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B571: Contract Broiler Growing in Maine

Richard F. Saunders

Contract Broiler Growing in Maine

next step—the market

. . . plus formula feeding . . .

. . . from egg to chick . . .

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Bulletin 571

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MAINE AGRICULTURAL EXPERIMENT STATION

UNIVERSITY OF MAINE

FOREWORD

The development and growth of the broiler industry in Maine has been without exception the most remarkable event in the history of Maine agriculture. By now the broiler industry has become well established in Maine, and this relatively young industry is fast becoming recognized as a very important segment of the economy of the State of Maine. The broiler industry has provided a new source of income to Maine people and has done much to bolster the economy of the state. The unique organization of the broiler industry, compared to other agricultural enterprises, has resulted in continued growth, increased efficiency, quality control, and income stability unprecedented in the history of agriculture. There is no question but what the broiler industry in Maine will continue to grow in the future. Further expansion is currently being scheduled, planned and promoted. Although, undoubtedly, there will be temporary periods of economic stress, as in any dynamic business enterprise, all indications point to a very bright future for Maine's broiler industry. It is hoped this publication will help provide a better understanding of the broiler industry in Maine.

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SUMMARY

The Maine broiler industry had its beginning in the late 1920's and early 1930's with the greatest development occurring after World War II. Live poultry buyers, who later became processors, were the originators of the industry and have played the leading role in its development. Processing and broiler production along with hatching egg production and hatchery operations are vertically integrated to a relatively high degree in Maine. Broiler production is primarily under the management and supervision of processors or their affiliates who contract with growers for raising the broilers. The grower owns and furnishes the buildings, equipment and labor for which he receives a guaranteed payment from the processor based either on a per bird, per square foot or a profit-sharing arrangement. The processor furnishes the chicks, feed, fuel, litter, medicine, insurance on the birds, lights in some instances, flock supervision, and makes most of the management decisions dealing with production and marketing.

Broiler production in Maine has continued to increase at a more rapid rate than broiler production in the entire United States. By 1957 broiler production in Maine had reached 50 million birds which amounted to 3.5 per cent of total U. S. broiler production, making Maine the 10th ranking broiler state. In recent years Maine has become the largest single supplier of processed poultry to New York City obtaining a 25 per cent share of this market, and at the same time receiving a premium price for its broilers. An increasing proportion of Maine's broiler production also is finding its way into nearby New England markets.

Along with the expansion that has taken place in the broiler industry there have been substantial advances in production efficiency which have lowered production costs in spite of continually rising costs of labor, buildings, equipment and supplies.

The average size broiler operation in Maine in 1956 was slightly over 11,000 birds per lot with most growers raising four lots per year. About 80 per cent of the growers devoted full time to broiler growing. Before going into raising broilers about 40 per cent of the growers were engaged in some type of non-farm work. Slightly less than half of the growers obtained their first broiler house by remodeling a dairy barn while an equal number built a new broiler house. About half of the growers paid cash for the remodeling or construction of buildings and the other half obtained loans, mostly from local banks. Capital invested in broiler buildings amounted to an average of $14,074 per farm

or $1.20 per bird capacity. Contract growers had net worths that averaged $21,692 in 1955.

Contract broiler growers' costs of producing broilers in 1955 averaged 10.3 cents per bird delivered, or 2.9 cents per pound for labor, buildings and equipment furnished by the grower. Building and equipment costs averaged 4.6 cents per bird delivered or 1.3 cents per pound, and varied from a low of 1.1 cents per pound for the larger lots to over 3 cents a pound for the smallest lots. Gross returns to contract growers during the period July 1956 to June 1957 averaged 2.6 cents per pound, or nearly one cent per bird per week.

Maine contract broiler growers were generally satisfied with their arrangements for growing broilers and their particular payment plan. A few indicated, however, that they would like to receive larger guarantee payments. When asked if they would like to raise broilers on an independent basis if they could obtain the financing, most of the growers said they would not, mainly because of the risks involved.

For some 300 lots of broilers marketed during the 12-month period July 1, 1956 to June 30, 1957 the average size flock was 11,564 birds. Mortality averaged 3.2 per cent. The birds were marketed at an average age of 10 weeks-4 days, weighed 3.62 pounds per bird and had an average feed conversion of 2.79 pounds of feed per pound of meat. Production costs, including the grower payment and flock supervision, averaged 20.4 cents per pound. Recent developments in nutrition, breeding, disease control and improved management practices now make these figures obsolete.

Current (1958) production costs average about 19 cents per pound.

Production costs varied as much as 5 cents per pound among individual broiler lots marketed during the period studied. The factors primarily affecting production costs were size of lot, feed conversion, labor efficiency and rate of mortality.

Comparisons between two systems of broiler production showed that broilers produced on a contract basis under the control and supervision of processors generally were produced at a lower cost per pound than broilers raised on an independent basis. The difference in production costs amounted to an average of 1.5 cents per pound in favor of the contract lots. Several factors may account for this difference. The more favorable weights and feed conversions in contract lots were probably the result of superior technical knowledge, management and supervision em-

ployed by the relatively large, vertically integrated broiler operations. Also, there are economies associated with large volume purchasing of feed, chicks and supplies that the larger integrated operations may be able to take advantage of more readily than smaller independent growers. One of the alleged weaknesses of the contract system has been that it provides less incentive to the grower to do a good job in caring for the birds. This weakness apparently has been overcome to a considerable extent in Maine through good management and close supervision on the part of processor-contractors, incentive and profit-sharing arrangements, and the likelihood of a grower being dropped if satisfactory performance is not attained.

Broilers grown under profit-sharing or incentive plans with minimum guarantees were generally produced at a lower cost per pound than broilers grown under flat-fee grower payment plans. The difference in production costs averaged 1.4 cents per pound in favor of profit-sharing plans. Although part of the difference was due to slightly lower grower payments for profit-sharing lots, most of the difference was due to their better average feed efficiency. It would appear then that profit-sharing plans with minimum guarantees provide more incentive to contract growers to reduce production costs than do plans that offer growers a flat rate payment per bird.

The findings from this study of contract broiler growing in Maine indicate that carefully planned, vertical integration by processors is a sound method of cost reduction and quality control. Furthermore, contract broiler growers generally are satisfied with their arrangements for growing broilers and prefer the contract system to growing broilers independently. The Maine broiler industry in tying together its production, processing and marketing functions has pioneered an evolution that may encompass other segments of agriculture in the future.

BULLETIN 571

CONTRACT BROILER GROWING IN MAINE

RICHARD SAUNDERS[1]

DEVELOPMENT and GROWTH of the BROILER INDUSTRY in MAINE

The Maine broiler industry had its beginning in the late 1920's and early 1930's. Live poultry buyers who later became processors were the originators of the industry and have played the leading role in its development. Previous to the advent of commercial broiler growing, the operations of poultry dealers were confined to buying and selling fowl and cockerels from farm laying and replacement flocks. Their operations were seasonal with the summer and early fall months being the important seasons. Until 1942 nearly all of the poultry moving out-of-state was shipped live to the Boston and New York live poultry markets.

As World War II began to make itself felt in the industry by the rationing of trucks, tires, and gasoline, the shipment of live poultry became increasingly difficult. In 1942-43, several live poultry buyers established poultry dressing plants in the state. By present standards the first processing plants were small, poorly equipped and required much hand labor. The supply of poultry was inadequate to operate the plants economically the year round.

During the war years the demand for poultry meat increased substantially as it was one of the few unrationed meat items. It was not long before dressing plant operators could see the advantages that were available to them in Maine. In this state an already well-established hatching egg and baby chick industry provided the foundation upon which a commercial broiler industry could be built and grow. For years Maine poultrymen had been producing large numbers of hatching eggs and baby chicks, most of which were being shipped to other states as replacements for laying flocks. Other important factors which contributed to the expansion of a commercial broiler industry in Maine were the existence of surplus labor in many rural areas, and the availability of small, sub-marginal farms with large dairy barns which could be made over economically into large broiler units. As the broiler industry expanded it carried other segments of the industry with it. The demand for baby chicks has risen steadily, and this in turn has increased the size of Maine's hatching egg market.

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[1] Associate Agricultural Economist, Maine Agricultural Experiment Station. The author wishes to express his gratitude to Dr. C. H. Merchant, head of the Department of Agricultural Economics, University of Maine, for his help in planning the study and in reviewing the manuscript. Special acknowledgment is made to the Maine broiler growers and processors who provided the data for the study.

Broiler production and processing are vertically integrated to a relatively high degree in Maine. Because of the large capital requirements of broiler growing, many Maine farmers are unable to raise sizable flocks of broilers without financial aid. Processors have been instrumental in supplying the necessary support through contractual arrangements with growers. Also, to operate efficiently and economically it is necessary for processors to have a steady supply of birds of the type demanded by the markets.

In Maine, broiler production is primarily under the control and management of processors who contract with growers for rearing the broilers. The farmer owns and furnishes the buildings, equipment, and labor for which he generally receives a payment from the processor amounting to about one cent per bird per week. The processors or their affiliates purchase or produce the chicks and retain ownership of them throughout the growing period and provide insurance on the birds. They also purchase or manufacture the feed, furnish fuel, litter, medicine, and flock supervision. The contractor-processor determines the number of birds to be started on each farm, the time of starting each lot, the breed and sex of the birds, the feed used and the age and weight at which the birds will be marketed. This sort of integrated arrangement wherein the farmer and processor work together as a team has been responsible in no small measure for the rapid growth of the Maine broiler industry and for the advances in production and marketing efficiency that have been made in Maine during a relatively short span of years.

Maine's poultry industry has grown substantially in a relatively short time and is continuing to expand. Gross income to farmers from the state's poultry industry was $64 million in 1956 compared with $49 million in 1950, and $24 million in 1945. The record shows that in five of the past six years poultry has been the largest source of agricultural income in the state.

A large part of the expansion has been due to the development and growth of commercial broiler production. Table 1 traces the growth of broiler production in Maine and in the United States from 1940 to 1957. By 1950 broiler production had become well established in Maine and since that time has continued to expand at a more rapid rate than broiler production in the entire United States. During this period, 1950-57, the number of broilers produced in Maine has increased three fold, or 198 per cent compared with a 131 per cent increase for the country as a whole. By 1957 broiler production in Maine had reached approximately 50 million birds. This amounted to a 16 per cent increase over the previous year's production compared to an 8 per cent increase for the United States. In 1957 Maine ranked 10th among the states in broiler

TABLE 1. BROILER PRODUCTION IN MAINE AND THE UNITED STATES 1940-1957

Year	Number produced		Period	Percentage increase in number produced	
	Maine	United States		Maine	United States
	Thousands			Per cent	
1940	500	142,762			
1945	1,452	365,572	1940-45	190	156
1950	16,916	630,816	1945-50	1065	73
1957	50,424	1,455,372	1950-57	198	131
1950	16,916	630,816			
1951	21,145	805,608	1950-51	25	28
1952	23,048	886,813	1951-52	9	10
1953	27,888	957,174	1952-53	21	8
1954	30,677	1,059,784	1953-54	10	11
1955	33,438	1,078,264	1954-55	9	2
1956	43,469	1,345,302	1955-56	30	25
1957	50,424	1,455,372	1956-57	16	8

production and produced 3.5 per cent of the broilers produced in the United States.

Equally impressive has been the increase in Maine's share of the New York market—the principal market for broilers produced in the East. Figure 1 shows the growth of Maine's broiler industry during recent years—both in production and in its share of the New York market. In 1950 Maine's share of the New York market was only 10 per cent. By 1956, Maine supplied 73.8 million pounds or 24 per cent of the processed poultry received at New York City, making Maine the city's largest single supplier of processed poultry. These figures become even more significant when one considers that Maine has been able to increase its share of the New York market and at the same time receive

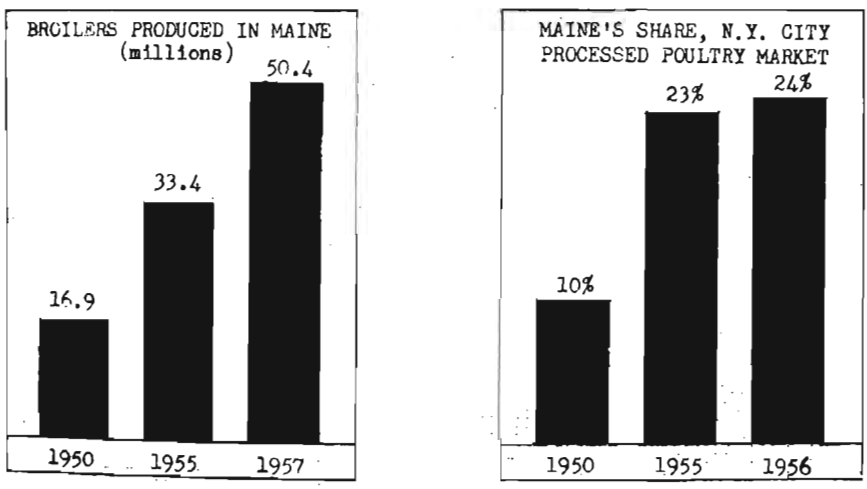

FIGURE 1. MAINE EXPANDS ITS BROILER PRODUCTION AND ITS MARKETS.

a premium price for its broilers amounting to about 2 to 2½ cents per pound above prices received for broilers produced in other sections of the country (table 2). Also, an increasing proportion of Maine's broiler production is finding its way into local markets within the state and in New England.

TABLE 2. UNER-BARRY PRICE QUOTATIONS, NEW YORK
Chickens: Eviscerated, 2¾ lb., Maine and Other Sections, 1957

Month	Maine	Other sections	Differential
	cents per pound		
January	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
November	31.2	28.2	3.0
December	30.8	27.1	3.7
Year average	34.1	31.7	2.4

The broiler area of Maine has experienced many significant changes in its agriculture over the years, the most recent of which has been the change from a predominately dairy and general farming area to one of intense and specialized commercial broiler and hatching egg production. Broiler production in Maine is concentrated heavily in the south central part of the state (figure 2). Waldo county is considered the hub of the broiler industry. Surrounding counties of Kennebec, Penobscot, Somerset, Knox and Lincoln also contain a relatively heavy concentration of

TABLE 3. LOCATION AND SIZE OF BROILER FARMS
790 Broiler Farms, Maine 1956

County	Average number of birds per lot	Number of farms	Per cent of farms
Waldo	10,294	186	24
Kennebec	13,324	142	18
Penobscot	8,994	88	11
Somerset	10,904	66	8
Knox	9,832	65	8
Cumberland	11,488	63	8
Androscoggin	12,798	41	5
Oxford	9,895	36	5
Lincoln	11,019	34	4
York	8,509	23	3
Sagadahoc	13,180	17	2
Hancock	18,000	15	2
Piscataquis	10,327	6	1
Franklin	11,900	5	1
Washington	22,500	2	*
Aroostook	—	1	*
Total or average	11,146	790	100

* Less than 0.5 per cent

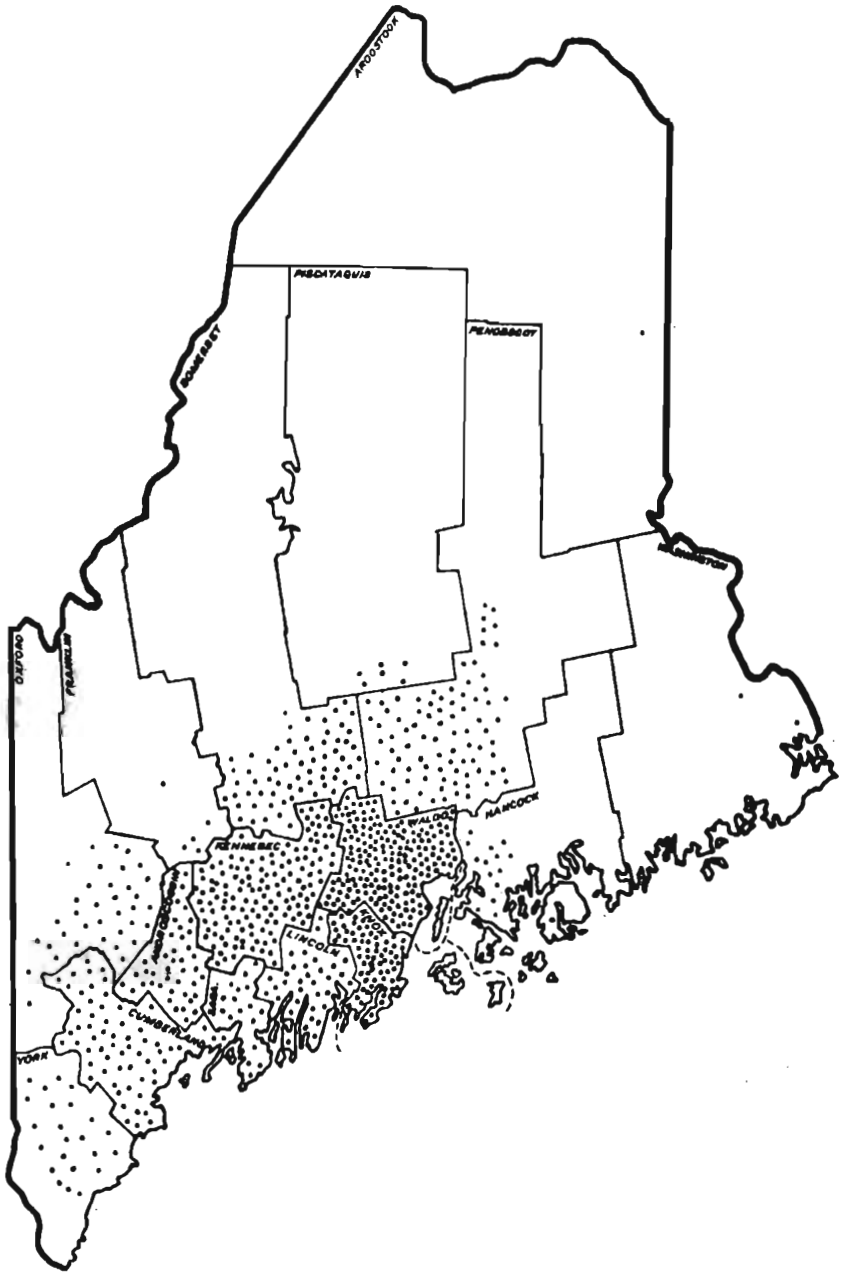

FIGURE 2. LOCATION OF BROILER FARMS.
Maine, 1956
(Each dot equals one farm)

broiler farms. During recent years considerable expansion in broiler production has taken place in the southwestern part of the state in Androscoggin, Cumberland, York, and Oxford counties. The location and average size of some 790 broiler farms is shown in table 3. It is estimated there are somewhere in the vicinity of 1,100 broiler farms in Maine.

PROGRESS IN PRODUCTION EFFICIENCY

Along with the expansion that has taken place in the broiler industry, there have been substantial advances in production efficiency on Maine broiler farms. Broiler farm management and cost studies made in 1950, 1955 and again in 1957 provide a basis for measuring the advances in production efficiency in commercial broiler growing operations. The series of charts in figure 3 show what has been happening on Maine broiler farms with regard to size of flock, number of lots raised per year, mortality, age and weight of birds when processed, feed conversion, point spread between weight and feed conversion, and production cost. The data shown in the charts are based on over 300 lots of broilers for each of the periods studied.

In the short span of seven years the average size of broiler flocks on Maine farms has increased from around 7,500 birds per lot in 1950 to about 12,000 in 1957. Along with the increase in size of flock, there has been a substantial increase in the number of lots raised per year. In 1950 an average of 2.5 lots were raised per year, while in 1957 an average of 4.0 lots were raised. At the same time production efficiency has shown marked improvement. For example, in 1950 it took nearly 14 weeks to grow a bird that weighed 3.9 pounds at market age with a 4.2 feed conversion. In 1957 broiler growers were raising a 3.6 pound bird in slightly over 10 weeks with an average feed conversion of 2.79. During this period mortality has been reduced nearly one-half, from 6.0 to 3.2 per cent. These improvements in efficiency have resulted in lower production costs per pound of meat in spite of rising costs of labor, buildings, equipment and supplies. In 1950 total production costs including labor and overhead averaged 26 cents per pound, whereas in 1957 the average cost of producing a pound of broiler was 20.4 cents. Recent developments in feeding, breeding, disease control and improved management practices occurring in the past few months (late 1957 and early 1958) make even these latter figures obsolete.

THE MAINE BROILER GROWER

With the exception of a very few independent broiler operations, broiler production in Maine is largely sponsored and supervised by

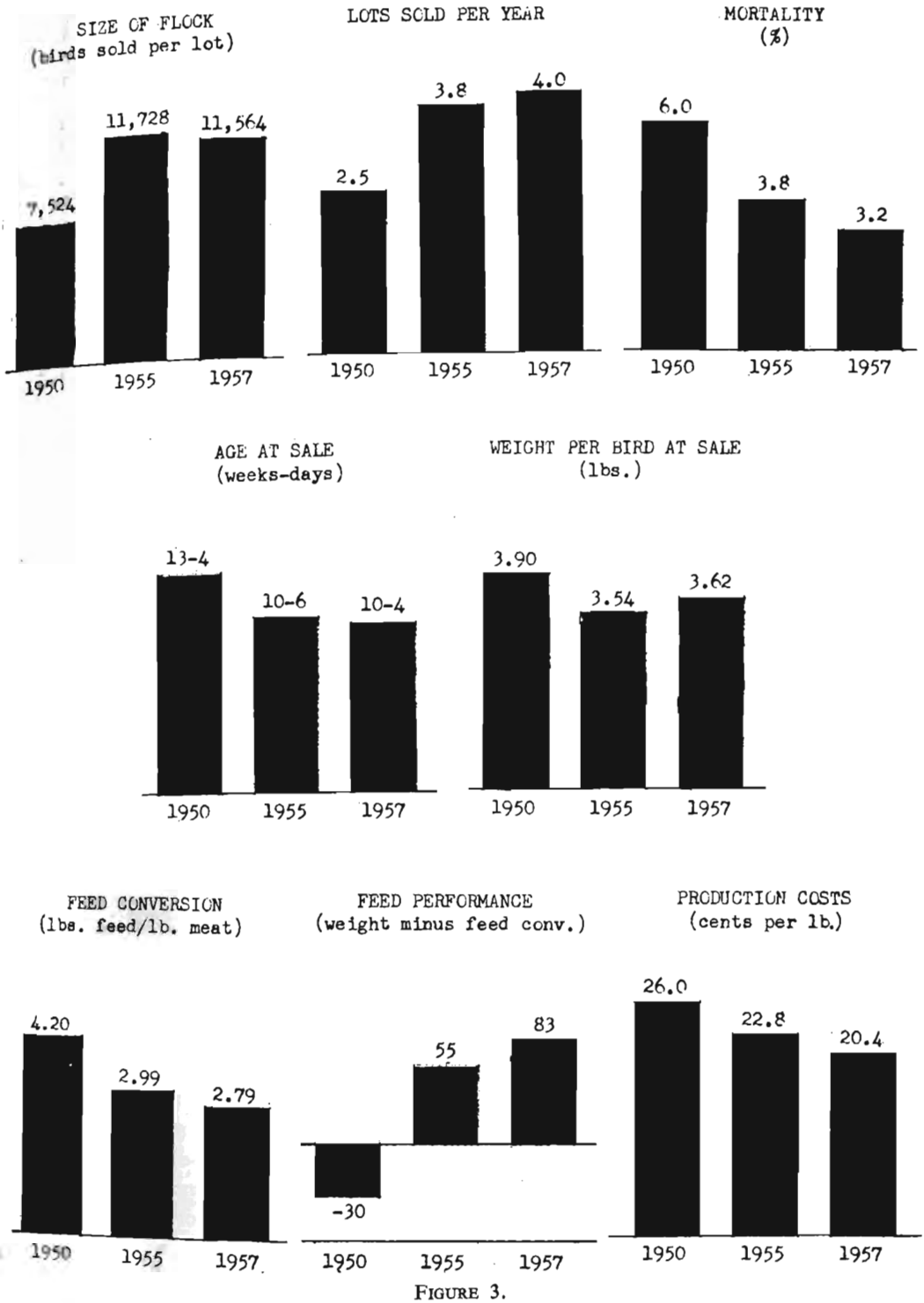
SIZE OF FLOCK
(birds sold per lot)
7,524
11,728
11,564
1950
1955
1957
LOTS SOLD PER YEAR
2.5
3.8
4.0
1950
1955
1957
MORTALITY
(%)
6.0
3.8
3.2
1950
1955
1957
AGE AT SALE
(weeks-days)
13-4
10-6
10-4
1950
1955
1957
WEIGHT PER BIRD AT SALE
(lbs.)
3.90
3.54
3.62
1950
1955
1957
FEED CONVERSION
(lbs. feed/lb. meat)
4.20
2.99
2.79
1950
1955
1957
FEED PERFORMANCE
(weight minus feed conv.)
-30
55
83
1950
1955
1957
PRODUCTION COSTS
(cents per lb.)
26.0
22.8
20.4
1950
1955
1957

FIGURE 3.

processor-contractors who retain ownership of the chicks throughout the growing period, pay for all production expenses, and make the management decisions. Although processing and production are vertically integrated to a fairly high degree, the basic broiler production unit is the so called "family-type farm." The grower, generally, owns the buildings and equipment and furnishes the labor in carrying out the growing program under the supervision of the processor-contractor. Generally, the grower is paid either a flat-fee amounting to one cent per week per bird delivered or one-half cent per week per bird delivered and a share in the profits.

In 1955 personal interviews were held with some 88 Maine broiler growers, 58 of which were contract broiler growers and 30 independent broiler growers. Data were obtained concerning the growers' occupational status both past and present, age, methods of financing broiler buildings and equipment, capital invested in buildings and equipment, and labor and overhead costs for growing broilers. A financial statement was obtained from each grower. An attempt also was made to get an accurate impression of the grower's feelings and of his attitude toward his particular growing arrangement.

OCCUPATION

Seventy-nine per cent of the growers included in the survey were full-time broiler producers. Another 10 per cent of the growers combined broiler raising with an off-the-farm job. Five per cent were combination broiler-dairy farmers and another 6 per cent combined broiler growing with other farm enterprises.

AGE

The average age of the broiler growers included in the survey was 46 years. Twenty-seven per cent of the growers were under 40, 59 per cent were between 40 and 60, and 14 per cent were 60 or older.

PREVIOUS OCCUPATION

Nearly one-half (43 per cent) of the broiler growers in the survey were engaged in some type of non-farm work before going into broiler raising (table 4). Many of them were factory workers, some had their own private businesses, some were "white collar" workers employed as clerks, bookkeepers and the like. The other 57 per cent were farmers of one kind or another previous to becoming broiler growers. Dairymen and egg producers make up a large share of this group.

TABLE 4. PREVIOUS OCCUPATIONS OF BROILER GROWERS
88 Growers, Maine, 1955

Occupation before broilers	Per cent of growers
Dairy farmer	28
Egg producer	23
Crop and general farmer	6
Total farm background	57
Factory worker	17
Proprietor non-farm business	13
Clerical worker	7
Miscellaneous non-farm jobs	6
Total non-farm work	43
Total	100

FINANCING BUILDINGS AND EQUIPMENT

Buildings

Forty-three per cent of the 88 broiler growers started by remodeling a dairy barn. About an equal number (42 per cent) built a new broiler house, while 15 per cent of the growers obtained their first broiler house by purchasing a farm that had one on it.

In order to pay for the remodeling, construction, or purchase of their first broiler buildings, 46 per cent of the growers paid cash for the entire amount from their own savings. An equal number (46 per cent) supplemented their own funds with direct loans from various types of lenders. The remaining 8 per cent of the growers financed the remodeling or construction of their first broiler buildings through dealer credit, mostly lumber and hardware dealers. In general, those who built a new broiler house borrowed money, while those who remodeled more frequently paid cash.

Banks were the leading source of loans for construction or re-

TABLE 5. FINANCING CONSTRUCTION OR REMODELING OF BROILER HOUSES BY DIRECT BORROWING
39 Growers, Maine, 1955

Lender	Number of loans	Average				
		Cost of construction	Amount loaned	Growers equity*	Loan period	Interest rate
					(years)	(%)
Bank	17	$10,840	$6,982	$3,858	11	5.4
Individual	7	5,071	4,114	957	6	4.8
Farmers Home Adm.	4	7,000	2,250	4,750	15	4.5
Federal Land Bank	2	14,250	11,250	3,000	15	4.5
Bank & individual	3	15,167	7,667	7,500	6	5.8
Farmers Home Adm. & bank	3	4,800	4,800	0	6	4.8
Processor	2	4,350	3,700	650	4	6.0
Lumber Company	1	1,800	1,800	0	3	0
Total or average	39	$ 8,892	$5,785	$3,107	9	5.1

* Grower's equity—cash down payment made by borrower.

modeling of the first broiler houses (table 5). Individuals were the second most important source of borrowed funds. Other sources of loans were Farmers Home Administration, Federal Land Banks, poultry processors and lumber companies.

The average cost of construction or remodeling of first broiler houses for those growers who borrowed money was $8,892 (table 5). The average amount borrowed was $5,785 with the grower making up the difference of $3,107 from his own savings. The average loan period was 9 years and the interest rate averaged 5.1 per cent. The details of loans made by the various types of lenders can also be seen in table 5.

A mortgage on the farm or residence was given as security for loans by 58 per cent of growers who borrowed money in obtaining their first broiler buildings. Other types of security given less frequently included mortgages on non-farm property, mortgages on the broiler houses and chattel mortgages on cattle. Some 14 per cent of the growers who borrowed money did not give any security at all.

Equipment

Sixty-five per cent of the growers financed the purchase of their original broiler equipment (feeders, waterers, brooders, etc.) by obtaining a cash loan. Another 23 per cent obtained dealer credit while 12 per cent of the growers paid cash for their equipment when they first started raising broilers.

Banks again were the most common source of loans for those growers who borrowed money to purchase their original equipment (table 6). Farmers Home Administration, individuals, and equipment dealers were other sources of equipment loans.

TABLE 6. FINANCING PURCHASE OF EQUIPMENT BY BORROWING
18 Growers, Maine, 1955

Lender	Number of loans	Cost of equipment	Amount loaned	Growers equity*	Loan period	Interest rate
					(years)	(%)
Bank	6	$3,433	$3,325	$ 108	4	5.6
Farmers Home Adm.	3	3,400	2,500	900	5	4.8
Individual	2	1,200	1,000	200	4	4.3
Equipment dealer	2	2,750	2,750	0	3	0
Bank & individual	3	4,633	2,167	2,466	3	6.0
Farmers Home Adm. & bank	2	1,800	1,750	50	5	5.5
Total or average	18	$3,122	$2,394	$ 728	4	4.3

* Grower's equity—cash down payment made by borrower.

The average cost of equipment for those growers who borrowed money to purchase their first equipment was $3,122 (table 6). The average amount borrowed was $2,394 with the grower making up the difference of $728 from his own savings. The average loan period was 4

years with the most common loan period being between 3 and 5 years. The average rate of interest charged was 4.3 per cent, although interest rates of between 5 and 6 per cent were most common.

A mortgage on the broiler house was given as security for equipment loans by 50 per cent of the growers, and another 22 per cent gave both the broiler house and the equipment as security. Other types of security given for equipment loans included mortgages on non-farm property, mortgages on farms, and chattel mortgages on cattle. Four per cent of the growers who obtained equipment loans gave no security at all.

Dealer credit was also an important source of credit used by broiler growers to finance the purchase of their first equipment. The most common sources of credit for purchase of equipment were retailers and wholesalers of poultry equipment. Forty-two per cent of the growers who used dealer credit obtained credit from these equipment men. Poultry processors for whom the growers were raising birds under contract extended credit to another 25 per cent. Feed dealers and lumber companies were other sources of dealer credit.

The amount of credit extended by dealers for equipment purchases was under $1,000 in 60 per cent of the cases. The credit period was indefinite in 50 per cent of the cases where equipment was purchased on dealer credit. Terms of between 6 and 9 months were commonly given as were terms of 3 to 5 months. In most instances there was no interest rate as such on credit advanced by equipment dealers. Rather the interest charge was included in the purchase price of the equipment. Where an interest charge was specified it was commonly 5 per cent.

Financing Expansion

Eighty-one per cent of the 88 broiler growers in the study stated they had expanded or improved their operations and facilities since starting to raise broilers. The remaining 19 per cent had made no changes.

Nearly one-half (49 per cent) of the growers who had expanded or improved their facilities did so by paying cash. Forty-one per cent borrowed money, mostly from banks, individuals and Farmers Home Administration, while 10 per cent financed their expansion by obtaining credit from lumber and equipment dealers, and processors.

The average cost of expansion was $5,126 and ranged from $300 up to $25,000. Four-fifths of the growers had expansion costs that amounted to less than $5,000.

Only 15 per cent of the growers indicated they had been refused a loan by a lending agency for financing the construction or purchase of a

broiler house or the purchase of equipment. The loan refusals were equally distributed among the major lenders, and were largely made because of insufficient equity on the part of the grower.

CAPITAL INVESTED IN BUILDINGS AND EQUIPMENT

Capital invested in broiler buildings and equipment amounted to an average of $14,074 per farm or $1.20 per bird capacity (table 7). Broiler houses, the largest capital item, accounted for 71 per cent of the total investment in broiler buildings and equipment. The second largest capital item was brooding equipment which amounted to an average of 14 cents per bird. The average investment in feeders and waterers amounted to 11 cents per bird, while miscellaneous equipment used in connection with the broiler enterprise required an investment of 10 cents per bird.

TABLE 7. CAPITAL INVESTED IN BROILER BUILDINGS AND EQUIPMENT

88 Broiler Farms, Maine, 1955

Item	Investment	
	Per farm	Per bird
	Dollars	
Broiler houses	9,969	.85
Heating system	1,642	.14
Feeders	938	.08
Waterers	352	.03
Other broiler equipment*	1,173	.10
Total	14,074	1.20

* Includes feed bins, carriers, elevators and broiler share of auto, trucks, tractor, small tools, etc.

Table 8 compares the investment in remodeled barns with the investment in new type broiler houses. The average investment in broiler buildings for those farms having remodeled barns was 78 cents per bird compared to 96 cents per bird for farms with broiler houses designed

TABLE 8. CAPITAL INVESTED IN BROILER HOUSES BY TYPE OF HOUSE

88 Broiler Farms, Maine, 1955

Type of house	Number of farms	Average investment	
		Per farm	Per bird
		Dollars	
New construction	37	12,740	.96
Remodeled barn	51	9,463	.78
Total or average	88	9,969	.85

and constructed specifically for raising broilers—a difference of 18 cents per bird.

Table 9 shows the average investment for various types of brooding systems. The 28 farms which had central hot water systems had the largest investment in brooding equipment—20 cents per bird. For farms with individual brooder stoves—gas, coal, and oil—the investment was considerably less, averaging between 7 and 9 cents per bird.

TABLE 9. CAPITAL INVESTED IN HEATING SYSTEMS
80 Broiler Farms, Maine, 1955

Type of heating system	Number of farms	Average investment	
		Per farm	Per bird
		Dollars	
Central hot water	28	3,484	.20
Gas brooders	17	888	.08
Coal brooders	16	642	.07
Oil brooders	11	913	.09
Electric brooders	1	670	.11
Central hot air	1	2,000	.13
Combinations of above	6	1,847	.12
Total or average	80	1,698	.14

Capital invested in feeders for farms using various types of feeders is shown in table 10. Investment for farms using hanging-tube feeders was 7 cents per bird. Farms using trough feeders had the lowest investment—2 cents per bird; while farms with automatic feeders had an average investment in the units amounting to 17 cents per bird.

TABLE 10. CAPITAL INVESTED IN FEEDERS
82 Broiler Farms, Maine, 1955

Type of feeder	Number of farms	Average investment	
		Per farm	Per bird
		Dollars	
Hanging	35	855	.07
Trough	34	238	.02
Automatic	13	3,102	.17
Total or average	82	951	.08

CONTRACT GROWER'S COSTS OF PRODUCING BROILERS

The contract grower's total cost of producing broilers in the period 1954-55 averaged 10.3 cents per bird delivered, or 2.9 cents per pound for the items furnished by the grower, namely labor, buildings and equipment (table 11).

Labor costs (including the value of the operator's time as determined by the grower himself) accounted for 55 per cent of the contract

TABLE 11. CONTRACT GROWERS' COSTS AND RETURNS IN PRODUCING BROILERS

56 Farms, Maine, 1954-55

Item	Costs and returns per:			Per cent of total
	Lot*	Bird	Pound	
	Dollars	Cents		
Costs:				
Labor	699	5.7	1.6	55
Buildings & equipment	565	4.6	1.3	45
Total costs	1,264	10.3	2.9	100
Returns:				
Payment from processor	1,326	10.9	3.0	100
Profits	62	.6	.1	
Total returns to labor	761	6.3	1.7	
Returns per hour of labor	$1.28	—	—	

* Average size flock was 12,175 birds delivered per lot.

grower's total cost of producing broilers. The average cost of labor was 5.7 cents per bird delivered or 1.6 cents per pound. The average labor requirement was 47 hours per 1,000 birds delivered.

Building and equipment costs accounted for the remaining 45 per cent of the contract grower's total cost of producing broilers. Building and equipment costs averaged 4.6 cents per bird delivered or 1.3 cents per pound.

The average gross return to contract growers during the 1954-55 period was 10.9 cents per bird delivered or 3.0 cents per pound (table 11). Contract growers' gross returns in the form of payments from the processor-contractor during this period were generally at the rate of one cent per week per bird delivered.

The profits to contract growers during 1954-55 were $62 per lot, 0.6 cent per bird delivered, or 0.1 cent per pound (table 11). The total returns for labor averaged $761 per lot. The contract growers' returns per hour of labor averaged $1.28.

Contract broiler growers' overhead costs of producing broilers are itemized in table 12. Overhead costs are those costs associated with buildings and equipment furnished by the grower and include depreciation, interest on investment, repairs, taxes and insurance. In total these costs amounted to 4.6 cents per bird or 1.3 cents per pound.

One of the most important factors affecting contract growers' costs of producing broilers is size of flock (table 13). The total contract growers' cost per pound for labor, buildings and equipment in raising the 12 smallest lots (averaging 3,117 birds) was 6.2 cents while the corresponding figure for the 29 largest lots (averaging 22,307 birds) was 2.9 cents, or a difference of 3.3 cents per pound of broilers delivered. The greatest reduction in costs occurred in lots larger than 10,000 birds.

Beyond 15,000 bird size there was little difference in labor and overhead costs.

TABLE 12. CONTRACT GROWERS' OVERHEAD COSTS OF PRODUCING BROILERS

48 Farms, Maine, 1954-55

Item	Annual cost
Depreciation (buildings)	$ 464
(equipment)	493
Interest on investment @ 5%	704
Repairs (buildings)	199
(equipment)	164
Taxes	211
Insurance (buildings & equipment)	155
Total costs (per year)	$2,390
(per lot)	$ 598
(per bird)	4.6 cents
(per pound)	1.3 cents

TABLE 13. RELATIONSHIP OF SIZE OF LOT TO LABOR AND OVERHEAD COSTS

291 Lots of Broilers, Maine, 1954-55

Item	Number started				
	Under 5,000	5,000-9,999	10,000-14,999	15,000-19,999	20,000 and over
Number of lots	12	96	87	67	29
Number started per lot	3,117	6,988	12,107	16,933	22,307
Hours of labor per 1,000 birds	73	60	47	39	37
Costs:	Cents per pound				
Labor	2.7	2.4	1.7	1.5	1.5
Buildings & equipment	3.5	1.5	1.1	1.3	1.4
Total	6.2	3.9	2.8	2.8	2.9

CONTRACT GROWER'S GROSS RETURNS

During recent years grower payment plans in Maine have undergone some major revisions. In general, the change has been from the flat-rate payment of one cent a bird per week to a minimum guarantee of one-half cent per bird per week and a share in the profits. This change was an attempt to provide more incentive to the grower to reduce production costs, give the grower a chance to benefit from favorable market prices and at the same time guarantee him against a severe financial loss.

A more recent study of contract broiler growing in Maine involving 317 lots of broilers marketed during the 12-month period from July 1, 1956 to June 30, 1957 shows that contract growers received a gross return which averaged 0.9 cent per week per bird delivered (table 14). Twenty-eight per cent of the lots brought an average return of .51 cent

per bird per week while 13 per cent of the lots brought average returns of 1.21 cents per bird per week. The most frequent amount paid growers was between the relatively narrow range of 0.9 to 1.0 cent per bird per week. The farm price of broilers during this 1956-57 period averaged 19 cents per pound and ranged from 16 to 22 cents per pound.

TABLE 14. CONTRACT GROWERS' GROSS RETURNS
317 Lots of Broilers, Maine, 1956-57

Gross return (cents per bird per week)		Number sold per lot	Per cent of lots
Range	Average		
.5–.6	.51	13,090	26
.7–.8	.85	11,711	8
.9–1.0	1.00	10,549	53
1.1 and over	1.21	11,091	13
All lots	.90	11,564	100

FINANCIAL CONDITION OF GROWERS

A financial statement was obtained from 54 contract broiler growers included in the survey. In August 1955 the average net worth of contract growers was $21,692 (table 15). Total assets of contract growers averaged $26,679 and total liabilities amounted to an average of $4,987.

TABLE 15. FINANCIAL STATEMENT
54 Contract Broiler Growers, Maine, 1955

Assets		Liabilities	
Land and buildings other than broiler houses	$ 8,806	Real estate mortgages	$ 4,045
Broiler houses	9,851	Notes, chattels, open accounts, etc.	942
Broiler equipment	2,787		
Farm machinery and equipment	2,512	TOTAL LIABILITIES	$ 4,987
Broilers	0		
Livestock	697	Proprietorship	
Crops and supplies	297		
Non-farm property*	1,729	Net worth	$21,692
TOTAL ASSETS	$26,679	TOTAL	$26,679

* Non-farm property includes other real estate, notes and accounts receivable, cash, bank deposits, bonds, etc.

There was a wide range in net worths among the broiler growers included in the study (table 16). Thirteen per cent of the growers had net worths that averaged $5,513 while 7 per cent of the growers had net worths averaging $55,042. Forty-five per cent of the growers had net worths within the relatively narrow range of $10,000 to $20,000. As would be expected, there was a direct relationship between net worth and size of lot raised, with the larger size growers having the more favorable net worth positions.

TABLE 16. NET WORTH
54 Contract Broiler Growers, Maine, 1955

Net worth (dollars)		Number of birds per lot	Per cent of lots
Range	Average		
Under 10,000	5,513	9,229	13
10,000 - 19,999	14,971	11,296	45
20,000 - 29,999	25,341	14,092	22
30,000 - 39,999	36,163	17,943	13
40,000 and over	55,042	16,950	7
All growers	21,692	12,930	100

GROWER'S SATISFACTION WITH GROWING ARRANGEMENT

Growers were generally satisfied with their arrangements for growing broilers and their particular payment plans (table 17). Of the 33 contract growers who were raising broilers under a flat-fee payment plan, 94 per cent expressed satisfaction with the arrangement. A few said, however, that they would like to receive larger guarantee payments. Ninety-one per cent of the growers who were raising broilers under incentive or profit sharing plans with a minimum guarantee said they were satisfied with this arrangement. A few expressed dissatisfaction, however, in the method used to determine profits under this arrangement and felt they would be better off with a flat-fee payment. All of the independent growers indicated satisfaction with their production and marketing arrangements.

TABLE 17. EXTENT OF SATISFACTION WITH PRESENT GROWING ARRANGEMENT
88 Broiler Growers, Maine, 1955

	Contract system		
	Flat-fee payment (33 growers)	Minimum guarantee with share in profits (25 growers)	Independent system (30 growers)
	Per cent of growers		
Satisfied	94	91	100
Not satisfied	6	9	—
Total	100	100	100

Contract growers were asked if they would like to raise broilers on an independent basis if they could obtain the financing. Most of the growers indicated they would not (table 18). It should be pointed out that this question was asked in 1955 when broiler prices were higher than they are now (1957-58) making it more profitable at that time to be an

independent grower. At current levels of broiler prices very few, if any, contract growers would prefer to grow broilers independently.[2]

TABLE 18. WOULD YOU LIKE TO BECOME AN INDEPENDENT BROILER GROWER IF YOU COULD OBTAIN THE FINANCING?

58 Contract Growers, Maine, 1955

Response	Flat-fee payment	Minimum guarantee with share in profits
	Per cent of growers	
Yes	20	36
No	80	64
Total	100	100

The reasons given by contract growers as to why they would rather not produce broilers on an independent basis are shown in table 19. Practically all of their reasons in one way or another relate to the element of risk involved in producing broilers independently. Broiler growers in Maine apparently are willing to relinquish some of their freedom of decision in order to enjoy the income security afforded them by their arrangements with processors.

TABLE 19. REASONS WHY CONTRACT BROILER GROWERS WOULD RATHER NOT PRODUCE BROILERS ON INDEPENDENT BASIS

42 Contract Growers, Maine, 1955

Reasons	Per cent of reasons
Too risky due to fluctuation in broiler prices	43
Too risky for small operator with limited capital	32
Too risky for man my age	8
Investment and costs high in relation to returns	8
Have no money to gamble with	5
Other reasons	4
Total	100

The few independent broiler growers in Maine usually have very little difficulty in finding a market for their birds (table 20). In fact, the contractor-processors in Maine generally like to buy independent lots and are competitive in bidding for the better lots for which they commonly pay 5 to 6 cents under the New York dressed quotation. The few independent growers who had experienced difficulty in finding a buyer for their birds indicated it was during the Thanksgiving and Christmas holiday season when the demand for broilers was weak.

[2] Social and Economic Implications of Vertical Integration in the Broiler Industry, Maine Agricultural Experiment Station, Unpublished data, L. A. Ploch and R. F. Saunders.

TABLE 20. HAVE YOU, AS AN INDEPENDENT GROWER, EVER EXPERIENCED ANY DIFFICULTY IN FINDING A MARKET FOR YOUR BIRDS?

30 Independent Growers, Maine, 1955

Response	Per cent of growers
Yes	17
No	83
Total	100

MANAGEMENT PRACTICES

In Maine, most of the management decisions regarding broiler production practices are made by contractor-processors who employ flock supervisors to see that prescribed management practices are carried out by the grower. The contractor-processor determines the number of birds to be started on each farm, the time of starting each lot, the breed and sex of birds, the feed used, the feeding and disease control programs, and the age and weight at which the birds will be marketed.

During the summer of 1957 production data were obtained on some 300 contract lots of broilers marketed during the period July 1, 1956 to June 30, 1957. Information was secured on the number of broilers raised, month started, mortality, feed conversion, age and weight when processed, labor efficiency and total production costs.

SIZE OF BROILER FARMS

The average capacity of 614 Maine contract broiler farms in 1956 was 11,060 birds (table 21). Fifteen per cent of the farms had a capacity of less than 5,000 birds. Another 34 per cent had capacity for between 5,000 and 10,000 broilers, while 29 per cent were between 10,000 and

TABLE 21. SIZE OF BROILER FARMS

614 Broiler Farms, Maine, 1956

Number of birds per lot		
Range	Average	Per cent of farms
Under 2,500	1,909	2
2,500 - 4,999	3,748	13
5,000 - 7,499	6,076	19
7,500 - 9,999	8,533	15
10,000 - 12,499	10,805	19
12,500 - 14,999	13,526	10
15,000 - 17,499	15,858	8
17,500 - 19,999	18,530	4
20,000 - 22,499	20,900	3
22,500 - 24,999	23,711	2
25,000 - 27,499	26,184	2
27,500 - 29,999	27,927	1
30,000 and over	36,668	2
All farms	11,060	100

15,000 bird size. Twelve per cent of the farms had space for between 15,000 and 20,000 broilers and 10 per cent were over 20,000 bird size.

MONTH STARTED

Of 317 lots of broilers started during the 1956-57 period studied 38 lots, or 12 per cent of the total, were started in May (table 22). The second most important month was April. Eight per cent of the 317 lots were started in each of the other months, with the exception of September and October when 7 per cent and 6 per cent of the lots were started, respectively.

The proportion of the lots started in each season of the year was as follows: 31 per cent were started in the spring, 24 per cent were started in the winter, 24 per cent were started in the summer, and 21 per cent were started in the fall.

TABLE 22. MONTH STARTED
317 Lots of Broilers, Maine, 1956-57

Month started	Number of lots	Per cent of all lots	Month started	Number of lots	Per cent of all lots
January	26	8	August	24	8
February	25	8	September	22	7
March	25	8	October	21	6
April	34	11	November	25	8
May	38	12	December	26	8
June	26	8			
July	25	8	All lots	317	100

MORTALITY

The average rate of mortality was 3.2 per cent (table 23). The lots having the lowest rate of mortality averaged 0.4 per cent while those with the highest rate of mortality averaged 10.3 per cent.

TABLE 23. RATE OF MORTALITY
317 Lots of Broilers, Maine, 1956-57

Per cent of mortality		Number sold per lot	Per cent of lots
Range	Average		
Under 1.0	.4	10,018	12
1.0 - 1.9	1.4	11,400	20
2.0 - 2.9	2.4	11,829	24
3.0 - 3.9	3.3	9,388	14
4.0 - 4.9	4.3	12,600	10
5.0 - 5.9	5.2	12,630	7
6.0 - 6.9	6.3	11,653	5
7.0 and over	10.3	10,058	8
All lots	3.2	11,564	100

The most frequent causes of mortality according to the survey were the respiratory diseases. Forty-seven per cent of the lots had experienced trouble with respiratory diseases (table 24). The respiratory diseases referred to in the survey included chronic respiratory disease, bronchitis, air-sac infection and Newcastle disease.

TABLE 24. CAUSES OF MORTALITY
303 Lots of Broilers, Maine, 1956-57

Causes of mortality	Number of lots	Per cent of all lots
Respiratory diseases*	141	47
Coccidiosis	38	13
Weak chicks	34	11
Over heating or chilling	31	10
Other**	65	21
Unknown	45	14

* Includes respiratory, bronchitis, Newcastle, air-sac infection.
** Includes leukosis, tremors, enteritis, debeaking, capetting and vaccination complex.

Coccidiosis was a cause of mortality in 13 per cent of all lots, weak chicks were a cause of mortality in 11 per cent of all lots, and overheating or chilling were a cause of mortality in 10 per cent of all lots. Growers did not give any specific cause for mortality in 14 per cent of all lots.

FEED CONVERSION

The average feed conversion was 2.79 pounds of feed per pound of meat (table 25). The 5 per cent of the lots which had the best feed conversion averaged 2.27. The 7 per cent having the poorest feed conversion averaged 3.53. Fifty-two per cent of the lots had feed conversions in the relatively narrow range between 2.6 and 2.9.

TABLE 25. FEED CONVERSION
317 Lots of Broilers, Maine, 1956-57

Pounds of feed per pound of meat		Number sold per lot	Per cent of lots
Range	Average		
Under 2.4	2.27	10,194	5
2.4 - 2.5	2.50	10,934	17
2.6 - 2.7	2.69	12,239	30
2.8 - 2.9	2.88	11,365	22
3.0 - 3.1	3.07	10,741	13
3.2 - 3.3	3.30	12,791	6
3.4 and over	3.53	8,890	7
All lots	2.79	11,564	100

AGE WHEN PROCESSED

The average age of the broilers when delivered to the processing plant was 10.6 weeks (table 26). The youngest lots were marketed at an average of 8.6 weeks while the oldest lots were marketed at an average of 12.6 weeks of age. The most common age at which the birds were marketed was 10 to 11 weeks.

TABLE 26. AGE WHEN PROCESSED
317 Lots of Broilers, Maine, 1956-57

Age when sold (weeks)		Number sold per lot	Per cent of lots
Range	Average		
Under 9.0	8.6	13,807	1
9.0 - 9.9	9.6	11,769	18
10.0 - 10.9	10.3	10,964	48
11.0 - 11.9	11.1	12,668	23
12.0 and over	12.6	9,198	10
All lots	10.6	11,564	100

WEIGHT WHEN PROCESSED

The average weight per bird sold or delivered was 3.62 pounds (table 27). Four per cent of the lots were marketed at an average weight of 2.87 pounds per bird, while 7 per cent were marketed at an average weight of 4.75 pounds per bird. The most common weight at which birds were marketed was 3.50 to 3.75 pounds.

TABLE 27. WEIGHT WHEN PROCESSED
317 Lots of Broilers, Maine, 1956-57

Weight per bird sold (pounds)		Number sold per lot	Per cent of lots
Range	Average		
Under 3.00	2.87	11,737	4
3.00 - 3.24	3.12	9,973	6
3.25 - 3.49	3.38	14,193	19
3.50 - 3.74	3.59	10,573	35
3.75 - 3.99	3.84	11,116	21
4.00 - 4.24	4.06	10,169	8
4.25 and over	4.75	11,308	7
All lots	3.62	11,564	100

The average point spread (average weight per bird minus feed conversion) was 83 points (table 28). Three per cent of the lots had an average point spread of –36 points while six per cent had an average point spread of 157 points. The most common point spreads were between 80 and 100 points.

TABLE 28. POINT SPREAD
317 Lots of Broilers, Maine, 1956-57

Point spread		Number sold per lot	Per cent of lots
Range	Average		
Less than 0	-36	6,895	3
0 - 19	12	9,192	3
20 - 39	27	7,543	6
40 - 59	51	13,092	11
60 - 79	70	12,195	21
80 - 99	90	11,443	27
100 - 119	108	11,816	17
120 - 139	127	12,009	6
140 and over	157	9,816	6
All lots	83	11,564	100

LABOR EFFICIENCY

An average of 48 man hours of labor per 1,000 birds was required to raise a lot of broilers (table 29). This includes time spent by the operator, family and hired help in doing all the jobs that are necessary in raising a lot of broilers—cleaning and preparing the house between lots, feeding, tending brooder stoves, cleaning waterers, stirring feed and litter, adjusting windows, feeders and waterers, routine checking on the birds, repairing and maintaining buildings and equipment, ordering supplies and keeping records. The most efficient lots in terms of labor required an average of only 25 hours of labor per 1,000 birds while the lots having the least efficient use of labor needed 79 hours per 1,000 birds. As would be expected, there was a direct relationship between man hours of labor required per 1,000 birds and size of lot raised, with the larger growers making more efficient use of labor. With more Maine growers installing facilities for handling bulk feed, the labor requirements for raising broilers are being further reduced.

TABLE 29. LABOR EFFICIENCY
317 Lots of Broilers, Maine, 1956-57

Hours of labor per 1,000 birds		Number sold per lot	Per cent of lots
Range	Average		
Under 30	25	16,504	12
30 - 39	34	14,241	20
40 - 49	43	13,250	25
50 - 59	51	10,811	19
60 - 69	64	8,860	11
70 and over	79	7,923	13
All lots	48	11,564	100

One hundred lots raised in remodeled barns were selected for comparison with 100 lots of comparable size raised in buildings designed and constructed primarily for broilers. The total labor requirement in

terms of hours per 1,000 birds was 53 hours for lots raised in remodeled barns, and 48 hours for lots raised in houses constructed specifically for raising broilers (table 30).

TABLE 30. RELATIONSHIP BETWEEN TYPE OF HOUSE AND LABOR EFFICIENCY

200 Lots of Broilers, Approximately Matched for Size of Flock
Maine, 1956-57

Item	Type of house	
	Remodeled barn	Broiler house
Number of lots	100	100
Number sold per lot	11,929	11,934
Hours of labor per 1,000 birds	53	48

Fifty lots grown with automatic feeders were selected for comparison with 50 lots of comparable size having hanging feeders and with 50 lots on trough feeders. The total labor requirement in terms of hours per 1,000 birds was 42 hours for the lots having automatic feeders, 44 hours for lots having hanging feeders and 46 hours for lots having trough feeders (table 31).

TABLE 31. RELATIONSHIP BETWEEN TYPE OF FEEDERS USED AND LABOR EFFICIENCY

150 Lots of Broilers, Approximately Matched for Size of Flock
Maine, 1956-57

Item	Type of feeder used		
	Trough	Hanging	Automatic
Number of lots	50	50	50
Number sold per lot	13,044	13,109	13,182
Hours of labor per 1,000 birds	46	44	42

PRODUCTION COSTS

The average total cost of producing broilers for 317 lots studied in 1956-57 was 20.4 cents per pound (table 32). The 8 per cent of the lots having the lowest production cost averaged 16.1 cents per pound of broiler delivered. The 11 per cent having the highest cost averaged 23.9 cents per pound of broiler delivered. Forty-two per cent of the lots had production costs in the range between 19 and 21 cents per pound.

TABLE 32. TOTAL PRODUCTION COSTS*
317 Lots of Broilers, Maine, 1956-57

Production costs (cents per pound)		Number sold per lot	Per cent of lots
Range	Average		
Under 18	16.1	10,579	8
18 - 18.9	18.5	11,135	11
19 - 19.9	19.5	11,392	22
20 - 20.9	20.3	11,863	20
21 - 21.9	21.5	11,180	16
22 - 22.9	22.4	12,664	12
23 and over	23.9	12,106	11
All lots	20.4	11,564	100

* Includes chicks, feed, fuel, litter, lights, medicine, insurance on birds, poultry tax, grower payment, flock supervision and office expense.

COMPARATIVE EFFICIENCY OF SYSTEMS OF BROILER PRODUCTION

The outstanding feature of the growth and development of the broiler industry during the past 20 years has been its unusual organization compared to other agricultural enterprises. To a significant degree, although with some variations from one broiler area to another, the production and marketing process has been integrated to a much greater extent than in other types of agriculture. This fact has been advanced as one explanation for the tremendous expansion of the broiler industry in a relatively short time and for the rapid improvements in efficiency.

In this connection, the question arises as to the relative efficiency of producing broilers under the integrated or contract system as compared to the "independent" system which has been more typical of agriculture in general. Also within the contract system itself there is the question as to which type of grower payment plan provides the best results in terms of efficiency and production costs.

CONTRACT AND INDEPENDENT SYSTEMS

The production efficiency and costs for 197 lots of broilers produced under the contract system are compared with 94 independent lots of broilers in table 33. The data in table 35 are for broilers marketed during the 12-month period July 1, 1954 to June 30, 1955 and are not representative of current (1958) levels of efficiency and costs since substantial improvements have been made since then. The data do, however, indicate the comparative efficiency of the two systems of broiler production.

The findings show that broilers produced on a contract basis under the control and supervision of contractor-processors generally are produced at a lower total cost than broilers raised on an independent basis.

TABLE 33. COMPARATIVE EFFICIENCY OF TWO SYSTEMS OF BROILER GROWING

Maine, 1955

Item	System	
	Contract	Independent
Number of farms	58	30
Number of lots	197	94
Number started per lot	12,651	11,181
Per cent mortality	3.7	3.9
Age at sale, weeks	10.9	10.9
Weight at sale, pounds	3.61	3.38
Feed conversion, lbs. feed/lb. meat	2.97	3.02
Point spread	64	36
Hours of labor per 1,000 birds	47	49
Investment (bldgs. & equip.), dollars per bird	1.12	1.36
	Cents per pound of broiler	
Production costs:		
Feed	14.7	15.2
Chicks	3.5	4.2
Labor }	3.0*	2.1
Buildings & equipment }		1.6
Flock supervision	.6	—
Fuel & electricity	.7	.7
Litter	.3	.2
Medicine	**	.2
All other	.1	.2
Total costs	22.9	24.4

* Grower payment, commonly one cent per week per bird delivered.
** Less than .05 cent.

Moreover, contract broiler lots generally are more uniform in size and quality than are independent lots. Total cost of production including the grower payment and supervision for the contract lots averaged 22.9 cents per pound compared to a 24.4 cents per pound average for independent lots, a difference of 1.5 cents per pound.

Several factors may account for this difference. The more favorable weights and feed conversions in contract lots are probably the result of superior technical knowledge, management and supervision employed by the relatively large vertically integrated broiler operations. Also there are certain economies associated with large volume purchasing of feed, chicks and supplies that the larger integrated operations may be able to take advantage of more readily than smaller independent growers.

One of the alleged weaknesses of the contract system has been that it provides little incentive for the grower to do a good job in caring for the birds. This weakness has evidently been overcome to a considerable extent in Maine through the application of good management and close supervision on the part of contractor-processors, incentive and profit sharing arrangements, and the likelihood of being dropped if satisfactory performance is not attained.

FLAT-FEE AND PROFIT SHARING PLANS

Within the contract system there is the question as to which type of grower payment plan provides the best results in terms of efficiency and production costs. In table 34, 125 contract lots of broilers marketed during the period July 1, 1956 to June 30, 1957, for which the grower received a flat-rate payment amounting to approximately one cent per bird per week, are compared with 101 contract broiler lots marketed during the same 12-month period for which the grower received a minimum guarantee of ½ cent per bird per week plus a share in the profits.

The findings show that broilers grown under profit sharing or incentive plans with minimum guarantees are generally produced at a lower cost than broilers grown under flat-fee grower payment plans. There was a difference of 1.4 cents per pound in the total production cost of birds raised under the flat-fee plan and under an incentive plan. Lots of the former averaged 21.4 cents per pound and lots raised under incentive or profit sharing arrangements averaged 20.1 cents a pound. In both cases the payment made to the grower by the contractor was included.

TABLE 34. COMPARATIVE EFFICIENCY OF TWO TYPES OF GROWER PAYMENT PLANS
226 Contract Lots of Broilers, Maine, 1956-57

Item	Grower payment plan	
	Flat-fee	Minimum guarantee with share in profits or bonus
Number of lots	125	101
Number of birds per lot	11,292	12,515
Per cent mortality	3.2	3.4
Age, weeks	10.7	10.4
Weight, pounds	3.67	3.65
Feed conversion, lbs. feed/lb. meat	2.88	2.71
Point spread	79	94
Total production costs, cents/lb.	21.4	20.1
Grower payment:		
Cents per pound	2.7	2.3
Cents per bird per week	.94	.82

Part of the difference in production costs is due to the difference in the amount of the grower payment which averaged 2.7 cents per pound for flat-fee lots and 2.3 cents per pound for profit sharing lots, a difference of .4 cents per pound. The remaining difference of about one cent is due largely to the better average feed efficiency of profit sharing lots. It would appear then that profit sharing plans with minimum guarantees do provide more incentive to contract growers to reduce production costs than do plans that offer growers a flat-rate payment per bird.

FACTORS AFFECTING PRODUCTION COSTS

The factors primarily affecting costs are size of lot, feed conversion, labor efficiency, and rate of mortality.

The averages of the production factors for 291 lots of broilers marketed during the period July 1, 1954 to June 30, 1955, are summarized in table 35 and may be referred to when interpreting the production factors of the various groupings shown in the tables throughout the remainder of the report. It should be understood that since 1955 production costs have been reduced substantially, therefore the data in the following tables do not reflect current levels of efficiency and costs. The analysis does, however, serve to show the effect of various production factors on costs of producing broilers.

TABLE 35. SELECTED PRODUCTION FACTORS
291 Lots of Broilers, Maine, 1954-55

Number of farms	88
Number of lots	291
Number started per lot	12,176
Per cent mortality	3.8
Age when processed, weeks	10.6
Weight when processed, pounds	3.54
Pounds of feed per pound of meat	2.99
Hours of labor per 1,000 birds	48

SIZE OF LOT

One of the most important factors affecting costs and profits in the broiler enterprise is the number of birds started (table 36).

TABLE 36. RELATIONSHIP OF THE NUMBER OF BROILERS STARTED TO COST PER POUND OF BROILER DELIVERED
291 Lots of Broilers, Maine, 1954-55

Item	Number started				
	Under 5,000	5,000-9,999	10,000-14,999	15,000-19,999	20,000 and over
Number of lots	12	96	87	67	29
Number started per lot	3,117	6,988	12,107	16,933	22,307
Per cent mortality	3.8	3.6	3.7	4.2	3.6
Age when processed, weeks	11.1	11.0	11.0	10.9	10.6
Weight when processed, pounds	3.5	3.6	3.6	3.5	3.4
Pounds of feed per pound of meat	2.97	2.99	3.02	2.97	2.92
Hours of labor per 1,000 birds	73	60	47	39	37
	Cents per pound of broiler				
Costs:					
Feed	15.6	14.9	15.1	14.7	14.4
Chicks	3.7	3.8	3.9	3.6	3.6
Labor	2.7	2.4	1.7	1.5	1.5
Buildings & equipment	3.5	1.5	1.1	1.3	1.4
Fuel & electricity	.5	.8	.7	.8	.6
Litter	.3	.2	.2	.2	.1
Medicine	.2	.1	*	*	*
All other	.3	.2	.1	.1	.1
Total costs	26.8	23.9	22.8	22.2	21.7

* Less than .05 cent.

The total cost per pound of broiler delivered for the 12 smallest lots (averaging 3,117 birds) was 26.8 cents while the corresponding figure for the 29 largest lots (averaging 22,307 birds) was 21.7 cents, or a difference of 5.1 cents per pound. Most of this difference in costs can be accounted for by the reduction in costs of labor and buildings as the size of the lot increased. The cost of labor decreased from 2.7 cents per pound of broiler sold for the 12 small lots to 1.5 cents per pound for the 29 large lots, a difference in costs of labor of 1.2 cents per pound The costs of buildings and equipment decreased from 3.5 cents per pound for the small lots to 1.4 cents per pound for the large lots. Approximately 65 per cent of the 5.1 cents difference in total costs in favor of the large lots can be attributed to savings in labor, building and equipment costs.

FEED CONVERSION

The conversion of feed into meat is one of the important production factors as far as the broiler producer is concerned. Since the cost of feed amounted to over 60 per cent of the total cost of producing a pound of broiler meat, costs vary directly with this production factor.

The age when processed, weight when processed and rate of mortality are closely associated with feed efficiency and must be taken into account when considering the effects of feed efficiency on costs. As feed efficiency decreased, the age and weight when processed and rate of mortality increased.

The difference in total costs between lots having the most efficient

TABLE 37. RELATIONSHIP OF POUNDS OF FEED USED PER POUND OF MEAT TO COSTS PER POUND OF BROILER DELIVERED

291 Lots of Broilers, Maine, 1954-55

Item	Pounds of feed used per pound of meat			
	Under 2.7	2.7-2.9	3.0-3.2	3.3 and over
Number of lots	23	134	83	49
Number started per lot	10,483	12,457	12,802	11,431
Per cent mortality	2.7	2.5	4.5	6.4
Age when processed, weeks	9.9	10.3	11.3	12.4
Weight when processed, pounds	3.3	3.4	3.5	4.0
Pounds of feed per pound of meat	2.58	2.81	3.09	3.48
Hours of labor per 1,000 birds	48	47	46	55
	Cents per pound of broiler			
Costs:				
Feed	12.9	14.2	15.3	17.1
Chicks	4.2	3.7	3.8	3.4
Labor	2.0	1.9	1.8	1.9
Buildings & equipment	1.5	1.5	1.3	1.2
Fuel & electricity	.7	.6	.8	1.0
Litter	.3	.2	.2	.2
Medicine	*	*	.1	.1
All other	*	.1	.1	.4
Total costs	21.6	22.2	23.4	25.3

* Less than .05 cent.

feed conversion (2.58 pounds of feed per pound of meat) and the lots having the least efficient feed conversion (3.48 pounds of feed per pound of meat) was 3.7 cents per pound of broiler delivered (table 37).

The feed costs for lots having the most efficient feed conversion were 12.9 cents per pound and the corresponding figure for the lots having the least efficient feed conversion was 17.1 cents. The difference in feed costs was 4.2 cents per pound.

LABOR EFFICIENCY

The hours of labor required per 1,000 birds are the result of several other production factors such as the number of birds started, age when processed, rate of mortality, organization and layout of plant, work methods, and the type of feed, water and heating equipment used. However, efficient use of labor has an important effect on total costs per pound of broilers. The above factors must be considered in interpreting the data in table 38. Labor costs for the most efficient lots amounted to 1.1 cents per pound of broiler delivered while the labor costs for the least efficient lots amounted to 2.9 cents per pound of broiler delivered (table 38). The difference of 1.8 cents in labor costs substantially affected total costs.

MORTALITY

The rate of mortality has a substantial effect upon profits by influencing costs. The total costs for the 89 lots having the lowest rate of

TABLE 38. RELATIONSHIP OF LABOR EFFICIENCY TO COSTS PER POUND OF BROILER DELIVERED

291 Lots of Broilers, Maine, 1954-55

Item	Hours of labor per 1,000 birds			
	Under 30	30-49	50-69	70 and over
Number of lots	46	124	74	41
Number started per lot	16,276	13,431	9,945	8,832
Per cent mortality	4.7	3.4	3.4	4.6
Age when processed, weeks	10.9	10.7	10.9	11.6
Weight when processed, pounds	3.4	3.5	3.6	3.8
Pounds of feed per pound of meat	2.97	2.98	2.97	3.09
Hours of labor per 1,000 birds	22	40	59	85
	Cents per pound of broiler			
Costs:				
Feed	14.7	14.9	14.7	15.6
Chicks	3.8	3.8	3.7	3.7
Labor	1.1	1.6	2.2	2.9
Buildings & equipment	1.4	1.4	1.3	1.4
Fuel & electricity	.7	.7	.8	1.0
Litter	.3	.2	.2	.3
Medicine	*	.1	*	.1
All other	.1	.1	.2	.2
Total costs	22.1	22.8	23.1	25.2

* Less than .05 cent.

mortality were 22.2 cents per pound of broiler delivered compared to 24.5 cents for the 53 lots having the highest rate of mortality (table 39). The higher total costs for the lots having the highest rate of mortality were caused primarily by the increased feed costs due to less efficient feed conversion.

TABLE 39. RELATIONSHIP OF PER CENT MORTALITY TO COSTS PER POUND OF BROILER DELIVERED

291 Lots of Broilers, Maine, 1954-55

Item	Per cent mortality			
	Under 2	2.0-2.9	4.0-5.9	6 and over
Number of lots	89	92	55	53
Number started per lot	11,334	12,542	12,404	12,987
Per cent mortality	1.1	2.8	4.7	9.0
Age when processed, weeks	10.4	10.9	11.0	11.6
Weight when processed, pounds	3.4	3.5	3.5	3.7
Pounds of feed per pound of meat	2.86	2.93	3.04	3.24
Hours of labor per 1,000 birds	49	49	46	48
	Cents per pound of broiler			
Costs:				
Feed	14.3	14.7	15.2	15.9
Chicks	3.8	3.7	3.8	3.7
Labor	1.9	1.9	1.9	1.8
Buildings & equipment	1.4	1.5	1.4	1.4
Fuel & electricity	.6	.6	.8	1.1
Litter	.2	.2	.2	.2
Medicine	*	.1	.1	.1
All other	*	.2	.1	.3
Total costs	22.2	22.9	23.5	24.5

* Less than .05 cent.

COMBINATION OF FACTORS

It has been shown that the number of chicks started, rate of mortality, feed efficiency and labor efficiency have a substantial effect upon costs in producing broilers.

Total costs decreased from 25.0 cents per pound of broiler delivered for the lots that were above average in none of these factors to 21.2 cents per pound for the lots that were above average in all four factors (table 40). This is a difference of 3.8 cents per pound in total costs.

Feed costs decreased from 16.3 cents per pound for lots that were above average in none of these factors to 14.0 cents per pound for the lots that were above average in all four factors. This is a difference of 2.3 cents per pound in feed costs.

There was also a 1.1 cents per pound difference in labor costs in favor of the lots above average in all four factors.

TABLE 40. RELATIONSHIP OF NUMBER OF FACTORS ABOVE AVERAGE TO COST PER POUND OF BROILER DELIVERED

291 Lots of Broilers, Maine, 1954-55

Item	Number of factors above average				
	None	One	Two	Three	Four
Number of lots	27	52	106	64	40
Factors considered					
Number started per lot	7,819	10,087	11,424	13,606	17,920
Per cent mortality	7.0	5.1	3.8	2.4	2.0
Pounds of feed per pound of meat	3.39	3.07	3.00	2.86	2.78
Hours of labor per 1,000 birds	73	59	45	44	32
Other factors					
Age when processed, weeks	12.1	11.3	10.9	10.4	10.4
Weight when processed, pounds	4.1	3.6	3.5	3.4	3.4
	Cents per pound of broiler				
Costs:					
Feed	16.3	15.4	15.1	14.1	14.0
Chicks	3.4	3.8	3.9	3.7	3.6
Labor	2.5	2.4	1.7	1.8	1.4
Buildings & equipment	1.1	1.6	1.5	1.3	1.4
Fuel & electricity	1.0	.9	.8	.6	.6
Litter	.2	.2	.2	.2	.2
Medicine	.1	.1	*	*	*
All other	.4	.2	.1	*	*
Total costs	25.0	24.6	23.3	21.7	21.2

* Less than .05 cent.