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## ECONOMIC ANALYSIS OF COMMERCIAL LAYER PRODUCTION DECISIONS FOR FAMILY FARM OPERATORS

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### INTRODUCTION

Egg production in Georgia traditionally was by small producers with eggs marketed through retail stores. Beginning in the early 1960's feed millers, egg distributors and broiler integrators began shifting from broilers and other enterprises to commercial egg production. Growth of the industry through the decade of the sixties developed into two different types of production and marketing structures. Industry leaders primarily interested in selling feed, and handling eggs encouraged expansion of independent ownership of flocks by small producers. Independent producers purchased feed and started pullets at retail prices and sold eggs on a grade-yield basis to processor-distributors. Other industry leaders encouraged vertical integration by offering production contracts. Contract producers provided facilities and labor for egg production and received a fixed payment per unit from the integrator. The integrators owned the layers and provided feed, medication and supervision for flocks.

Survey data in 1968 indicated that nearly half of the commercial layers in Georgia were owned by independent producers. There was a very active grade-yield egg market in Georgia at that time. A later survey in 1971 indicated that only 31 percent of commercial layers in Georgia were under independent ownership. Reports from vertically integrated operations indicated that nearly 44.8 percent of the commercial layers were under production contracts and 24.2 percent were housed on integrator company-owned farms. These data indicated a major shift from independent production to integrated production.

### OBJECTIVE OF THE STUDY

Initial contacts with producers, county extension workers and representatives of lending organizations indicated a limited knowledge of costs and returns for the rapidly changing industry were available. There were wide variations in egg production estimates, investment requirements and production costs between flocks and types of housing systems. There were also extreme seasonal and cyclical variations in commercial egg prices. Economic analyses were needed to evaluate prospective returns and risks for independent and contract producers over extended time periods.

The primary objective of this study was to provide costs and returns information for decision making in the commercial egg industry. Additional objectives were to measure variability and evaluate economic risks involved in independent and contract egg production.

### METHODOLOGY

A farm survey was undertaken to obtain detailed records on feed conversion, flock mortality, days in production and egg production by sizes and grades. Data on investment in facilities and on variable costs were tabulated for each system. Flock records were needed for first cycle flocks (pullets) and force molted flocks in conventional floor houses and in cages to measure variability by types of flocks and housing systems. The advantages of the farm survey method were: (1) the data were produced under actual stress conditions; (2) large numbers of flock records were available; (3) decisions on accuracy and completeness of data were made at the farm; and (4)

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**Table 1. AVERAGE PRODUCTION PER HEN, FIRST CYCLE FLOCKS, ALL CAGE TYPE HOUSES, GEORGIA.<sup>a</sup>**

Production range	Jumbo and extra large	Large	Medium	Small	Undergrades <sup>b</sup>	Total	Mortality	Feed conversion	Days	Flocks <sup>c</sup>
		dozen eggs per hen					per cent	lbs. per doz.	No.	No. percent
Below 15.00	2.46	5.61	3.72	0.88	1.45	14.12	21.96	4.64	351	12 23.08
15.00-15.99	2.56	6.01	4.13	1.12	1.68	15.50	19.53	4.40	357	3 5.77
16.00-16.99	2.59	5.98	4.54	1.22	2.24	16.57	14.42	4.43	365	5 9.62
17.00-17.99	2.57	7.58	4.21	1.06	2.11	17.53	21.27	4.41	391	10 19.23
18.00-18.99	2.73	7.39	5.16	1.27	1.95	18.50	18.26	4.42	397	11 21.15
19.00-19.99	3.28	8.38	4.50	1.19	2.16	19.51	15.74	4.22	406	8 15.38
above 20.00	2.99	10.01	4.23	0.98	3.02	21.23	15.25	4.57	425	3 5.77
Weighted Average	2.71	7.10	4.27	1.10	1.97	17.25	18.84	4.45	382	-- --

<sup>a</sup>Production records from 20-weeks of age to the date that the flocks were sold or molted. Records were calculated from the number of hens housed per flock in both manual and mechanical type cages.

<sup>b</sup>Undergrades include pee wees, grade B's, cracks, checks, stains and other marketable eggs other than grade A.

<sup>c</sup>Observed within the designated production ranges.

human behavior factors were also obtained from the primary sources.

Data were sorted into frequency distributions and production ranges by types of housing systems and types of flocks to measure the likelihood of reaching various production levels. The Consumer and Marketing Service, USDA, reported average prices paid at Georgia farms by months for grade A large, medium and small sizes of eggs. Additional data from the farm survey on market prices for jumbo, extra large, and undergrade eggs were utilized to complete price series by months for the 1965-70 period. Budgetary procedures were used to estimate variability in costs and returns between housing systems, types of flocks, ownership methods and years of production. Separate analyses were made for each of the selected variables to measure and evaluate production and price risks jointly and separately. Production capacities were synthesized to evaluate total returns and investment risks for selected sizes of operations and ownership methods typical of family farm operations in Georgia.

## RESULTS OF ANALYSIS<sup>1</sup>

### Independent Operations

During the course of the farm survey, a common estimate of production made by producers, salesmen, and others was 20 dozen eggs per hen per year, but only about 6 percent of the flocks in the farm survey obtained this level of production in 425 days (Table 1). With the wide range in production there was

about a 5 cents per dozen range in production costs which would amount to about \$1.00 difference per hen in returns between the lowest and the highest production ranges observed (Table 2). Returns to labor and management per hen varied from -\$0.74 for the lowest production level in 1967 to \$2.31 for the highest production in 1969 (Table 3). During 1967 almost all independent operations lost money due to below-cost prices but most production levels were profitable in other years. Variability of average commercial egg prices by years for grade-yield eggs at farms and average production costs by housing methods for the period are shown in Figure 1.

### Contract Operations

The same production systems and production levels were analyzed for contract operations. The most typical contract for cage systems paid 5 cents per dozen for grade A production and 2 cents per dozen for undergrades.<sup>2</sup> The variability in costs and returns for a particular contract was primarily due to production variability (Table 3). The six-year average returns to family labor for independent producers was higher than for contract producers when production per hen exceeded 15.5 dozen. Yet in only three of the six years were returns for the independent producer higher than the returns assumed for contract producers at this level. Production per hen had to exceed 19.5 dozen before independent returns exceeded contract producer returns in five of the six years. Therefore producers with limited information did not realize that on the

<sup>1</sup> Analyses were also made for first cycle and molted flocks produced in conventional floor type houses and mechanical cage houses. Mechanical cages had mechanical feeders and egg belts.

<sup>2</sup> Analyses for contract operations included five other contract payment plans that were commonly used.

**Table 2. AVERAGE COMMERCIAL LAYER PRODUCTION COSTS FOR INDEPENDENT AND CONTRACT PRODUCERS, MANUAL CAGE HOUSES, FIRST CYCLE FLOCKS, GEORGIA 1965-70.**

Ownership	Production <sup>a</sup> costs	Production (dozens per hen)							
		Average	Below	15.0-	16.0-	17.0-	18.0-	19.0-	Above
		17.25	15.0	15.9	16.9	17.9	18.9	19.9	20.0
		----- cents per dozen -----							
Independent	excluding labor	27.06	29.97	27.94	27.27	26.83	26.31	25.05	25.71
	including labor	29.43	32.64	30.41	29.63	29.22	28.61	27.28	27.86
Contract	excluding labor	2.08	2.39	2.21	2.10	2.10	2.02	1.94	1.85
	including labor	4.45	5.06	4.68	4.46	4.49	4.32	4.17	4.00

<sup>a</sup>Average costs for the 1965-70 period were used: (1) Feed, \$75/ton; (2) 20 weeks old pullets, \$1.50 each; (3) interest, 9 percent; (4) minimum farm wage, \$1.35 per hour. Building and equipment depreciation, medication and miscellaneous costs were also included.

**Table 3. AVERAGE RETURNS PER HEN FOR INDEPENDENT AND CONTRACT PRODUCERS, FIRST CYCLE FLOCKS, MANUAL CAGE TYPE HOUSES, GEORGIA, 1965-70.**

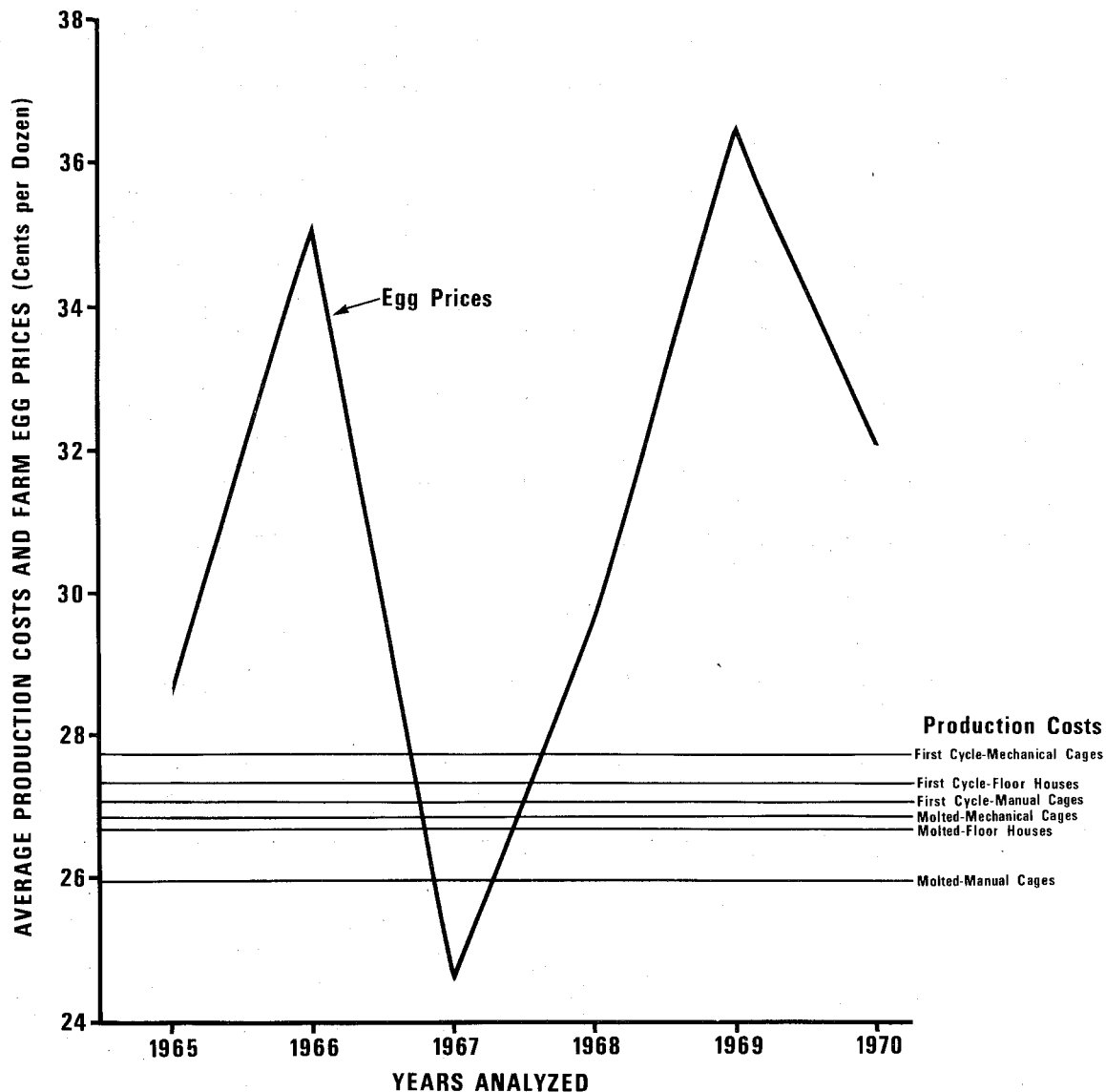
Ownership	Year	Returns per hen <sup>a</sup>	Production (dozen eggs per hen)							
			Average 17.25	Below 15.0 14.12	15.0-15.9 15.50	16.0-16.9 16.57	17.0-17.9 17.53	18.0-18.9 18.50	19.0-19.9 19.51	Above 20.0 21.23
----- dollars per hen -----										
Independent	1965	Family labor <sup>b</sup>	0.3106	-0.1354	0.1343	0.1767	0.3556	0.4637	0.7825	0.6691
		Hired labor <sup>c</sup>	-0.0982	-0.5124	-0.2486	-0.2144	-0.0634	0.0382	0.3475	0.2126
Independent	1966	Family labor <sup>b</sup>	1.4262	0.7800	1.1333	1.2339	1.4909	1.6564	2.0515	2.0507
		Hired labor <sup>c</sup>	1.0174	0.4030	0.7504	0.8428	1.0719	1.2309	1.6165	1.5942
Independent	1967	Family labor <sup>b</sup>	-0.4219	-0.7393	-0.5307	-0.5297	-0.3826	-0.3332	-0.0392	-0.1992
		Hired labor <sup>c</sup>	-0.8307	-1.1163	-0.9136	-0.9208	-0.8016	-0.7587	-0.4742	-0.6557
Independent	1968	Family labor <sup>b</sup>	0.4885	0.0154	0.2929	0.3313	0.5353	0.6557	0.9887	0.8828
		Hired labor <sup>c</sup>	0.0797	-0.3616	-0.0900	-0.0598	0.1163	0.2302	0.5537	0.4263
Independent	1969	Family labor <sup>b</sup>	1.6518	0.9693	1.3340	1.4369	1.7194	1.8994	2.3100	2.3259
		Hired labor <sup>c</sup>	1.2430	0.5923	0.9511	1.0458	1.3004	1.4739	1.8750	1.8694
Independent	1970	Family labor <sup>b</sup>	0.8966	0.3491	0.6538	0.7108	0.9541	1.0859	1.4591	1.4075
		Hired labor <sup>c</sup>	0.4878	-0.0279	0.2709	0.3197	0.5351	0.6595	1.0241	0.9510
Independent average	6 year	Family labor <sup>b</sup>	0.7111	0.2065	0.5029	0.5600	0.7788	0.9045	1.2588	1.1895
		Hired labor <sup>c</sup>	0.3023	-0.1705	0.1200	0.1689	0.3598	0.4790	0.8238	0.7330
Contract	1965-70	Family labor <sup>b</sup>	0.4446	0.3250	0.3820	0.4133	0.4451	0.4928	0.5322	0.5781
		Hired labor <sup>c</sup>	0.0358	-0.0520	-0.0008	0.0223	0.0261	0.0673	0.0971	0.1271

<sup>a</sup>Production valued by Georgia Farm Prices for Independent Producers; Contract producers were paid 5 cents per dozen for grade A eggs and 2 cents per dozen for undergrades.

<sup>b</sup>Returns to labor and management.

<sup>c</sup>Returns to management, only.

Figure 1. COMMERCIAL EGGS, AVERAGE PRODUCTION COSTS TO FAMILY OPERATIONS, AND AVERAGE FARM PRICES RECEIVED BY INDEPENDENT PRODUCERS, GEORGIA, 1965-70.



average independent production returns were more profitable. Many independent producers felt that they could not withstand the risks of uncertain egg market prices and changed to contract production after the 1967 price slump. The greatest risks for contract operators were the dangers of losing and not being able to obtain contracts after the outlay of fixed investments in facilities. Returns were fairly safe for family operations provided the producers maintained their contracts and did not have too much down-time while waiting for flock replacement.

#### Comparison of Family Size Operations

Capital labor and the total number of years that a family wishes to produce eggs are constraints on commercial egg production. Comparisons of capital and labor requirements for full employment of family labor and average annual returns (1965-70) for independent and contract operations for three different housing systems are shown in Table 4. This comparison indicated that with limited capital the manual cage operation is probably the most practical

**Table 4. COMPARISON AVERAGE ANNUAL RETURNS TO LABOR AND MANAGEMENT AND CAPITAL REQUIREMENTS, BY TYPE OWNERSHIP AND HOUSING METHOD, FIRST CYCLE FLOCKS, FAMILY FARM OPERATIONS, GEORGIA, 1965-70.<sup>a</sup>**

Ownership	Type facility	Size <sup>b</sup> No. of hens	Investment capital <sup>c</sup>	Annual returns <sup>d</sup>		Annual returns per dollar <sup>e</sup>		Labor returns <sup>f</sup> dols./hr.
				Family labor	Hired labor	Family labor	Hired labor	
				dollars				
Independent	Conventional floor flocks	10,975	38,852	5,709	1,215	0.1469	0.0313	1.56
Independent	Manual cage flocks	12,128	36,505	7,840	3,333	0.2148	0.0913	2.15
Independent	Mechanical cage flocks	23,607	85,457	12,818	8,301	0.1500	0.0971	3.51
Contract <sup>g</sup>	Conventional floor flocks	10,975	22,389	3,808	-686	0.1700	-0.0306	1.04
Contract <sup>g</sup>	Manual cage flocks	12,128	18,313	4,902	394	0.2677	-0.0215	1.34
Contract <sup>g</sup>	Mechanical cage flocks	23,607	50,047	7,097	2,583	0.1418	-0.0516	1.94

<sup>a</sup>Nine percent interest charges for use of capital were deducted as a production cost.

<sup>b</sup>Typical number of hens that one worker could care for by each production method in a 10-hour day.

<sup>c</sup>Includes investment for building, facilities and laying flocks.

<sup>d</sup>Returns to labor and management from average flock production periods converted to annual basis.

<sup>e</sup>Returns to labor and management per dollars invested in buildings, facilities and laying flocks.

<sup>f</sup>Returns to labor and management per hour of labor required to care for flocks.

<sup>g</sup>Typical contracts paid 5 cents per dozen for grade A and 2 cents per dozen for undergrades.

for the family farm for either independent or contract operations. Another important finding is that about 12,000 to 15,000 layers is probably about all the typical independent family farm operation can finance over an egg price cycle. Investment capital to refinance an independent operation of 15,000 hens for 1968 after an average loss of \$0.42 per hen on 1967 operations was \$51,300. This was near the credit limit of 300-acre farms with land valued at \$250 to \$300 per acre.<sup>3</sup>

### IMPLICATIONS

Returns over the 1965-70 period were adequate to provide profitable incomes to independent producers with sufficient risk capital and well

planned and designed operations. The mistake that many independent producers made was putting in more layers than they could finance through the below cost periods of the egg price cycle. Consequently they over extended borrowing powers and were forced to change to contracts.

The analysis indicated that contract production was primarily for family farm operations and net returns were barely sufficient to pay hired labor. Contract operations though usually had a more stable level of income than independent operations and producers did not have to withstand the financial strain of uncertain egg prices. An important advantage of contracts was that producers with little egg production experience and business management ability had additional income opportunities.

<sup>3</sup>Investment based on \$1.50 per hen for manual cage production facilities, \$1.50 for replacement pullets and \$0.42 per hen loss for 1967 operation. Many commercial egg farms were located in rural sparsely populated areas with low agricultural value.

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