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A Perspective of Tennessee Broiler Production

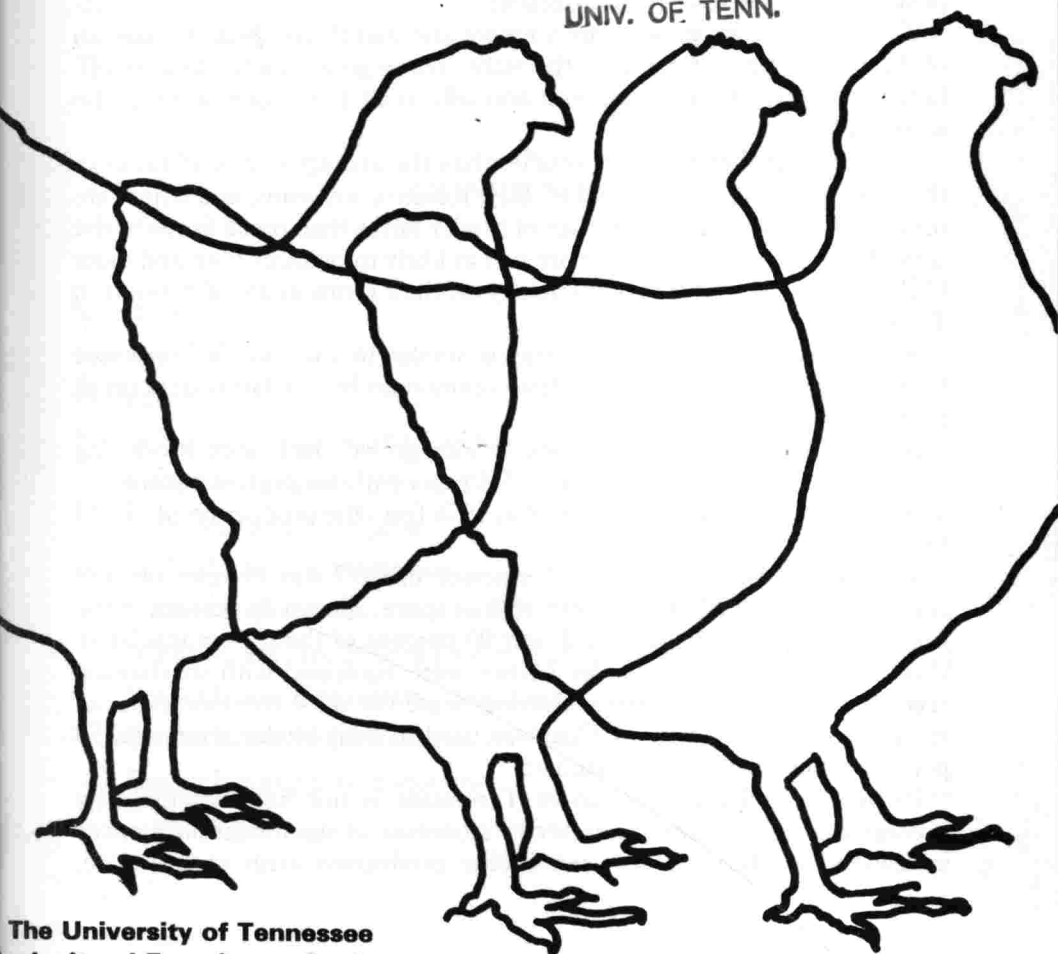
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Summary

Less than 2 percent of the broiler chickens produced in the U. S. each year are grown in Tennessee. However, broiler production is an important agricultural enterprise in some Tennessee counties — contributing over 50 percent of the value of agricultural sales.

Survey data describing selected characteristics of Tennessee broiler farms, broiler farm operators, and broiler enterprises which should be related to future broiler production potential in the state are presented in this report. In addition, selected characteristics of Tennessee broiler farms and broiler farm operators are compared in this report with those of all farms and all farm operators in the state. Differences in selected characteristics of broiler enterprises between production areas in Tennessee are also analyzed in this report.

Tennessee broiler growers are younger and slightly less likely to have an off-farm job than all farmers in the state. Those growers who do work off-farm earn about the same amount annually as all Tennessee farmers who work off-farm.

Tennessee broiler farms are smaller than the average size of all farms in the state based on acres per farm. Hay, tobacco, soybeans, and wheat are produced on a smaller percentage of broiler farms than on all farms in the state. However, broiler growers are just as likely to produce corn and more likely to grow vegetables commercially on their farms as are all farmers in Tennessee.

Beef production on broiler farms is similar to that on all Tennessee farms. However, dairy herds are less common on broiler farms than on all farms in the state.

In 1977 the average Tennessee broiler grower had been producing broilers on contract for 9.3 years — 5.8 years with his present contractor. The average grower received \$6,054 in 1976 from the production of 73,113 broilers.

The average broiler house in Tennessee in 1977 was 10 years old and contained about 9,073 square feet of floor space. Almost 80 percent of the houses were pole structures and over 90 percent of them were insulated. Over 60 percent of the broiler houses were equipped with mechanical feeders and sawdust and wood shavings were the most common types of litter used in broiler houses. Coal was used to heat broiler houses on 50 percent of the broiler farms studied.

However, broiler production in Tennessee is not fully described by average grower and farm characteristics because of significant differences in these characteristics between broiler production areas in the state.

Broiler houses in Region 1 (Fentress, Morgan, and Scott counties) are older and smaller than those in the other two regions analyzed. And Region 1 is characterized by a smaller percentage of broiler houses which are insulated and equipped with mechanical feeders than is either Region 2 or 3. Coal is used to heat broiler houses on a higher proportion of farms in Region 1 than in either of the other two study regions. And broiler income per farm in 1976 was lower in Region 1 than in either Region 2 or 3 apparently due to lower contractor payments to growers.

In contrast, broiler houses in Region 3 (Bradley, Hamilton, McMinn, Marion, Monroe, Polk, and Sequatchie counties) are newer and larger than those in either of the other two regions analyzed in this study. A larger percentage of broiler houses are equipped with mechanical feeders and a smaller proportion of broiler growers use coal to heat their broiler houses in Region 3 than in either Region 1 or 2. And broiler income per farm in Region 3 in 1976 was more than twice as large as in either of the other two study areas primarily because of the larger number of broilers produced per farm in Region 3.

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A Perspective of Tennessee Broiler Production

by

Charles M. Cuskaden and Gary Gene Hunter

Broiler chicken production in Tennessee is only a small part of the U. S. broiler industry. Tennessee growers produced 1.4 percent of the 3,399,960,000 broilers produced in the U. S. in 1977 and the value of broiler production in Tennessee in 1977 was \$39,792,000, 1.3 percent of the value of all broilers produced in the U. S.¹

Broiler production accounted for less than 10 percent of the total value of farm sales in Tennessee in 1974 (Table 1). However, broilers are grown in relatively few counties in the state and in some counties they account for a significant portion of the value of farm products sold. In 1974, poultry products accounted for over 59 percent of the total value of farm products sold in Grundy County and for over 50 percent of the total value of farm products sold in Bradley, Fentress, and Hamilton counties.²

The primary purpose of this report is to present data obtained from a survey of Tennessee broiler farm operators which describe selected characteristics of broiler growers, broiler farms, and broiler enterprises.³ Two other objectives of this report are to: 1) compare selected characteristics of Tennessee broiler farms and broiler farm operators with those of all farms and all farm operators, and 2) analyze differences in selected characteristics of broiler enterprises between geographic production areas of the state.

The information in this report should be related to future broiler production potential in Tennessee. Although not included in this report, information about contract provisions, grower attitudes toward and perceptions of broiler contract provisions, and the potential for future broiler production in the state was also obtained in the survey of broiler farm operators. The characteristics of broiler production and the differences between: 1) broiler farms and all farms, 2) broiler farm operators and all farm operators, and 3) broiler enterprises in various production areas presented in this report will be used in analyzing broiler production potential in Tennessee in future research reports on contract broiler production.

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¹Agricultural Statistics 1978, United States Department of Agriculture, p. 403.

²1974 U. S. Census of Agriculture, Tennessee state and county data for farms with sales of \$2,500 or more.

³Data of the nature presented in this report, particularly that describing the broiler enterprise, is not generally available in secondary agricultural data sources.

TABLE 1. 1974 TENNESSEE BROILER PRODUCTION, POULTRY AND POULTRY PRODUCTS SALES,
AND TOTAL AGRICULTURAL SALES BY COUNTY

	Broiler production		Value of poultry and products sales		Value total ag. sales		Poultry and products sales share of total ag sales
	Number	(%)	(\$1,000)	(%)	(\$1,000)	(%)	(%)
Fentress	4,159,421		3,088		6,065		
Morgan	1,065,820		780		2,471		
Scott	765,917		607		1,647		
Region 1	5,991,158	17.0	4,475	6.1	10,183	1.2	43.9
Bedford	586,662		1,198		11,239		
Coffee	131,113		249		12,841		
Franklin	741,525		2,114		17,393		
Lincoln	336,001		808		17,362		
Grundy	3,898,287		3,377		5,710		
Region 2	5,693,588	16.1	7,746	10.5	64,545	7.4	12.0
Bradley	6,766,938		6,118		11,571		
Hamilton	2,650,538		4,256		7,953		
McMinn	1,249,309		5,035		17,363		
Marion	1,956,872		1,518		3,601		
Monroe	954,285		1,298		9,755		
Polk	2,261,789		1,827		4,596		
Sequatchie	971,470		1,081		2,737		
Region 3	16,811,201	47.7	21,133	28.8	57,576	6.6	36.7
Three Region Total	28,495,947	80.8	33,354	45.4	132,304	15.1 ^a	25.2
Tennessee	35,269,405	100.0	73,476	100.0	874,192	100.0	8.4

Source: 1974 U. S. Census of Agriculture — Includes only farms with sales of \$2,500 or more.

^aRegions 1 through 3 do not sum to the "Three Region Total" due to rounding error.

Procedure

A complete list of Tennessee growers producing broilers on contract in 1977 for four companies located in Tennessee was used as the basis for a random sample of 88 broiler growers⁴ living in 15 different Tennessee counties. Data were obtained by personal interview. The sample area used in this study was subdivided by geographic area to facilitate analysis of regional differences in broiler production. Three subregions (Figure 1) were delineated for this purpose based on the geological characteristics of the counties in the sample area and their location with respect to three broiler chicken processing and feed distribution centers⁵ in the study region. Tests for differences in broiler enterprise characteristics between the three geographical subregions delineated in this study are based on the chi-square (χ^2) statistic.⁶

Broiler Farms Compared with All Farms

A comparison of selected characteristics of broiler growers and broiler farms with those of all farm operators and all farms in the study area and all farm operators and all farms in Tennessee is presented in this section.

Operator Age and Off-Farm Work

The broiler growers sampled averaged almost 47 years old (Table 2). Growers in Region 1 were the oldest of the three regions, averaging almost 50 years old. The average age of growers in Region 2 was under 45 and they were the youngest in the three study areas.

Broiler growers averaged over 5 years younger than all farmers in the sample area and in Tennessee. The average age of broiler growers in Region 1 was close to the average age of all farmers in that region. However, in each of the other two regions, broiler growers averaged at least 6 years younger than all farmers in the same region.

⁴The sample used in this study was drawn from a list of 560 broiler growers and the sample size was determined using a method outlined in: Taro Yamane, *Statistics — An Introductory Analysis* (New York: Harper and Row, 1967), p. 581. A more detailed description of the methodology used in this research project can be found in: Gary Gene Hunter, *An Analysis of Contract Broiler Production in Tennessee*, unpublished M.S. thesis, The University of Tennessee, Knoxville, June, 1978.

⁵Jamestown in Region 1, Shelbyville in Region 2, and Chattanooga in Region 3.

⁶Uses of, and procedures for calculating, the chi-square statistic are discussed in: Sidney Siegel, *Nonparametric Statistics for the Behavioral Sciences* (New York: McGraw-Hill Book Company, 1956), pp. 42-47, 104-111.

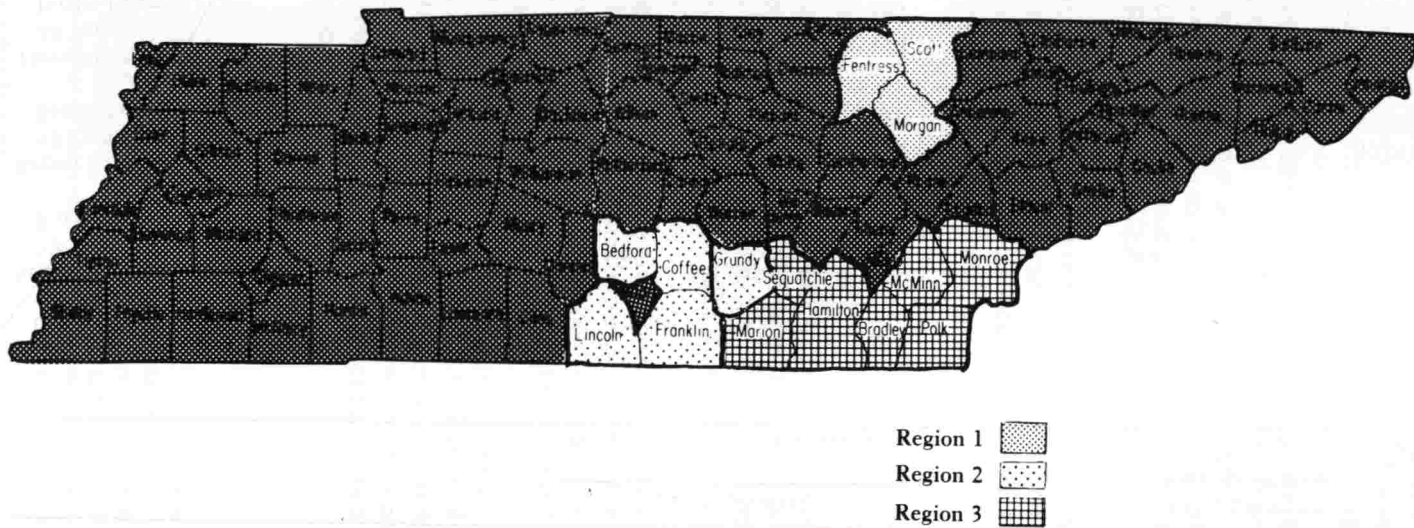


Figure 1. 1977 Tennessee broiler production survey area by region.

TABLE 2. AGE AND OFF-FARM WORK FOR ALL FARM AND BROILER FARM OPERATORS IN TENNESSEE BY REGION

	Farm operators		Farm operators working off farm ^c	
	Number	Avg. age (yrs.)	(%)	Nonfarm earnings ^d
Region 1				
All Farmers ^a	467	51.3	61.7	\$ 7,953
Broiler Farms ^b	28	49.7	50.0	9,597
Region 2				
All Farms	3,308	52.6	54.4	9,553
Broiler Farms	32	44.7	53.1	11,081
Region 3				
All Farms	1,706	52.4	56.7	10,291
Broiler Farms	28	46.0	50.0	13,086
Three Region Total				
All Farms	5,481	52.4	55.7	9,636
Broiler Farms	88	46.7	51.1	11,243
Tennessee				
All Farms	48,292	53.1	55.6	9,055

^a1974 U. S. Census of Agriculture — Includes only farms with sales of \$2,500 or more.

^b1977 Broiler Farm Survey.

^cThe "All Farms" category includes only individual or family operations (sole proprietorships) and partnerships. Off-farm work by all farm operators is for 1974 and by broiler farm operators is for 1976.

^dAverage for operators reporting off-farm work.

Off-farm work was reported by over half of the broiler growers surveyed. However, the percentage of broiler growers reporting off-farm work was lower than either the percentage of all farmers in the study area working off-farm or the percentage of all farmers in Tennessee working off-farm.

The average annual earnings from off-farm work by all farm operators and broiler growers were apparently about equal. Although the income from off-farm work reported by all farmers was lower than that of broiler growers, the reported incomes were for different years. An average annual increase of 8 percent in the 1974 off-farm earnings of all farm operators would make them equivalent to the 1976 off-farm earnings of broiler growers by 1976.⁷

The relative nonfarm earnings of farm operators in the three study areas were the same for both broiler growers and all farmers who reported off-farm work. Income from off-farm work was highest in Region 3 and lowest in Region 1 for both these groups of farm operators.

Farm Size and Enterprises

The average acreage of all farms in the study area and in Tennessee was larger than the average acreage operated by broiler growers (Table 3). The average size of broiler farms in the sample was about 110 acres. The average broiler farm in each region analyzed was smaller than the average size of all farms in the same region.

The largest broiler farms — based on acres per farm⁸ — in the three sample areas were in Region 1. Broiler growers in Region 3 operated the smallest farms in the three areas studied based on average acreage. The rank of all farms in each of the three study regions on the basis of acres per farm was identical to that for broiler farms.

The major crops produced by broiler growers were corn, hay, and tobacco (Table 4). Corn production by broiler growers was similar to that of all farmers in Tennessee both in terms of the percentage producing corn and the average acreage produced. However, based on these two measures both hay and tobacco were less important enterprises on broiler farms than on all farms in the three study regions or in Tennessee.

⁷Data from the *Survey of Business*, Center for Business and Economic Research, The University of Tennessee, indicate that the seasonally adjusted index of average weekly earnings of production workers in manufacturing in Tennessee increased 6.3 percent between January, 1974, and January, 1975, and from January, 1975, to January, 1976, it increased 11.8 percent. Therefore, an average annual increase of 8 percent in the off-farm earnings of farm operators appears feasible.

⁸Acres per farm may not accurately reflect farm size. Over 51 percent of the land-in-farms with sales of \$2,500 or more in Region 1 was classified as wooded in the 1974 U. S. *Census of Agriculture*. However, only about 20 percent of the land-in-farms of the same type in Region 2 was wooded.

Soybeans were produced on more than 25 percent of all farms in Tennessee and all farms in the three study areas, but fewer than 5 percent of the broiler growers surveyed produced soybeans. Wheat was also produced by a much smaller percentage of broiler growers than by either all of the farmers in the study regions or in Tennessee. However, commercial vegetable production was reported by a higher percentage of broiler growers, especially those in Region 1, than by all farmers in Tennessee or all farmers in the three areas analyzed.

Beef cattle and hogs were the most frequently reported livestock enterprises on broiler farms (Table 5). Over half of the broiler growers had beef enterprises on their farms and over a third reported swine enterprises. Beef enterprises were less prevalent on broiler farms than on all farms in Tennessee, but the average number of beef cows on broiler farms reporting beef enterprises was greater than on all farms in the state reporting beef cows.

**TABLE 3. AVERAGE SIZE OF ALL FARMS AND BROILER FARMS
IN TENNESSEE BY REGION**

	Number of farms	Acres per farm
Region 1		
All farms ^a	467	233.6
Broiler farms ^b	28	175.4
Region 2		
All farms	3,308	209.1
Broiler farms	31	81.3
Region 3		
All farms	1,706	198.3
Broiler farms	27	76.3
Three region total		
All farms	5,481	207.8
Broiler farms	86	110.4
Tennessee	48,292	205.2

^a1974 U. S. Census of Agriculture — Includes only farms with sales of \$2,500 or more.

^b1977 Broiler Farm Survey.

TABLE 4. PRODUCTION OF SELECTED CROPS ON ALL FARMS
AND BROILER FARMS IN TENNESSEE BY REGION

	Number of farms	Farms Producing											
		Corn ^c		Soybeans		Hay		Tobacco		Wheat		Vegetables ^e	
		(%)	Acres ^d	(%)	Acres ^d	(%)	Acres ^d	(%)	Acres ^d	(%)	Acres ^d	(%)	Acres ^d
Region 1													
All Farms ^a	467	42.0	22.3	1.5	19.3	66.0	32.2	27.2	1.3	3.0	37.6	8.4	77.3
Broiler Farms ^b	28	53.6	20.9	3.6	25.0	57.1	34.8	25.0	0.9	0.0	---	21.4	69.8
Region 2													
All Farms	3,308	41.0	29.9	36.4	63.7	64.9	31.6	19.2	1.2	22.5	39.1	2.2	6.3
Broiler Farms	32	37.5	26.8	9.4	33.3	43.8	20.7	9.4	1.5	6.3	27.5	3.1	5.0
Region 3													
All Farms	1,076	29.2	21.6	11.0	72.5	66.7	41.9	24.5	1.4	10.1	34.6	3.1	11.5
Broiler Farms	28	21.4	12.0	0.0	---	39.3	21.6	7.1	0.3	3.6	20.0	0.0	---
Three Region Total													
All Farms	5,481	37.4	27.1	25.5	64.7	65.5	34.9	21.5	1.3	17.0	38.2	3.0	24.7
Broiler Farms	88	37.5	21.4	4.5	31.3	46.6	26.4	13.6	1.0	3.4	25.0	8.0	60.5
Tennessee													
All Farms	48,292	37.0	21.4	27.4	104.4	59.7	28.3	41.5	2.0	12.5	39.3	3.4	17.3

^a1974 U. S. Census of Agriculture — Includes only farms with sales of \$2,500 or more.

^dAcres per farm producing.

^b1977 Broiler Farm Survey.

^eVegetables, sweet corn, and melons.

^cCorn for grain.

TABLE 5. LIVESTOCK INVENTORY ON ALL FARMS AND BROILER FARMS
IN TENNESSEE BY REGION

	Number of farms	Farms Reporting					
		Beef cows		Dairy cows		Breeding hogs	
		(%)	Head ^c	(%)	Head ^c	(%)	Head ^c
Region 1							
All Farms ^a	467	55.7	33.6	27.6	16.0	23.3	10.3
Broiler Farms ^b	28	60.7	49.2	10.7	26.3	32.1	9.2
Region 2							
All Farms	3,308	63.5	35.8	23.9	27.3	23.5	9.2
Broiler Farms	32	43.8	34.8	9.4	22.0	53.1	11.8
Region 3							
All Farms	1,706	57.3	34.0	28.9	50.9	11.0	10.8
Broiler Farms	28	50.0	45.1	10.7	52.7	21.4	6.2
Three Region Total							
All Farms	5,481	60.1	35.1	25.8	34.5	19.6	9.6
Broiler Farms	88	51.1	43.4	10.2	33.7	36.4	10.0
Tennessee							
All Farms	48,292	58.9	32.1	20.7	21.5	19.2	9.8

^a1974 U. S. Census of Agriculture — Includes only farms with sales of \$2,500 or more.

^b1977 Broiler Farm Survey.

^cHead per farm reporting.

Swine enterprises were more common, and dairy cows were less common, on broiler farms than on all farms in the three study regions. However, the average size of herds on farms with dairy cows was practically the same for both broiler farms and all farms in the survey region. The size of swine enterprises on farms with breeding hogs was also about the same for both broiler farms and all farms in the study area.

BROILER PRODUCTION IN TENNESSEE

Selected characteristics of broiler production in Tennessee are presented in this section. Regional differences in Tennessee broiler production are also analyzed.

Grower Experience

The experience of the growers surveyed in producing broilers on contract ranged from less than 1 year to 32 years and averaged 9.3 years (Table 6). Broiler growers in Region 1 had the most contracting experience among growers in the three study areas and those in Region 2 had the least. The distributions of broiler farms by operator experience contracting for broiler production in the three areas analyzed were significantly different ($P = .05$). However, the study regions did not differ significantly with respect to the distribution of farms by operator experience producing broilers for their present contractor (Table 7). The average experience which growers reported with their present broiler contractor was 5.8 years. And growers in Region 1, who had the most experience producing broilers on contract, had the shortest tenure with their present contractor.

Number, Age, and Size of Broiler Houses

Almost 65 percent of the broiler growers surveyed reported operating only one broiler house (Table 8). No grower reported over six broiler houses on his farm and the average number of broiler houses reported per farm was 1.5. The distributions of broiler farms by the number of broiler houses on farms were significantly different for the three study areas ($P = .01$). Broiler farm operators in Region 3 reported the largest number of houses per farm and those in Region 2 reported the fewest.

TABLE 6. DISTRIBUTION OF BROILER FARMS BY EXPERIENCE OF OPERATOR PRODUCING BROILERS
ON CONTRACT BY REGION

Experience contracting (years)	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0-7	8	28.6	18	56.3	11	39.3	37	42.0
8-11	11	39.3	4	9.4	12	42.9	26	29.5
12 or more	9	32.1	11	34.4	5	17.9	25	28.4
Total farms	28	100.0	32	100.1 ^a	28	100.1 ^a	88	99.9 ^a
Average ex- perience con- tracting (years)	10.5		7.6		10.1		9.3	

^aDoes not sum to 100 % due to rounding error.

Chi-square statistics: $\chi^2 = 11.4$, d.f. = 4, $\chi^2_{0.05,4} = 9.5$, $\chi^2_{0.01,4} = 13.3$

TABLE 7. DISTRIBUTION OF BROILER FARMS BY EXPERIENCE OF OPERATOR PRODUCING BROILERS
FOR PRESENT CONTRACTOR BY REGION

Experience contracting (years)	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0-4	15	53.6	15	46.9	8	28.6	38	43.2
5-7	9	32.1	7	21.9	8	28.6	24	27.3
8 or more	4	14.3	10	31.3	12	42.9	26	29.5
Total farms	28	100.0	32	100.1 ^a	28	100.1 ^a	88	100.0
Average ex- perience con- tracting (years)	4.5		6.1		6.7		5.8	

^aDoes not sum to 100 percent due to rounding error.

Chi-square statistics: $\chi^2 = 6.7$, d.f. = 4, $\chi^2_{.05,4} = 9.5$

**TABLE 8. DISTRIBUTION OF BROILER FARMS BY NUMBER OF BROILER HOUSES ON BROILER FARMS
AND AVERAGE NUMBER OF BROILER HOUSES ON BROILER FARMS BY REGION**

Broiler houses	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	20	71.4	26	81.2	11	39.3	57	64.8
2 or more	8	28.6	6	18.8	17	60.7	31	35.2
Total farms	28	100.0	32	100.0	28	100.0	88	100.0
Total houses on farms	43		40		53		136	
Houses per farm	1.5		1.3		1.9		1.5	

Chi-square statistics: $\chi^2 = 12.4$, d.f. = 2, $\chi^2_{.01,2} = 9.2$

The average age of all broiler houses on the broiler farms sampled in this study was 10.0 years (Table 9). Broiler houses in Region 1 were the oldest and those in Region 3 were the newest based on the average age of broiler houses in the three areas analyzed. The distributions of broiler houses by age in the three study regions differed significantly ($P = .01$).

The most common broiler house size⁹ reported by growers interviewed in this study was 10,000 square feet and the average size of all broiler houses on sample farms was about 9,073 square feet (Table 10). Average broiler house size was largest in Region 3 and smallest in Region 1 among the three regions analyzed. The proportions of broiler houses in various size categories were significantly different in the three study areas ($P = .01$).

Broiler House Construction and Insulation

About 79 percent of the broiler houses on farms sampled in this study were pole type buildings (Table 11). The percentage of pole type broiler houses ranged from 64.2 in Region 3 to 97.5 in Region 2. And the proportions of clear span and pole houses in the three study areas differed significantly ($P = .01$).

Almost 92 percent of the broiler houses utilized by the growers interviewed in this study were insulated (Table 11). Practically all of the houses in Regions 2 and 3 were insulated, but less than 80 percent of those in Region 1 were insulated.¹⁰

Broiler House Feeders, Litter, and Heat

The types of feeders used in broiler houses differed significantly ($P = .01$) between the three regions compared in this study (Table 12). Over 70 percent of the houses in Region 1 were equipped with feeders which were filled by hand labor. In contrast, almost all of the broiler houses in Region 3 were equipped with either chain conveyor or auger type mechanical feeders. Chain conveyor feeders were used in at least 25 percent of the houses in each study area, but auger type feeders were uncommon except in Region 3.

⁹Modal size.

¹⁰The proportions of houses which were insulated and not insulated differed significantly between the three study areas ($P = .01$). However, 50 percent of the expected frequencies in the table used to calculate the chi-square statistic were less than 5. The results of this test should, therefore, be interpreted with caution.

TABLE 9. DISTRIBUTION OF BROILER HOUSES BY AGE, TOTAL NUMBER OF BROILER HOUSES,
AND AVERAGE BROILER HOUSE AGE BY REGION

House age (years)	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than 6	0	0	12	30.0	19	35.8	31	22.8
6-8	5	11.6	7	17.5	11	20.8	23	16.9
9-11	17	39.5	8	20.0	8	15.1	33	24.3
12-14	13	30.2	5	12.5	6	11.3	24	17.6
15 or more	8	18.6	8	20.0	9	17.0	25	18.4
Total houses	43	99.9a	40	100.0	53	100.0	136	100.0
Average house age (years)	12.1		9.3		8.8		10.0	

^aDoes not sum to 100 % due to rounding error.

Chi-square statistics: $\chi^2=27.8$, d.f.=8, $\chi^2_{.01,8}=20.1$

TABLE 10. DISTRIBUTION OF BROILER HOUSES BY SIZE, TOTAL NUMBER OF BROILER HOUSES, AVERAGE BROILER HOUSE SIZE, AVERAGE BROILER CHICK CAPACITY PER HOUSE, AND AVERAGE BROILER CHICK CAPACITY PER SQUARE FOOT OF BROILER HOUSE SPACE BY REGION

House size (square feet)	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than 7,500	18	41.9	6	15.0	9	17.0	33	24.3
7,500-10,499	22	51.2	30	75.0	23	43.4	75	55.1
10,500 or more	3	7.0	4	10.0	21	39.6	28	20.6
Total houses	43	100.1 ^a	40	100.0	53	100.0	136	100.0
Square feet per house	7,839.1		9,233.0		9,952.9		9,072.8	
Chicks per house	9,448.8		11,330.0		13,167.9		11,451.5	
Chicks per square foot	1.2		1.2		1.3		1.3	

^aDoes not sum to 100 % due to rounding error.

Chi-square statistics: $\chi^2 = 27.9$, d.f. = 4, $\chi^2_{.01,4} = 13.3$

TABLE 11. TYPE OF CONSTRUCTION AND INSULATION OF BROILER HOUSES BY REGION

	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Type construction ^a								
Clear span	9	20.9	1	2.5	19	35.8	29	21.3
Pole type	34	79.1	39	97.5	34	64.2	107	78.7
Total houses	43	100.0	40	100.0	53	100.0	136	100.0
Insulation ^b								
Not insulated	9	20.9	1	2.5	1	1.9	11	8.1
Insulated	34	79.1	39	97.5	52	98.1	125	91.9
Total houses	43	100.0	40	100.0	53	100.0	136	100.0

^aChi-square statistics: $\chi^2 = 15.1$, d.f. = 2, $\chi^2_{.01,2} = 9.2$.

^bChi-square statistics: $\chi^2 = 14.0$, d.f. = 2, $\chi^2_{.01,2} = 9.2$; 50% of the cells in this table have expected frequencies of less than 5. Therefore, the results of this test should be interpreted with caution.

TABLE 12. TYPE OF FEEDERS AND LITTER USED IN BROILER HOUSES BY REGION

	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Type feeders ^c								
Chain	12	27.9	20	50.0	26	49.1	58	42.6
Auger	0	0	1	2.5	25	47.2	26	19.1
Hand	31	72.1	19	47.5	2	3.8	52	38.2
Total houses	43	100.0	40	100.0	53	100.1 ^a	136	99.9 ^a
Type litter ^d								
Sawdust	14	32.6	32	80.0	6	11.3	52	38.2
Shavings	14	32.6	0	0	40	75.5	54	39.7
Other ^b	15	34.9	8	20.0	7	13.2	30	22.1
Total houses	43	100.1 ^a	40	100.0	53	100.0	136	100.0

^aDoes not sum to 100 % due to rounding error.

^bIncludes all other types of litter reported by broiler farm operators including combinations of sawdust and shavings used in some houses.

^cChi-square statistics: $\chi^2 = 69.3$, d.f. = 4, $\chi^2_{.01,4} = 13.3$

^dChi-square statistics: $\chi^2 = 67.3$, d.f. = 4, $\chi^2_{.01,4} = 13.3$

Sawdust was used as litter in 80 percent of the broiler houses in Region 2 (Table 12). But in Region 3 wood shavings was the type of litter used in 75 percent of the broiler houses. No one type of litter was used in a predominant number of broiler houses in Region 1. The proportions of broiler houses in which various types of litter was used were significantly different in the three areas analyzed ($P = .01$).

Half of all the broiler growers interviewed in this study reported using coal to heat the broiler houses on their farms (Table 13). However, coal was not used uniformly by broiler growers across the three study regions. Coal was used to heat broiler houses on over 80 percent of the broiler farms in Region 1, but in Region 3 it was used for this purpose on less than 20 percent of the broiler farms. The proportions of broiler growers reporting using coal to heat broiler houses differed significantly between the three study regions ($P = .01$).

Broiler Income and Production

Broiler income per farm is the product of the number of broilers produced per farm and the price received by growers per unit of broiler production. Differences in both of these factors were observed between the three regions analyzed in this study. Average broiler income on the farms sampled in this study was just over \$6,000 in 1976 (Table 14). However, the distributions of broiler farms by broiler income differed significantly between the three study areas ($P = .01$). Broiler income averaged over three times more per farm in Region 3 than in Region 1. Over 80 percent of the growers in Region 1 received an income of less than \$4,500 from broiler production in 1976 while over half of the broiler farm operators in Region 3 reported broiler incomes of \$7,500 or more in the same year.

The average number of broilers produced in 1976 per broiler farm sampled in this study was just over 73,100 (Table 15). However, the percentage distribution of farms by number of broilers produced differed significantly between regions ($P = .01$). The average number of broilers produced in 1976 by growers in Region 3 was more than twice that of growers in either Regions 1 or 2. Over two-thirds of the growers interviewed in both Regions 1 and 2 produced fewer than 60,000 broilers in 1976. But in Region 3 over half of the growers reported producing 90,000 or more broilers in 1976.

Differences in broiler production levels per farm between regions do not fully explain differences in broiler income per farm between regions. There was also a significant difference between regions in the distribution of broiler farms by broiler income per thousand broilers produced in 1976 ($P = .01$). The average income per thousand broilers produced in 1976 by all growers interviewed in this study was almost \$83 (Table 16). However, grower incomes in Region 1 averaged only about \$62 per thousand broilers produced while those in Regions 2 and 3 averaged over \$88 per thousand broilers produced.

TABLE 13. TYPE OF FUEL USED TO HEAT BROILER HOUSES ON BROILER FARMS BY REGION

Type fuel	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Coal	23	82.1	16	50.0	5	17.9	44	50.0
Other ^a	5	17.9	16	50.0	23	82.1	44	50.0
Total farms	28	100.0	32	100.0	28	100.0	88	100.0

^aIncludes propane, butane, natural gas, and fuel oil.

Chi-square statistics: $\chi^2 = 23.2$, d.f. = 2, $\chi^2_{.01,2} = 9.2$

TABLE 14. DISTRIBUTION OF BROILER FARMS BY BROILER INCOME IN 1976 BY REGION

Broiler income (\$)	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0-4,499	21	80.8	16	64.0	5	20	42	55.3
4,500-7,499	3	11.5	7	28.0	6	24.0	16	21.1
7,500 or more	2	7.7	2	8.0	14	56.0	18	23.7
Total farms	26	100.0	25	100.0	25	100.0	76	100.1 ^a
Broiler income per farm	\$3,111.00		\$4,877.20		\$10,292.00		\$6,054.16	

^aDoes not sum to 100 % due to rounding error.

^aChi-square statistics: $\chi^2 = 27.2$, d.f. = 4, $\chi^2_{.01,4} = 13.3$

TABLE 15. DISTRIBUTION OF BROILER FARMS BY NUMBER OF BROILERS PRODUCED
IN 1976 BY REGION

Broilers produced (number)	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than 60,000	18	69.2	17	68.0	6	24.0	41	53.9
60,000-89,999	5	19.2	7	28.0	6	24.0	18	23.7
90,000 or more	3	11.5	1	4.0	13	52.0	17	22.4
Total farms	26	99.9 ^a	25	100.0	25	100.0	76	100.0
Broilers per farm	50,023.1		53,672.0		116,568.0		73,113.2	

^aDoes not sum to 100% due to rounding error.

^aChi-square statistics: $\chi^2 = 21.6$, d.f. = 4, $\chi^2_{.01,4} = 13.3$

TABLE 16. DISTRIBUTION OF BROILER FARMS BY BROILER INCOME PER THOUSAND BROILERS
PRODUCED IN 1976 BY REGION

\$ / 1,000 broilers	Region 1		Region 2		Region 3		Combined regions	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than 70.00	17	65.4	1	4.0	5	20.0	23	30.0
70.00-94.99	6	23.1	13	52.0	13	52.0	32	42.1
95.00 or more	3	11.5	11	44.0	7	28.0	21	27.6
Total farms	26	100.0	25	100.0	25	100.0	76	100.0
Income per 1,000 broilers	\$62.19		\$90.87		\$88.29		\$82.81	

Chi-square statistics: $\chi^2 = 25.4$, d.f. = 4, $\chi^2_{.01,4} = 13.3$

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