite seasonal variation with slightly higher prices in the winter months than during the rest of the year.

<sup>28</sup> Urner-Barry weekly price quotation report.

APPENDIX TABLE 1

Production of Broilers by States 1948-1957<sup>1</sup>  
(thousands)

State	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Maine	6,509	13,018	16,916	21,145	23,048	27,888	30,677	33,438	43,469	50,424
New Hampshire	3,321	3,952	4,034	4,841	6,051	7,261	7,334	7,627	8,390	7,635
Vermont	400	480	462	508	559	593	894	966	918	835
Massachusetts	6,374	7,458	11,943	15,526	16,147	17,600	16,736	17,071	18,437	14,565
Rhode Island	606	697	770	947	1,136	1,272	1,348	1,375	1,581	1,360
Connecticut	9,800	11,760	13,982	17,198	21,154	23,904	25,099	25,852	30,505	28,370
New York	6,794	8,153	7,714	8,717	8,194	9,259	13,052	13,052	14,618	14,326
New Jersey	4,176	5,136	7,538	8,518	6,644	7,840	8,232	9,384	10,670	10,990
Pennsylvania	7,903	10,432	13,562	16,546	18,035	20,740	29,724	30,318	36,382	35,291
Delaware	53,245	71,881	80,922	85,777	65,191	68,451	69,820	69,820	85,669	93,537
Maryland	38,233	48,174	54,596	60,602	56,966	62,093	58,367	58,367	67,033	74,288
Virginia	26,477	38,127	40,033	46,038	50,642	58,745	59,332	55,179	62,904	61,646
West Virginia	11,817	13,708	15,079	17,341	19,075	22,508	25,434	21,873	24,279	25,233
North Carolina	18,286	21,943	28,109	32,606	43,366	50,738	58,349	72,936	94,087	106,352
South Carolina	3,951	6,519	8,801	11,441	14,301	13,718	11,047	10,053	13,359	15,690
Georgia	33,025	45,574	62,892	88,678	112,621	121,631	154,471	177,642	222,780	261,000
Florida	7,276	8,367	9,001	8,911	9,980	10,479	11,736	9,389	11,830	10,884
Kentucky	1,090	1,526	1,702	2,468	3,677	5,221	7,884	9,540	12,211	14,409
Tennessee	2,596	3,115	3,894	5,841	8,762	10,952	11,500	13,225	17,854	21,068
Alabama	5,995	10,491	13,114	16,655	23,484	28,416	47,739	57,764	82,473	103,875
Mississippi	5,984	9,395	17,010	23,474	30,751	35,671	40,308	37,486	52,855	66,597
Arkansas	24,380	39,983	49,179	69,834	72,627	74,080	78,525	76,954	99,271	110,191
Louisiana	1,617	2,426	2,146	4,507	8,113	11,358	11,437	11,666	15,716	17,428
Oklahoma	1,056	2,006	2,909	5,382	6,728	7,132	6,775	6,436	5,824	6,523
Texas	14,208	25,290	33,383	50,408	60,994	65,264	71,790	79,687	100,116	100,826
Ohio	3,583	4,479	5,823	9,026	11,102	12,878	16,057	17,181	19,500	17,600
Indiana	9,503	20,219	27,880	34,014	33,674	33,674	36,368	32,368	38,518	42,370
Illinois	7,872	10,076	14,610	18,262	27,393	14,207	9,148	8,691	9,126	8,337
Michigan	1,104	1,546	2,180	3,008	3,309	3,971	4,252	4,252	4,900	4,300
Wisconsin	4,235	5,082	6,607	8,589	11,166	13,623	13,148	13,805	16,566	17,394
Minnesota	1,384	1,661	2,193	3,618	3,980	4,139	2,707	2,463	2,709	2,926
Iowa	4,018	4,621	6,007	7,809	8,590	9,449	4,989	4,740	4,635	4,460
Missouri	5,080	11,430	14,288	22,004	23,544	25,898	25,767	25,767	31,700	28,200
Nebraska	500	1,750	3,720	6,138	6,138	5,524	4,471	3,577	3,040	2,280
Kansas	1,034	1,551	2,094	2,618	3,272	2,945	2,040	1,734	1,907	1,716
Idaho	910	1,310	750	840	1,126	1,464	1,332	1,292	1,705	2,182
Colorado	729	838	1,048	1,100	825	594	535	562	461	539
Arizona	3,756	—	700	1,421	1,634	1,928	1,870	1,776	2,309	1,916
Washington	1,214	4,883	4,646	7,666	7,513	8,339	9,590	9,782	11,115	11,671
Oregon	15,744	1,578	5,854	5,854	5,093	4,889	5,525	6,133	8,382	7,697
California	—	20,782	32,605	47,603	48,079	48,560	50,179	48,516	52,397	43,490
United States	355,785	501,417	630,816	805,608	886,813	957,174	1,047,798	1,091,684	1,343,660	1,451,661

<sup>1</sup> 1948-1956, Agricultural Statistics, U.S.D.A.  
1957, Chickens and Eggs, Commercial Broilers by States, 1956-57



APPENDIX TABLE 2

Average Weight of Broilers in the United States by States  
from 1948 to 1957<sup>1</sup>

State	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Maine	3.9	4.1	4.4	4.1	3.8	3.8	3.6	3.6	3.6	3.8
New Hampshire	3.5	3.6	3.8	3.8	3.9	3.9	3.7	3.6	3.7	3.6
Vermont	3.7	3.6	3.8	3.7	3.5	3.6	3.4	3.4	3.4	3.5
Massachusetts	3.7	3.5	4.0	3.8	3.7	3.6	3.5	3.4	3.5	3.5
Rhode Island	3.7	3.5	3.7	3.8	3.9	3.8	3.6	3.5	3.6	3.6
Connecticut	3.7	3.8	3.9	3.9	3.7	3.7	3.6	3.5	3.6	3.5
New York	3.3	3.4	3.6	3.6	3.5	3.8	4.0	3.9	4.0	4.1
New Jersey	3.4	3.4	3.7	3.7	3.8	4.1	4.2	3.8	4.1	4.3
Pennsylvania	3.5	3.5	3.5	3.5	3.4	3.2	3.4	3.3	3.4	3.5
Ohio	3.1	3.2	3.2	3.3	3.3	3.3	3.3	3.3	3.4	3.4
Indiana	3.0	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.3	3.3
Illinois	2.8	2.9	2.9	2.9	3.0	3.1	3.0	3.0	3.1	3.2
Michigan	3.3	3.3	3.3	3.5	3.4	3.4	3.4	3.3	3.4	4.0
Wisconsin	3.0	3.0	3.0	3.2	3.3	3.2	3.2	3.2	3.3	3.3
Minnesota	3.0	3.0	3.0	3.0	2.9	2.9	3.0	3.0	3.0	3.3
Iowa	3.5	3.5	3.3	3.0	3.0	3.0	3.3	3.3	3.2	3.5
Missouri	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.1	3.0
Nebraska	2.8	2.8	2.9	2.9	2.9	3.0	3.0	3.0	3.0	3.1
Kansas	2.8	2.7	2.8	2.9	2.8	2.9	2.9	2.9	3.0	3.0
Delaware	3.1	3.1	3.0	3.0	3.1	3.1	3.1	3.1	3.3	3.4
Maryland	3.2	3.1	3.0	3.0	3.1	3.1	3.1	3.1	3.3	3.4
Virginia	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.2	3.1
West Virginia	3.3	3.2	3.2	3.2	3.3	3.2	3.2	3.2	3.3	3.3
North Carolina	2.9	2.8	2.8	2.8	2.8	2.9	2.9	3.0	3.1	3.1
South Carolina	2.6	2.7	2.7	2.8	2.8	2.8	2.8	2.9	2.9	3.2
Georgia	2.6	2.7	2.8	2.8	2.8	2.9	3.0	2.9	3.1	3.2
Florida	2.5	2.8	2.9	2.9	2.8	2.9	2.9	2.9	3.0	3.1
Kentucky	2.8	2.8	2.9	3.0	3.1	3.0	3.0	3.1	3.2	3.2
Tennessee	2.5	2.9	2.8	2.8	2.8	2.8	2.9	2.9	3.0	3.2
Alabama	2.5	2.6	2.7	2.7	2.7	2.6	3.0	3.1	3.1	3.2
Mississippi	2.7	2.9	2.8	2.8	2.8	2.7	2.8	2.8	2.9	3.1
Arkansas	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.9
Louisiana	2.5	2.7	2.7	2.8	2.8	2.7	3.0	3.0	3.1	3.0
Oklahoma	2.7	2.6	2.7	2.8	2.7	2.8	2.8	2.9	2.9	3.1
Texas	2.6	2.7	2.7	2.8	2.8	2.9	2.9	2.9	3.0	3.0
Colorado	2.7	2.7	2.9	3.0	2.9	2.9	2.9	3.1	3.1	3.2
Arizona	2.8	2.9	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0
Washington	3.1	3.0	3.1	3.3	3.1	3.2	3.1	3.1	3.4	3.4
Oregon	3.3	3.2	3.2	3.0	3.1	2.9	3.0	3.1	3.2	3.2
California	3.2	3.2	3.4	3.3	3.3	3.3	3.2	3.1	3.3	3.2
Idaho	—	—	2.7	2.8	2.7	3.0	2.9	2.9	3.3	3.1
Utah	—	—	3.1	3.1	3.0	3.1	3.2	3.2	3.2	3.3
United States	3.0	3.1	3.1	3.1	3.0	3.1	3.1	3.1	3.2	3.2

<sup>1</sup> 1948-1954, Agricultural Statistics, U.S.D.A.  
1955-1957, Chickens and Eggs, Commercial Broilers by States, 1956-57  
Crop Reporting Board, A.M.S., U.S.D.A., April 1958.

## APPENDIX TABLE 3

Cost of #2 Yellow Corn to Feed Manufacturers in the New England,  
Delmarva and Georgia Areas as Related to Prices in Chicago  
for the Years 1956 and 1957

		New England	Delmarva	Georgia	Chicago
(Dollars Per Ton)					
1956	October	60.76	57.80	54.29	46.35
	November	59.66	56.80	55.74	47.80
	December	60.02	58.40	56.39	48.45
1957	January	60.76	59.40	55.89	47.95
	February	58.56	56.80	53.39	45.55
	March	58.56	57.60	53.99	46.05
	April	58.92	57.80	54.29	46.35
	May	59.30	58.20	55.54	47.60
	June	57.82	55.80	54.94	47.00
	July	58.92	57.00	55.69	47.75
	August	58.92	57.80	54.79	46.85
	September	57.82	56.20	52.99	45.05
	October	56.36	54.40	52.00	41.00
	November	54.90	54.00	50.80	42.86

## APPENDIX TABLE 4

Cost of 50% Soybean Meal to Feed Manufacturers in the New England,  
Delmarva and Georgia Areas as Related to Prices in Decatur,  
Illinois, for the Years 1956 and 1957

		New England	Delmarva	Georgia <sup>1</sup>	Decatur
(Dollars Per Ton)					
1956	October	66.80	68.30	65.90	52.70
	November	68.42	70.00	67.60	54.40
	December	67.80	69.55	67.40	53.95
1957	January	71.25	72.50	68.60	56.90
	February	70.62	69.90	66.45	53.90
	March	68.60	69.50	64.40	53.75
	April	66.88	68.10	62.65	52.50
	May	66.62	67.10	61.20	52.40
	June	65.38	67.50	62.10	51.25
	July	68.12	70.10	67.70	53.60
	August	73.62	74.50	74.60	59.90
	September	72.18	73.10	72.05	58.00
	October	68.75	68.00	65.90	52.40
	November	66.60	67.10	63.80	51.50

<sup>1</sup> Feed Market News, Grain Division, A.M.S., U.S.D.A., October 2, 1957, Volume XL, No. 40, p. 4.

## APPENDIX TABLE 5

All-Mash Broiler Starting and Finishing Rations<sup>1</sup>

Mash Ingredients	Starter <sup>2</sup> (Pounds)	Finisher (Pounds)
Ground yellow corn <sup>4</sup>	1,060	1,210
Stabilized animal fat	80	80
Soybean oil meal (50%)	500	350
Corn gluten meal	100	100
Fish meal <sup>4</sup>	100	100
Dried corn distillers solubles or equiv. <sup>5, 6</sup>	50	50
Alfalfa meal (17%) (100,000 A/lb.)	50	50
Dicalcium phosphate or equivalent <sup>7</sup>	28	28
Ground limestone <sup>8</sup>	20	20
Iodized salt	10	10
Manganese sulfate (feed grade) <sup>9</sup>	0.5	0.5
Antibiotic supplement	<sup>12</sup>	<sup>12</sup>
d1 Methionine (feed grade)	0.5	0.5
BHT (butylated hydroxytoluene) <sup>10</sup>	0.25	0.25
Organic arsenical supplement <sup>11</sup>	0.1	0.1
Coccidiostat	<sup>13</sup>	<sup>13</sup>
Vitamin Supplements—		
Vitamin A (I.U.)	1,135,000	1,135,000
Vitamin D (I.C.U.)	681,000	681,000
Menadione (Mg.)	500	—
Riboflavin (Mg.)	2,500	1,470
Calcium pantothenate (Mg.)	4,720	4,720
Choline chloride (Mg.)	219,360	219,360
Niacin (Mg.)	20,600	20,600
Vitamin B <sub>12</sub> (Mg.)	12	24
Totals <sup>14</sup>	1,999.35	1,999.35

<sup>1</sup> Wherever substitutions are made the rations should be recalculated to agree with the analysis shown.

<sup>2</sup> To be fed as *all mash rations*. Feed starting ration until birds are 7 weeks old.

<sup>3</sup> Two to four hundred pounds of coarsely ground wheat or yellow hominy may be used to replace an equal amount of corn. If wheat is used, add 200,000 I.U. of vitamin A for each 100 pounds of corn removed.

<sup>4</sup> Twelve milligrams per ton of vitamin B<sub>12</sub> may be added to promote finish.

<sup>5</sup> Amount of riboflavin supplement needed will vary depending upon the fermentation product used.

<sup>6</sup> A vitamin concentrate containing not less than 1 gram of riboflavin and 4 grams of pantothenic acid and possibly other vitamins may be used to replace part or all of the fermentation products, and the total weight made up by adding corn meal.

<sup>7</sup> Based on an 18% phosphorus product. Steamed bone meal or defluorinated rock phosphate may replace the dicalcium phosphate on a phosphorus basis. Raw rock phosphate containing not more than 3.5% fluorine may replace one-half of the phosphorus in the dicalcium phosphate in the grower and one-fourth in the layer and breeder rations.

<sup>8</sup> Ninety-five per cent calcium carbonate is desirable.

<sup>9</sup> Manganese sulphate (70% feeding grade) or equivalent amount of manganese from other sources.

<sup>10</sup> BHT (Butylated hydroxytoluene) is an antioxidant used in the chick starter and broiler ration at the 0.0125 per cent level to prevent the appearance of encephalomalacia (crazy chick disease). If desired, it may also be added at the 0.0125 per cent level (one-quarter pound per ton) to the other rations to help prevent the destruction of the fat-soluble vitamins.

<sup>11</sup> Based on 3-nitro, 4-hydroxyphenyl arsonic acid at a level of 45 grams per ton. Other compounds that may be used at a level recommended by the manufacturer are sodium arsenite or arsenic acid.

<sup>12</sup> Use one to five pounds per ton depending upon the product used. Suggested levels are aureomycin, bacitracin, or terramycin, 9 grams, or procaine penicillin, 2 to 4 grams, per ton of finished ration or equivalent. For the broiler rations increase the above level by 50%.

<sup>13</sup> A coccidiostat controlling drug may be used in these rations at the level recommended by the manufacturer.

<sup>14</sup> If an even 2000 pounds is desired, adjust by removing or adding ground yellow corn.

Source: New England College Conference Poultry Rations, High Efficiency Poultry Feed Formulas, Revised June 1957, Poultry Dept., Univ. of Mass., Amherst, Mass.

APPENDIX TABLE 6

The Annual Average Composite Farm Wage Rates for New England, Delmarva and Georgia Areas, 1948-1957<sup>1</sup>

(Average Per Hour)

Year	New England	Delmarva	Georgia
1948	\$.72	\$.58	\$.39
1949	.68	.56	.36
1950	.67	.56	.38
1951	.76	.65	.42
1952	.80	.68	.44
1953	.83	.70	.45
1954	.83	.69	.44
1955	.86	.71	.45
1956	.92	.76	.49
1957	.95	.78	.50

<sup>1</sup> Farm Labor, Agricultural Marketing Service, Crop Reporting Board, United States Department of Agriculture, Washington, D. C., January 10, 1958.

APPENDIX TABLE 7

Daily Temperatures, Minimum, Maximum and Average at Selected Stations, 1921 to 1950<sup>1</sup>

Month	Portland, Maine			Baltimore, Maryland			Atlanta, Georgia		
	Mini- mum	Maxi- mum	Average	Mini- mum	Maxi- mum	Average	Mini- mum	Maxi- mum	Average
January	10.6	30.7	20.7	29.6	43.6	36.6	36.6	52.5	44.6
February	11.3	31.6	21.5	29.9	44.6	37.3	38.0	55.1	46.6
March	21.9	41.0	31.5	36.8	53.7	45.3	43.8	62.3	53.1
April	31.9	51.8	41.9	45.3	63.3	54.3	52.1	70.8	61.5
May	42.0	62.6	52.3	56.2	74.4	65.3	60.2	78.7	69.5
June	51.0	72.6	61.8	65.5	83.1	74.3	67.8	85.9	76.9
July	56.9	78.7	67.8	70.0	86.9	78.5	70.0	87.3	78.7
August	55.3	77.4	66.4	68.2	84.6	76.4	69.7	86.4	78.1
September	47.4	69.7	58.6	62.2	78.6	70.4	65.4	82.3	73.9
October	37.2	59.6	48.4	50.7	67.8	59.3	54.7	72.2	63.5
November	27.8	47.1	37.5	41.1	56.2	48.7	43.8	60.4	62.1
December	15.7	34.5	25.1	32.1	45.4	38.8	37.6	53.0	45.3
Average	34.1	54.8	44.5	49.0	65.2	57.1	53.3	70.6	62.0

<sup>1</sup> Statistical Abstract of the United States, 1955, 77th Annual Edition, Bureau of the Census, U. S. Dept. of Commerce, Washington 25, D. C.

APPENDIX TABLE 8

Wholesale Price for Broilers in the New York Market from November, 1956 to October, 1957<sup>1</sup>

Month and Year	Wholesale Prices at New York for 2 $\frac{3}{4}$ Pound Eviscerated Broilers <sup>2</sup>		Difference in Price Rec'd Between Maine and Other Sections
	Maine	Other Sections <sup>3</sup>	
November, 1956	32.6	29.8	2.8
December	30.5	28.9	1.6
January, 1957	32.7	31.0	1.7
February	34.3	32.3	2.0
March	35.0	32.5	2.5
April	34.0	31.8	2.2
May	34.6	32.1	2.5
June	37.0	34.4	2.6
July	38.2	36.0	2.2
August	37.2	34.4	2.8
September	33.2	31.0	2.2
October	31.3	29.0	2.3
Average	34.2	31.9	2.3

<sup>1</sup> Wholesale prices for broilers in the New York market were tabulated from the Producers Price Current, published by the Urner-Barry Co., New York 7, New York, November, 1956 to September, 1957.

<sup>2</sup> A 2 $\frac{3}{4}$  pound eviscerated broiler would weigh approximately 3.5 pounds live weight.

<sup>3</sup> Other sections include the Delmarva area, Georgia and other southern states shipping to the New York market.