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AN ECONOMIC FEASIBILITY ANALYSIS OF ESTABLISHING AN INTEGRATED CHICKEN EGG PRODUCTION AND PROCESSING COMPLEX IN MICHIGAN

By

Joseph Kiragu Muiruri

A DISSERTATION

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Michigan State University
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DOCTOR OF PHILOSOPHY

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ABSTRACT

AN ECONOMIC FEASIBILITY ANALYSIS OF ESTABLISHING AN INTEGRATED CHICKEN EGG PRODUCTION AND PROCESSING COMPLEX IN MICHIGAN

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This study was undertaken to analyze the economic feasibility of establishing an egg production and processing complex capable of producing 280 eggs per capita annually for Michigan's 9,000,000 residents.

Operating budgets for all phases connected with the enterprise were made based on data and assumptions derived from personal communications with people in the egg industry and from published literature on egg production and processing.

It was found that based on the conditions and assumptions of this study it is economically feasible to establish such a complex. The capital investment required was calculated to be $105,100,000 during the first three years. Annual operating expenses were calculated to be $101,191,339 when the complex was fully operational. Annual income from the sale of excess hatching eggs, spent fowl and commercial shell eggs was calculated to be $116,872,850 during the third year of operation, $131,793,039 during the fourth year and $114,741,393 during the fifth year. Therefore, profits before taxes were calculated to be $15,581,511

in the third year, $30,501,700 in the fourth year and $13,450,054 in the fifth year. Hence, the rate of return on owned capital was calculated to be 14.62 percent in the third year, 28.54 percent in the fourth year and 12.64 percent in the fifth year. The rate of return on owned capital for egg producers in Michigan according to Telfarm records was 5.50 percent, 6.60 percent and 19.50 percent during the same periods.

DEDICATION

This dissertation is dedicated to my father, Muiruri wa Kiragu, my mother Agnes Waruthu wa Muiruri and to my late sister, Veronica Waithira wa Ngigi.

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My family, Kathleen, Waruthu, Muiruri and Muthoni for their patience and encouragement during the course of my graduate study.

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INTRODUCTION

Agriculture in the United States has been transformed from the traditional family-oriented farming into large business-like agricultural complexes. This has been brought about by increased technical complexity of farming, the tendency of farmers to take advantage of volume operations, and the pressure put upon farmers to join large business organizations that are often built upon marketing strategies.

The egg industry has been affected by the same pressures that have affected the rest of agriculture.

The objective of this study was to analyze the economics of producing, under one complex, enough eggs to supply each of Michigan's 9,000,000 residents with 280 eggs annually. The complex in this simulation was assumed to begin operations with no existing facilities but to build them as they were needed. The complex bought 2,000 acres and all phases of the egg production complex were situated on this farm.

When fully operational the synthesized complex had direct control over the following phases of the egg production-marketing process:

1. Production of hatching eggs
2. Hatching replacement pullets

3. Growing replacement pullets
4. Commercial egg production
5. Shell egg processing
6. Wholesale marketing of shell eggs
7. Wholesale marketing of spent fowl, and
8. Manufacture of feed for all the birds

Cost structures were synthesized based on cost data obtained from several sources such as personnel from hatchery companies, cooperatives, equipment companies, the Departments of Agricultural Economics, Agricultural Engineering, and Poultry Science at Michigan State University, as well as from various agricultural experiment stations and U.S. Department of Agriculture research studies which are listed in the bibliography.

When fully operational the synthesized complex would have two feed mills each capable of producing 150 tons of feed per hour, a hatchery with a setting capacity of 138,990 dozen eggs, housing capacity of 140,000 breeders and their replacements, 4,320,000 replacement pullets and 10,400,000 layers at any time. The complex would produce 212,810,000 dozen salable eggs and 9,183,200 spent hens annually.

LITERATURE REVIEW

Specialization in farming both as a cause and a consequence of growth in the economy has led to concentration either in the form of large industrial-type corporate farms or in the form of agribusiness firms (Kyle et al., 1972). Concentration in farming usually brings about coordination of various stages of production under one management. Some of the stages of production might have formerly been in other firms but after coordination they are no longer identified as separate. Mighell and Hoofnagle (1972) call this type of coordination vertical integration.

In the egg industry, small and scattered flocks tend to mean relatively higher costs for delivering inputs. According to Rogers and Bluestone (1967) cost studies have determined that economies of large-scale exist in egg-packing, feed-milling, and chick hatching operations. That is, up to the limits of technology, average cost per unit handled declines as plant size increases.

Rogers (1971) reported that the egg industry has gone through several stages of structural evolution. In the early days it was common practice for many egg producers to be directly involved with other aspects of the egg industry such

as chick hatching and brooding, mixing feed, selling live or dressed surplus poultry, and etc. That is, poultry farms were vertically integrated mainly due to necessity. As egg production units increased in size and became more specialized, specialization increased in other areas of the industry, such as input-supplying. At this stage such functions as egg-packing were removed from the farm and situated near consuming areas. But at present, reintegration of the various functions connected to egg production is occurring. Egg-packing has moved away from consuming areas toward production areas, feed-mixing on the farm is also on the increase and more and more egg producers are becoming involved in marketing. This reintegration of functions has resulted in heavy emphasis on either contract production or large-scale owner integrated enterprises.

Concentration of production due to vertical integration has led to a decline in the number of farms keeping market egg flocks. According to Schrader et al. (1978) about 200,000 farms in the United States now have market egg flocks. More than 96 percent of these farms have fewer than 3,200 birds and account for about 15 percent of egg production. During the 1970s the proportion of egg production coming from large-scale owner integrated operations rose from 20 to 35 percent.

During the 1950s the midwest began to lose its domination in egg production perhaps because the egg industry was based on sideline flocks on many general farms and

marketing was done with little coordination. But, according to Schrader et al. (1978), the rapid growth of larger units and increased integration of production has probably played a major role in stopping the decline of production in the midwest.

According to Kelsey and Sheppard (1974), probably the most important trend in the egg industry today is that the size of laying flocks is increasing.

Vertical integration in the egg industry can occur for various reasons. The assets of a weak farm may be acquired by a stronger farm during the time of low egg prices. Companies that are not in farming may wish to diversify their earning or companies already in the egg business may decide to take advantage of economies of large scale. With a savings of 20 cents per pullet through growing their own versus buying from other farms, and perhaps more certain control of delivery dates, producers may elect to produce their own replacement pullets. Egg producers may wish to integrate into marketing and feed processing to overcome the effect of variability in egg prices by the more nearly stable market and feed prices. Coordination is also due to the need to eliminate too many handling stages because the product--eggs--is a very perishable commodity.

Although coordination in the egg industry has been growing rapidly, very few feasibility studies have been reported. Haas (1975) reported on a study done by the U.S.D.A. whose purpose was to determine the viability of a

cooperatively coordinated egg-production-marketing system as opposed to an owner-integrated complex. Both systems were simulated. The study indicated that, assuming equal production performance, the decentralized cooperatively run system would have difficulty competing in an industry dominated by centralized owner-integrated complexes.

PROCEDURE

In synthesizing this egg producing complex various assumptions were made in order to facilitate expense and revenue calculations. For purposes of accounting, these expenses were grouped into various segments and financial budgets presented for each segment. The segments were designed such that all expenses were allocated to the proper segments. These segmented financial budgets were then summarized into one budget for the whole complex. The segments were:

1. Land
2. Administration
3. Standby power generation
4. Feed manufacturing
5. Hatching egg production
6. Hatchery
7. Replacement pullet growing
8. Commercial egg production
9. Shell egg processing

In preparing the financial budgets the complex was assumed to begin operating in 1973 and be fully operational in 1975. In this study the price paid for goods and services was assumed to remain constant throughout the life of the

study. That is, inflational effects were not taken in consideration in calculating the cost of operating the complex.

In this study the operating cycle was assumed to be 364 days and was subdivided into 13 periods of 28 days each. The periods were grouped into quarters as follows: first, second and third periods in the first quarter; fourth, fifth and sixth periods in the second quarter; seventh, eighth and ninth periods in the third quarter; and tenth, eleventh, twelfth and thirteenth periods in the fourth quarter. Therefore, all budgetary figures for the fourth quarter are higher than for each of the other three quarters because the fourth quarter is 28 days longer than the other quarters.

For purposes of this study the complex was assumed to begin operations with no facilities, building them as they were needed. At the beginning of the first year of operations the complex invested funds in 2,000 acres of land and a feed mill capable of manufacturing 150 tons of feed per eight hour day, 260 days per year. The feed mill manufactured a combination of chick starter, chick grower, chick developer, breeder layer mash and chicken layer mash diets. The complex bought a 25-ton bulk feed truck to transport feed from the feed mill to the birds. Fourteen breeder replacement houses were built to house 140,000 day-old chicks. The complex also invested funds in an administrative building and a standby power generator for the breeder replacement pullets.

In the second quarter of the first year the complex built 14 houses and purchased a standby power generator for the adult breeders. In the third quarter the complex built a hatchery and installed a standby power generator in it. Funds were also invested in four replacement pullet houses. From this point on, the third quarter of the first year, hatching eggs were set twice a week. Starting in the third quarter 216,000 replacement pullets were housed each week. Therefore, during the last two quarters of the first year the complex built eighty replacement pullet houses each of which was capable of housing 54,000 pullets. For every eight replacement pullet houses, the complex had a standby power generator. In the fourth quarter the complex bought another bulk-feed truck and another group of day-old breeder replacement pullets. The complex also invested funds in four laying houses capable of holding 50,000 birds each.

During the second year of operations the complex made additional capital investments in eight bulk-feed trucks, a second feed mill, four replacement pullet houses, 208 chicken laying houses, standby power generators for layers and egg processing and a third group of day-old breeder replacement pullets.

In the third year the complex made capital investments in twelve chicken laying houses, a standby power generator for the layers and for egg processing and a fourth group of day-old breeder replacement pullets.

Financial budgets for the various segments were calculated according to the following assumptions and data:

1. Land

The complex bought 2,000 acres of land and each acre was assumed to cost $1,000, therefore, the complex had a $2,000,000 investment in land. The complex built parking lots, roadways, driveways, fences and prepared the sites for buildings at a cost of $150,000. This cost was depreciated in twenty years at an annual cost of $7,500. Annual maintenance cost on the land and improvements was figured to be 2 percent of the original total investment or $43,000 per year. Property taxes were assumed to be 1.5 percent of the original total investment on land and improvements or $32,250 per year.

2. Administration

The complex built an administrative building at a cost of $60,000. Equipment for the building cost $40,000 while automobiles for use by complex officials cost $20,000. The annual depreciation rate on the building, equipment and automobiles was assumed to be 5, 10 and 20 percent, respectively. The annual maintenance and repair cost on the building, equipment and automobiles was figured to be 3, 3 and 5 percent, respectively, while insurance and property taxes were figured to be 3 percent of the original total investment in buildings and equipment and 5 percent on automobiles.

Administrative personnel salaries and the number of people required were set as follows:

General Manager (1)	$30,000
Assistant General Manager (1)	24,000
Mechanic (1)	20,800
Accountant (1)	20,800
Bookkeepers (7)	10,400
Secretaries (4)	8,320
Custodians (3)	7,653

Fringe benefits--vacation, sick leave, compensation coverage, social security, etc.--for all employees of the complex were assumed to be 20 percent of gross pay.

Other annual costs associated with administration were assumed to be as follows:

Supplies	$ 6,000
Telephone	4,000
Utilities	2,000
Legal Fees and Auditing	5,000
Public Relations	20,000
Vehicle Operation	15,000
Miscellaneous	20,000

3. Standby Power Generation

Standby power generators were installed and wired in such a way as to be able to supply power to any building of the complex housing birds or incubating eggs should that building encounter a power shortage. Standy power requirements

were assumed to be 1KW per 1,000 adult birds, 1/2KW per 1,000 pullets and 250KW per hatchery. Additional standby power generators with total output of 360KW were also installed for breeder replacement pullets, the adult breeder flock and the hatchery just in case something should happen to the first standby generators. The cost of standby power generators was assumed to be $400 per KW. Based on these assumptions capital investment on generators was calculated to be $56,000 for breeder replacement pullets, $112,000 for adult breeders, $200,000 for the hatchery, $864,000 for replacement pullets and $8,320,000 for layers and egg processing. Annual depreciation, maintenance and repairs, insurance and property tax costs were asumed to be 5, 0.5, 1.5, and 1.5 percent, respectively, for a total of 8.5 percent of the original total investment.

4. Feed Manufacturing

In this study it was assumed that the complex bought raw feed ingredients and manufactured all the feed as required. The cost of the ingredients was assumed to be as shown in Table 1. Feed was mixed according to the formulations computed by Adams et al. (1975).

The complex invested $1,800,000 during the first quarter of the first year of operation on a feed mill--$1,200,000 for the feed mill building and $600,000 on equipment. The complex also bought a bulk feed truck for moving feed from the mill to the birds. The feed mill manufactured

Table 1.--Assumed Cost of Raw Feed Ingredients Per Ton.

Yellow Corn	$ 100
Corn Glutten Meal, 60%	250
Wheat Middlings	90
Alfalfa Meal, 17%	100
Soybean Meal, 44%	160
Soybean Meal, 49%	180
Meat and Bone Meal, 50%	180
Fat (Stabilized)	340
Fish Meal, 60%	360
Dicalcium Phosphate	170
Phosphate Defluorinated	150
Monocalcium Phosphate	190
Limestone	15
Salt (Iodized)	30
Trace Mineral-Vitamin Mixture	500
Methionine Dl	2,500

five different rations--chick starter, chick grower, chick developer, breeder layer mash and chicken layer mash--at the rate of 150 tons per hour, eight hours a day, 260 days a year. Later, when demand for feed increased, the complex built another feed mill similar to the first one and purchashed nine more bulk feed trucks.

Labor costs including benefits were assumed to be $1.31 per ton of feed produced for caretakers and $59,904 annually for administrative personnel at the feed mills--$20,800 for a manager, $12,480 for a laboratory technician, $8,320 for an assistant laboratory technician and $8,320 for a secretary. Supplied, utilities, feed mixing overhead (shrinkage, demmurage and inventory cost), vehicle operating and miscellaneous expenses were figured to be $0.15, $0.22, $0.25, $0.10 and $0.10 per ton, respectively, for a total of $0.82 for each ton of feed manufactured.

5. Hatching Egg Production

In this study it was assumed that the complex bought 140,000 day-old breeder replacement chicks at $4.80 per chick and housed them in 14 houses for 12 weeks. The houses were 45 ft. by 225 ft. and their floors were 60 percent wire slats and 40 percent litter. The houses were assumed to cost $3.50 per bird for building and $3.00 per bird for equipment. There were 10,000 birds in each house. Therefore, investment in houses was $65,000 per house for a total of $910,000.

Annual depreciation cost on buildings was assumed to be 10 percent and the equipment was depreciated at 20 percent. Maintenance and repair costs were assumed to be 3 percent of the original total investment annually while insurance and property tax costs were assumed to be 1.5 percent each. Labor costs were assumed to be $10.00 per hour for managers, $7.50 per hour for assistant managers and $3.50 per hour for caretakers. Labor requirements were assumed to be full-time for manager and assistant manager during the three periods the pullets were in breeder replacement pullet houses, 8 man-hours per day per 20,000 chicks during the first 2 weeks for caretakers and 16 man-hours per day per 140,000 pullets during the next 10 weeks.

Medication for breeders was assumed to be $0.08 per breeder housed. Utilities were assumed to cost $200.00 per period and miscellaneous costs were assumed to be $1,400.00 per year. Feed consumption for breeder replacement pullets was assumed to be 0.35 pounds per pullet per week of chick starter diet during the first 6 weeks and 0.68 pounds per pullet per week of chick grower during the next 6 weeks.

At the end of 12 weeks the breeder replacement pullets were moved into adult breeder houses where they were housed at the rate of 10,000 pullets per 45 ft. by 450 ft. house. Therefore, 14 houses were required to house all the pullets. Houses were assumed to cost $3.50 per breeder for building and $3.00 per breeder for equipment. Depreciation, maintenance and repair costs, cost of insurance and property

taxes were assumed to be the same as for breeder replacement pullets.

Supplies and miscellaneous costs were assumed to be $0.01 per bird housed. Salaries were assumed to be $20,800 annually for a manager, $15,600 annually for an assistant manager and $3.50 per hour for caretakers. Labor requirements for 140,000 breeders were assumed to be one manager, one assistant manager and seven caretakers. Adult breeders were assumed to consume 1.4 pounds of chick developer diet per bird per week for eight weeks. When the breeders were 21 weeks of age they were fed breeder layer mash at the rate of 0.22 pounds per bird per day. Eggs for hatching were collected starting when the birds were 26 weeks old until they were 72 weeks old. Eggs collected from breeders between the 21st and 26th weeks and excess hatching eggs thereafter were sold to consumers at $0.50 per dozen.

The coefficients expressed here on the basis of pullets or adult breeders included the males which were housed at the rate of one male for every 15 females. Hatching eggs were collected and incubated twice a week. The average rate of lay was assumed to be 65 percent of all the birds housed. Egg loss was assumed to be 5 percent of eggs laid and the average number of settable eggs per week was assumed to be 95 percent of all eggs collected. Therefore, 53,000 dozen eggs were laid and 50,400 dozen eggs were collected each week.

6. Hatching Eggs

The hatchery was assumed to have a setting capacity of 138,990 dozen incubating eggs. Hatchability was assumed to be 80 percent of eggs set. After the eggs were hatched, the chicks were sexed, graded, vaccinated, debeaked and moved by van to replacement pullet houses where they were housed for 20 weeks. Two hundred and sixteen thousand day-old replacement pullet chicks were assumed to be housed each week starting from the ninth period of the first year of operation.

Capital investment in a hatchery was assumed to be $600,000 for building, $400,000 for equipment and $12,000 for the van. Annual depreciation, maintenance and repair, insurance and property tax costs were assumed to be 5 percent, 3 percent, 1.5 percent and 1.5 percent, respectively, for a total of 11 percent, on the original total investment in the building and equipment. Depreciation, maintenance and repair, insurance and property tax costs were assumed to be 20 percent, 5 percent, 2.5 percent and 2.5 percent on the van, respectively for a total of 30 percent. Supplies were assumed to cost $0.01 per replacement pullet housed, van operating expenses were assumed to be $500 per period, utilities were assumed to cost $5,000 per period while miscellaneous costs were assumed to be $2,000 per period. Labor requirements were assumed to be $24,000 annually for a hatchery manager, $15,600 annually for an assistant hatchery

manager, $6,240 annually for a typist and $4,410 per week for caretakers (1,260 man hours or 22 1/2 people).

A total of 46,330 dozen eggs were set each week and hatchability was assumed to be 80 percent of all eggs set. After sexing, 3 percent of the chicks were culled and the rest were moved to replacement pullet houses. The hatchery when operating at full capacity produced 216,000 day-old replacement pullet chicks every week.

7. Growing Replacement Pullets

Two hundred and sixteen thousand day-old replacement pullets were moved from the hatchery each week starting from the third quarter of the first year of operation. Twenty pullet houses were built in the third quarter and 64 in the fourth quarter for a total of 84 houses. Four more houses were built in the first quarter of the second year of operation. Each 45 ft. by 300 ft. house was assumed to hold 54,000 birds. The houses were occupied for 20 weeks and then left vacant for two weeks to facilitate cleaning and sanitizing. With this schedule, 2.36 flocks a year were produced per house for a total of 10,400,000 replacement pullets annually.

Investment in buildings and equipment was assumed to be $3.50 per bird housed. Depreciation on buildings was assumed to be 10 percent and on equipment 20 percent annually. Maintenance and repair costs, insurance and property tax costs were figured to be 3, 1.5 and 1.5 percent of the

original total investment, respectively, for a total of 6 percent. Labor requirements were assumed to be one man-hour per week per house for manager and 28 man-hours for caretakers. Utility, medication and house cleaning expenses were assumed to be $0.08, $0.05 and $0.04 per pullet housed, respectively. Insurance for the pullets was assumed to be $0.49 per 100 pullets. The pullets were assumed to eat 0.35 pounds of chick starter diet per pullet per week for the first six weeks, 0.68 pounds of chick grower diet per pullet per week for the next six weeks and 1.4 pounds of chick developer per pullet per week for the last eight weeks.

8. Egg Production

The replacement pullets were moved into laying houses at the end of 20 weeks. Due to mortality and culling 200,000 pullets were transferred every week. Fifty thousand layers were housed in a 45 ft. by 450 ft. house where they were kept for 364 days and another 28 days were allowed for cleaning and sanitizing the house. Houses were erected as follows--four during the last quarter of the first year, 48 per quarter during the first, second and third quarters of the second year, 64 during the fourth quarter of the same year and 12 during the first quarter of the third year for a total of 224 houses.

Investment in buildings and equipment was assumed to be $2.50 per bird and $3.00 per bird, respectively. These were depreciated at 10 percent and 20 percent per year,

respectively. Maintenance and repairs, insurance and property tax costs were assumed to be 3, 1.5 and 1.5 percent of the original total investment per year, respectively, for a total of 6 percent. Insurance for the layers was assumed to be $0.79 per 100 layers.

Mortality was assumed to average 0.9 percent of birds housed per period. Therefore, at the end of 13 periods 176,600 spent hens were sold each week. These birds were assumed to weigh 4.2 pounds each and sell for $0.10 per pound. Labor requirements were assumed to be one man-hour per house per week for manager, two man-hours per house per week for supervisor and 28 man-hours per house per week for caretakers. Annual utility, medication, hen removal and cleaning, supplies and miscellaneous costs were assumed to be $0.15, $0.02, $0.05 and $0.02 per bird housed, respectively.

9. Egg Processing

Eggs were mechanically transported by belts from the laying houses to the processing plants. There the eggs were washed, candled, graded, cartoned according to size, packed in 30-dozen cases, and moved to a holding room.

One processing plant was built for every 400,000 layers. The egg processing machine was assumed to have a rated capacity of 90 cases per hour but average output was assumed to be 89 percent of capacity. The machine needed six people to operate it. Management labor was figured to be

two hours per plant per week for manager and two hours per day per plant for supervisor

Investment in building and equipment was assumed to be $165,000 and $93,000, respectively per plant. Depreciation, maintenance and repairs, insurance and property tax costs were assumed to be 5, 3, 1.5 and 1.5 percent of the original total investment, respectively, for a total of 11 percent. Materials were assumed to cost $0.04 per carton, $0.30 per case, and $0.10 for every case for miscellaneous supplies. Utilities were assumed to cost $0.07 for every case.

Revenue from the sale of commercial shell eggs, spent fowl and excess hatching eggs was calculated based on the following assumptions:

1. Commercial Shell Eggs--The annual average hen-housed egg production was assumed to be 70 percent and the average egg loss was assumed to be 4 percent of all eggs laid. Egg prices per dozen were assumed to be $0.51 in 1973, $0.54 in 1974, $0.53 in 1975, $0.60 in 1976 and $0.52 in 1977.
2. Excess Hatching Eggs--Hatching eggs were assumed to sell at the same prices as commercial shell eggs.
3. Spent Fowl--Spent fowl were assumed to weigh 4.2 pounds each and sell at $0.10 per pound.

RESULTS

At the end of the first year of operation (1973) the complex had spent a total of $25,260,000 in major capital investments (Table 2). During the second year of operation (1974) the complex spent a total of $75,384,000 in major capital investments (Table 3) and in the third year (1975) the complex spent a total of $4,456,000 in major capital investments (Table 4).

Based on data and assumptions stated previously the cost of owning and operating the various segments of the complex was calculated to be as shown in the following tables.

1. Land

The annual cost on land was calculated to be $82,750 (Table 5). This cost was allocated to other segments within the complex as site costs. The distribution was as follows:

Administration	$ 1,833
Feed Manufacturing	3,653
Hatching Egg Production	18,278
Hatchery	3,653
Replacement Pullet Growing	18,535
Egg Production	18,536
Egg Processing	18,262
Total	$82,750

Table 2.--Assumed Cost of Capital Investments--First Year.

Type of Investment	Quarter				Total
	1	2	3	4	
Land Purchase and Improvements	$2,150,000	-	-	-	$2,150,000
Administration	120,000	-	-	-	120,000
Standby Power Generators	56,000	$112,000	$ 372,800	$ 691,200	1,232,000
Feed Manufacturing	1,875,000	-	-	75,000	1,950,000
Hatching Egg Production	910,000	910,000	-	-	1,820,000
Hatchery	-	-	1,012,000	-	1,012,000
Pullet Growing	-	-	3,780,000	12,096,000	15,876,000
Egg Production	-	-	-	1,100,000	1,100,000
Egg Processing	-	-	-	-	-
Total Investment	$5,111,000	$1,022,000	$5,164,800	$13,962,200	$25,260,000

Table 3.--Assumed Cost of Capital Investments--Second Year.

Type of Investment	Quarter				Total
	1	2	3	4	
Land Purchase and Improvements	-	-	-	-	-
Administration	-	-	-	-	-
Standby Power Generators	$1,920,000	$1,920,000	$9,920,000	$2,560,000	$ 8,320,000
Feed Manufacturing	150,000	2,025,000	225,000	-	2,400,000
Hatching Egg Production	-	-	-	-	-
Hatchery	-	-	-	-	-
Pullet Growing	756,000	-	-	-	756,000
Egg Production	13,200,000	13,200,000	13,200,000	17,600,000	57,200,000
Egg Processing	1,548,000	1,548,000	1,548,000	2,064,000	6,708,000
Total Investment	$17,574,000	$18,693,000	$16,893,000	$22,224,000	$75,384,000

Table 4.--Assumed Cost of Capital Investment--Third Year.

Type of Investment	Quarter				Total
	1	2	3	4	
Land Purchase and Improvements	-	-	-	-	-
Administration	-	-	-	-	-
Standby Power Generators	$ 640,000	-	-	-	$ 640,000
Feed Manufacturing	-	-	-	-	-
Hatching Egg Production	-	-	-	-	-
Hatchery	-	-	-	-	-
Pullet Growing	-	-	-	-	-
Egg Production	3,300,000	-	-	-	3,300,000
Egg Processing	516,000	-	-	-	516,000
Total Investment	$4,456,000	-	-	-	$4,456,000

Table 5.--Calculated Annual Cost of Owning Land.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation on Improvements	$1,731	$1,731	$1,731	$2,307	$7,500
Maintenance and Repairs	9,923	9,923	9,923	13,231	43,000
Property Taxes	-	-	-	32,250	32,250
Total Expenses	$34,731	$34,731	$34,731	$78,557	$82,750

2. Administration

The annual cost of administering the complex was calculated to be $362,401 (Table 6) and was allocated to other segments within the complex as general administration costs and was distributed as follows:

Feed Manufacturing	$ 18,122
Hatching Egg Production	36,244
Hatchery	54,353
Replacement Pullet Growing	54,353
Egg Production	108,719
Egg Processing	90,610
Total	$362,401

3. Standby Power Generation

The cost of owning a standby source of power was calculated to be $36,880 during the first year of operation (1973), $496,488 during the second year (1974) and $866,320 during the third year (1975) of operation (Table 7).

4. Feed Manufacturing

The cost of raw feed ingredients required to manufacture a ton of each of the five rations needed by the complex is shown in Table 8. Based on these figures the total cost of raw feed ingredients during the first three years of operation was calculated to be $2,301,561, $36,506,144 and $59,789,393, respectively (Table 9).

The cost of mixing these rations was calculated to be $377,840 during the first year (1973) of operation, $1,287,268 during the second year (1974) of operation and $1,874,255 during the third year (1975) of operation (Tables 10, 11 and 12).

Table 6.--Calculated Annual Cost of Administering the Complex.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$2,538	$2,538	$2,538	$3,386	$11,000
Maintenance and Repairs	924	924	924	1,228	4,000
Insurance	462	462	462	614	2,000
Property Taxes	-	-	-	2,000	2,000
Salaries and Benefits	62,208	62,208	62,208	82,946	269,570
Supplies	1,386	1,386	1,386	1,842	6,000
Telephone	924	924	924	1,228	4,000
Utilities	462	462	462	614	2,000
Legal Fees and Audit	1,155	1,155	1,155	1,535	5,000
Public Relations	4,615	4,615	4,615	6,155	20,000
Vehicle Operations	3,460	3,460	3,460	4,620	15,000
Miscellaneous	4,615	4,615	4,615	6,155	20,000
Site Costs	423	423	423	564	1,833
Total Expenses	$83,172	$83,172	$83,172	$112,887	$362,403

Table 7.--Calculated Cost of Standby Power.

Type of Expense	Quarter				Total
	1	2	3	4	
First Year					
Depreciation	$645	$1,935	$4,138	$14,966	$21,684
Maintenance and Repairs	66	195	416	1,515	2,192
Insurance	195	582	1,243	4,486	6,506
Property Taxes	-	-	-	6,506	6,506
Total Expenses	$906	$2,712	$5,797	$27,473	$36,888
Second Year					
Depreciation	$28,989	$51,147	$73,306	$132,208	$285,650
Maintenance and Repairs	2,907	5,121	7,335	13,224	28,587
Insurance	5,054	15,330	21,972	39,628	81,984
Property Taxes	-	-	-	81,984	81,984
Total Expenses	$36,950	$71,598	$102,613	$267,044	$478,205
Third Year					
Depreciation	$117,600	$117,600	$117,600	$156,800	$509,600
Maintenance and Repairs	11,760	11,760	11,760	15,680	50,960
Insurance	35,280	35,280	35,280	47,040	152,880
Property Taxes	-	-	-	152,880	152,880
Total Expenses	$164,640	$164,640	$164,640	$219,520	$866,320

Table 8.--Calculated Cost of Raw Feed Ingredients Used to Manufacture a Ton of Feed.

Ingredient	Amount in Pounds	Cost in Dollars
Chick Starter		
Yellow Corn	1,288.61	$ 64.43
Wheat Middlings	6.65	0.30
Soybean Meal, 44%	537.20	42.98
Meat and Bone, 50%	134.56	12.11
Limestone	8.77	0.07
Salt (Iodized)	10.35	0.16
Trace Mineral and Vitamin Mixture	12.00	3.00
Methionine Dl	1.86	2.33
Total	2,000.00	$140.75
Chick Grower		
Yellow Corn	1,336.08	$ 66.80
Wheat Middlings	200.20	9.01
Soybean Meal, 44%	312.47	25.00
Meat and Bone, 50%	117.65	10.59
Limestone	10.81	0.08
Salt (Iodized)	9.86	0.15
Trace Mineral and Vitamin Mixture	12.00	3.00
Methionine Dl	0.94	1.16
Total	2,000.00	$118.91
Chick Developer		
Yellow Corn	1,359.97	$ 68.00
Wheat Middlings	307.12	13.82
Soybean Meal, 44%	203.29	16.26
Meat and Bone, 50%	96.77	8.71
Limestone	10.30	0.08
Salt (Iodized)	9.81	0.15
Trace Mineral and Vitamin Mixture	12.00	3.00
Methionine Dl	0.74	0.93
Total	2,000.00	$110.95

Table 8.--Continued.

Ingredient	Amount in Pounds	Cost in Dollars
Breeder Layer Mash		
Yellow Corn	1,335.00	$ 66.75
Soybean Meal, 49%	450.00	40.50
Fat (Stabilized)	20.00	3.40
Limestone	135.00	1.01
Calcium Phosphate	35.00	3.33
Salt (Iodized)	5.00	0.08
Trace Mineral and Vitamin Mixture	20.00	5.00
Total	2,000.00	$122.07
Chicken Layer Mash		
Yellow Corn	1,462.72	$ 73.14
Soybean Meal, 49%	210.57	18.95
Meat and Bone Meal, 50%	140.00	12.60
Corn Gluten Meal, 60%	28.20	3.53
Phosphate, Defluorinated	6.20	0.47
Limestone	132.59	0.99
Salt (Iodized)	6.51	0.10
Trace Mineral and Vitamin Mixture	12.00	3.00
Methionine Dl	1.21	1.51
Total	2,000.00	$114.29

Table 9.--Calculated Cost of Raw Feed Ingredients.

Type of Feed in Tons	Quarter				Total
	1	2	3	4	
First Year					
Chick-Starter	147	-	380	3,738	4,265
Chick-Grower	190	95	-	5,037	5,322
Chick-Developer	-	784	-	5,436	6,220
Breeder Layer Mash	-	216	1,293	1,724	3,233
Chicken Layer Mash	-	-	-	-	-
Total Tons	337	1,095	2,768	16,935	19,040
Total Cost	$43,337	$124,681	$211,326	$1,922,217	$2,301,561
Second Year					
Chick-Starter	2,785	2,736	2,736	3,795	12,052
Chick-Grower	5,574	5,289	5,289	7,242	23,394
Chick-Developer	14,906	14,906	14,514	19,352	63,678
Breeder Layer Mash	1,293	1,940	1,293	1,724	6,250
Chicken Layer Mash	12,012	34,188	56,364	109,648	212,212
Total Tons	36,570	59,059	80,195	141,761	317,586
Total Cost	$4,237,671	$6,803,845	$9,209,463	$16,255,165	$36,506,144
Third Year					
Chick-Starter	2,736	2,736	2,736	3,795	12,003
Chick-Grower	5,289	5,289	5,289	7,337	23,204
Chick-Developer	15,298	14,514	14,514	19,744	64,070
Breeder Layer Mash	1,509	1,724	1,293	1,724	6,250
Chicken Layer Mash	96,096	96,096	96,096	128,128	416,416
Total Tons	120,928	120,359	119,928	160,728	521,943
Total Cost	$13,852,287	$13,791,493	$13,728,911	$18,416,702	$59,789,393

Table 10.--Calculated Cost of Mixing Feed--First Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$31,155	$31,155	$31,155	$45,002	$138,467
Maintenance and Repairs	13,326	13,326	13,326	18,632	58,610
Insurance	6,663	6,663	6,663	9,316	29,305
Property Taxes	-	-	-	29,305	29,305
Salaries and Benefits	14,265	15,246	16,016	39,268	84,795
Supplies	50	163	252	2,387	2,852
Utilities	75	238	368	3,499	4,180
Overhead	84	272	419	3,976	4,751
Vehicle Operation	34	108	167	1,591	1,900
Miscellaneous	34	108	167	1,591	1,900
Site	843	843	843	1,124	3,653
General Administration	4,182	4,182	4,182	5,576	18,122
Total Expenses	$70,711	$72,304	$73,558	$161,267	$377,840

Table 11.--Calculated Cost of Mixing Feed--Second Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$41,541	$56,542	$83,082	$120,008	$301,173
Maintenance	15,921	21,516	31,842	44,760	114,039
Insurance	7,962	10,759	15,921	22,380	57,022
Property Taxes	-	-	-	57,022	57,022
Salaries and Benefits	61,731	91,114	118,881	204,140	475,866
Supplies	5,486	8,850	12,029	21,264	47,629
Utilities	8,045	12,980	17,643	31,187	69,855
Overhead	9,143	14,750	20,049	35,441	79,383
Vehicle Operation	3,657	5,900	8,019	14,176	31,752
Miscellaneous	3,657	5,900	8,019	14,176	31,752
Site	843	843	843	1,124	3,653
General Administration	4,182	4,182	4,182	5,576	18,122
Total Expenses	$162,168	$233,336	$320,510	$571,254	$1,287,268

Table 12.--Calculated Cost of Mixing Feed--Third Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$90,006	$90,006	$90,006	$120,008	$390,026
Maintenance and Repairs	33,570	33,570	33,570	44,760	145,470
Insurance	16,785	16,785	16,785	22,380	72,735
Property Taxes	-	-	-	72,735	72,735
Salaries and Benefits	172,213	171,444	170,931	228,985	743,573
Supplies	18,136	18,047	17,988	24,109	78,280
Utilities	26,600	26,471	26,385	35,360	114,816
Overhead	30,227	30,080	29,982	40,183	130,472
Vehicle Operation	12,091	12,033	11,994	16,073	52,191
Miscellaneous	12,091	12,033	11,994	16,073	52,191
Site	843	843	843	1,124	3,653
General Administration	4,182	4,182	4,182	5,576	18,122
Total Expenses	$416,744	$415,494	$414,660	$627,366	$1,874,264

Therefore, the total cost of producing 19,040 tons of feed during the first year of operation was calculated to be $2,679,401. During the second year the cost of producing 317,586 tons of feed was calculated to be $37,793,412 and during the third year of operation $61,663,657 was spent to produce 521,943 tons of feed. These costs were allocated to other segments within the complex according to the amount of feed produced for that segment. During the first year of operation the distribution was $761,805 for the hatching egg production segment and $1,917,595 for the replacement pullet growing segment. During the second year of operation $985,202 were allocated to the hatching egg production segment, $11,780,955 to the replacement pullet growing segment and $25,027,254 to the commercial egg production segment. During the third year of operation $976,264 were allocated to the hatching egg production segment, $11,730,924 to the replacement pullet growing segment and $48,956,469 to the commercial egg production segment.

5. Hatching Egg Production

The cost of producing hatching eggs was calculated to be $2,646,439 during the first year, $2,269,928 during the second year and $2,266,121 during the third year of operation (Tables 13, 14 and 15). These costs were then allocated to the hatchery segment.

Table 13.--Calculated Cost of Keeping Breeders--First Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$30,693	$61,386	$61,386	$81,848	$235,313
Maintenance and Repairs	6,300	12,600	12,600	16,800	48,300
Insurance	3,702	9,468	9,468	12,624	35,262
Property Taxes	-	-	-	24,150	24,150
Salaries and Benefits	14,793	29,838	29,838	44,715	119,184
Utilities	600	600	600	1,000	2,800
Medication	1,632	1,632	1,632	2,721	7,617
Miscellaneous	324	324	324	432	1,404
Site	4,218	4,218	4,218	5,624	18,278
General Administration	8,364	8,364	8,364	11,152	36,244
Standby Power	1,100	3,295	3,295	4,391	12,081
Feed	114,048	196,985	219,564	231,209	761,806
Breeder Chicks	672,000	-	-	672,000	1,344,000
Total Expenses	$857,774	$328,710	$351,289	$1,108,666	$2,646,439

Table 14.--Calculated Cost of Keeping Breeders--Second Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$61,386	$61,386	$61,386	$81,848	$266,006
Maintenance and Repairs	12,600	12,600	12,600	16,800	54,600
Insurance	9,468	9,468	9,468	12,624	41,028
Property Taxes	-	-	-	27,300	27,300
Salaries and Benefits	39,700	29,838	29,838	39,784	139,160
Utilities	1,000	600	600	800	3,000
Medication	3,267	2,722	1,632	3,811	11,432
Miscellaneous	324	324	324	432	1,404
Site	4,218	4,218	4,218	5,624	18,278
General Administration	8,364	8,364	8,364	11,152	36,244
Standby Power	3,295	3,295	3,295	4,389	14,274
Feed	251,060	289,285	162,922	281,935	985,202
Breeder Chicks	-	-	-	672,000	672,000
Total Expenses	$394,681	$422,099	$294,646	$1,158,502	$2,269,928

Table 15.--Calculated Cost of Keeping Breeders--Third Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$61,386	$61,386	$61,386	$81,848	$266,006
Maintenance and Repairs	12,600	12,600	12,600	16,800	54,600
Insurance	9,468	9,468	9,468	12,624	41,028
Property Taxes	-	-	-	27,300	27,300
Salaries and Benefits	29,838	29,838	29,838	54,577	144,091
Utilities	600	600	600	1,400	3,200
Medication	3,267	2,177	1,632	4,356	11,432
Miscellaneous	324	324	324	432	1,404
Site	4,218	4,218	4,218	5,624	18,278
General Administration	8,364	8,364	8,364	11,152	36,244
Standby Power	3,295	3,295	3,295	4,389	14,274
Feed	279,016	216,275	162,219	318,754	976,264
Breeder Chicks	-	-	-	672,000	672,000
Total Expenses	$412,375	$348,544	$293,943	$1,211,256	$2,266,121

6. Hatchery

The cost of operating the hatchery including the cost of producing hatching eggs was calculated to be $3,021,984 during the first year (1973) of operation, $2,993,547 during the second year (1974) and $2,989,737 during the third year (1975) of operation (Tables 16, 17 and 18).

7. Replacement Pullet Growing

The cost of growing replacement pullets including the cost of operating the hatchery was calculated to be $6,187,079 during the first year (1973) of operation, $21,034,818 during the second year (1974) and $20,998,998 during the third year (1975) of operation (Tables 19, 20 and 21).

8. Egg Production

The cost of keeping layers was calculated to be $54,472,230 during the second year of operation (1974) and $88,129,808 during the third year (1975) of operation (Tables 22 and 24).

Egg production was calculated according to the rates shown in Table 24 and was 108,697,000 dozen eggs during the second year (1974) of operation and 221,312,000 dozen eggs during the third year (1975) of operation (Table 25). Egg loss was assumed to average 4 percent of all eggs produced annually. Therefore, 102,989,000 dozen eggs were

Table 16.--Calculated Cost of Hatching Eggs--First Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	-	-	$8,062	$16,124	$24,186
Maintenance and Repairs	-	-	3,938	7,876	11,814
Insurance	-	-	3,531	4,708	8,239
Property Taxes	-	-	-	7,062	7,062
Salaries and Benefits	-	-	50,798	101,596	152,394
Supplies	-	-	17,280	34,560	51,840
Utilities	-	-	10,000	20,000	30,000
Vehicle Operation	-	-	1,000	2,000	3,000
Miscellaneous	-	-	4,000	8,000	12,000
Site	$843	$843	843	1,124	3,653
General Administration	12,543	12,543	12,543	16,724	54,353
Standby Power	3,924	3,924	3,924	5,232	17,004
Cost of Producing Eggs	857,774	328,710	351,289	1,108,666	2,646,439
Total Expenses	$875,084	$346,020	$467,208	$1,333,672	$3,021,984

Table 17.--Calculated Cost of Hatching Eggs--Second Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$12,093	$12,093	$12,093	$16,124	$52,403
Maintenance and Repairs	5,907	5,907	5,907	7,876	25,597
Insurance	3,531	3,531	3,531	4,708	15,301
Property Taxes	-	-	-	15,301	15,301
Salaries and Benefits	76,197	76,197	76,197	101,596	330,187
Supplies	25,920	25,920	25,920	34,560	112,320
Utilities	15,000	15,000	15,000	20,000	65,000
Vehicle Operation	1,500	1,500	1,500	2,000	6,500
Miscellaneous	6,000	6,000	6,000	8,000	26,000
Site	843	843	843	1,124	3,653
General Administration	12,543	12,543	12,543	16,724	54,353
Standby Power	3,924	3,924	3,924	5,232	17,004
Cost of Producing Eggs	394,681	422,099	294,646	1,158,502	2,269,928
Total Expenses	$558,139	$585,557	$458,104	$1,391,747	$2,993,547

Table 18.--Calculated Cost of Hatching Eggs--Third Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$12,093	$12,093	$12,093	$16,124	$52,403
Maintenance and Repairs	5,907	5,907	5,907	7,876	25,597
Insurance	3,531	3,531	3,531	4,708	15,301
Property Taxes	-	-	-	15,301	15,301
Salaries and Benefits	76,197	76,197	76,197	101,596	330,187
Supplies	25,920	25,920	25,920	34,560	112,320
Utilities	15,000	15,000	15,000	20,000	65,000
Vehicle Operation	1,500	1,500	1,500	2,000	6,500
Miscellaneous	6,000	6,000	6,000	8,000	26,000
Site	843	843	843	1,124	3,653
General Administration	12,543	12,543	12,543	16,724	54,353
Standby Power	3,924	3,924	3,924	5,232	17,004
Cost of Producing Eggs	412,375	348,544	293,943	1,211,256	2,266,121
Total Expenses	$575,833	$512,002	$457,401	$1,444,501	$2,989,737

Table 19.--Calculated Cost of Growing Replacement Pullets--First Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	-	-	$32,712	$471,045	$503,757
Maintenance and Repairs	-	-	6,106	94,210	100,316
Insurance	-	-	3,891	56,670	60,561
Property Taxes	-	-	-	50,358	50,358
Salaries and Benefits	-	-	7,776	111,974	119,750
Utilities	-	-	12,096	186,624	198,720
Medication	-	-	7,560	116,640	124,200
Site Costs	$4,275	$4,275	4,275	5,710	18,535
General Administration	12,543	12,543	12,543	16,724	54,353
Standby Power	-	-	1,130	15,820	16,950
Cost of Hatching Eggs	875,084	346,020	467,208	1,333,672	3,021,984
Feed	-	-	65,321	1,852,274	1,917,595
Total Expenses	$891,902	$362,838	$620,618	$4,311,721	$6,187,079

Table 20.--Calculated Cost of Growing Replacement Pullets--Second Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$575,721	$575,721	$575,721	$767,628	$2,494,791
Maintenance and Repairs	115,146	115,146	115,146	153,528	498,966
Insurance	69,264	69,264	69,264	92,352	300,144
Property Taxes	-	-	-	249,483	249,483
Salaries and Benefits	136,857	136,857	136,857	182,476	593,047
Utilities	228,117	228,117	228,117	304,156	988,507
Medication	124,560	124,560	124,560	166,080	539,760
Site Costs	4,275	4,275	4,275	5,710	18,535
General Administration	12,543	12,543	12,543	16,724	54,353
Standby Power	16,950	16,950	16,950	22,600	73,450
Cost of Hatching Eggs	558,139	585,557	458,104	1,391,747	2,993,547
Pullet Removal	103,680	103,680	103,680	138,240	449,280
Feed	2,727,717	2,714,874	2,716,452	3,621,912	11,780,955
Total Expenses	$4,672,969	$4,687,544	$4,652,669	$7,112,636	$21,034,818

Table 21.--Calculated Cost of Growing Replacement Pullets--Third Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$575,721	$575,721	$575,721	$767,628	$2,494,791
Maintenance and Repairs	115,146	115,146	115,146	153,528	498,966
Insurance	69,264	69,264	69,264	92,352	300,144
Property Taxes	-	-	-	249,483	249,483
Salaries and Benefits	136,857	136,857	136,857	182,476	593,047
Utilities	228,117	228,117	228,117	304,156	988,507
Medication	124,560	124,560	124,560	166,080	539,760
Site Costs	4,275	4,275	4,275	5,710	18,535
General Administration	12,543	12,543	12,543	16,724	54,353
Standby Power	16,950	16,950	16,950	22,600	73,450
Cost of Hatching Eggs	575,833	512,002	457,401	1,444,501	2,989,737
Pullet Removal	103,680	103,680	103,680	138,240	449,280
Feed	2,703,831	2,704,056	2,704,206	3,618,831	11,730,924
Total Expenses	$4,670,938	$4,607,332	$4,552,881	$7,167,847	$20,998,998

Table 22.--Calculated Cost of Keeping Laying Hens--Second Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$294,231	$765,003	$1,235,775	$2,380,012	$4,675,021
Maintenance and Repairs	57,114	148,500	239,886	462,004	907,504
Insurance	31,296	81,372	131,448	253,160	497,276
Property Taxes	-	-	-	57,746	57,746
Salaries and Benefits	50,976	132,534	214,092	412,324	809,926
Utilities	51,924	135,003	218,082	420,010	825,019
Medication	6,924	18,003	29,082	56,010	110,019
Miscellaneous	6,924	18,003	29,082	56,010	110,019
Hen Removal	-	-	-	-	-
Site	4,275	4,275	4,275	5,711	18,536
General Administration	25,089	25,089	25,089	33,452	108,719
Standby Power	12,552	31,380	50,208	96,232	190,372
Growing Pullets	4,677,130	4,691,705	4,565,830	7,118,174	21,052,839
Feed	1,421,062	4,033,022	6,650,598	12,922,572	25,027,254
Total Expenses	$6,658,418	$10,102,810	$13,412,368	$24,298,634	$54,472,230

Table 23.--Calculated Cost of Keeping Laying Hens--Third Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$2,187,122	$2,196,930	$2,196,930	$2,929,240	$9,510,222
Maintenance and Repairs	424,547	426,450	426,450	568,600	1,846,047
Insurance	232,624	233,667	233,667	311,556	1,011,514
Property Taxes	-	-	-	923,088	923,088
Salaries and Benefits	378,922	380,622	380,622	507,496	1,647,662
Utilities	385,959	387,690	387,690	516,920	1,678,259
Medication	51,459	51,690	51,690	68,920	223,759
Miscellaneous	51,459	51,690	51,690	68,920	223,759
Hen Removal	120,000	120,000	120,000	160,000	520,000
Site	23,196	23,196	23,196	30,928	100,516
General Administration	25,089	25,089	25,089	33,452	108,719
Standby Power	87,876	87,876	87,876	117,168	380,796
Growing Pullets	4,670,938	4,607,332	4,552,881	7,167,847	20,998,998
Feed	11,286,184	11,286,636	11,277,146	15,106,483	48,956,469
Total Expenses	$19,925,375	$19,878,888	$19,814,927	$28,510,618	$88,129,808

Table 24.--Assumed Rate of Egg Production, Egg Loss and Distribution According to Size.

	Quarter				Average Percent
	1 Percent	2 Percent	3 Percent	4 Percent	
Egg Production	53.00	83.33	76.33	68.50	70.29
Egg Loss	1.33	2.83	4.83	6.38	3.84
Salable Eggs	98.67	97.17	95.17	93.62	96.16
Extra-Large	0.83	21.67	43.33	47.63	28.37
Large	22.67	49.83	40.33	35.50	37.08
Medium	46.00	18.83	5.50	2.75	18.27
Small	20.83	0.83	0.83	0.83	5.83
Undergrades	8.34	6.01	5.18	6.91	6.61

Table 25.--Calculated Egg Production, Egg Loss and Egg Distribution by Size.

		Quarter				
		1	2	3	4	Total
		Dozen				
Second Year						
Egg Production	(x 1000)	3,442	16,581	29,944	58,730	108,697
Egg Loss	(x 1000)	46	469	1,446	3,747	5,708
Salable Eggs	(x 1000)	3,396	16,112	28,498	54,983	102,989
Extra Large	(x 1000)	29	3,593	12,975	27,973	44,570
Large	(x 1000)	780	8,262	12,076	20,849	41,967
Medium	(x 1000)	1,583	3,122	1,647	1,615	7,967
Small	(x 1000)	717	138	249	487	1,591
Undergrades	(x 1000)	287	997	1,551	4,058	6,893
Third Year						
Egg Production	(x 1000)	51,072	51,072	51,072	68,096	221,312
Egg Loss	(x 1000)	1,962	1,962	1,962	2,616	8,503
Salable Eggs	(x 1000)	49,110	49,110	49,110	65,480	212,810
Extra Large	(x 1000)	14,490	14,490	14,490	19,320	62,790
Large	(x 1000)	18,939	18,939	18,939	25,252	82,069
Medium	(x 1000)	9,330	9,330	9,330	12,440	40,430
Small	(x 1000)	2,979	2,979	2,979	3,972	12,909
Undergrades	(x 1000)	3,372	3,372	3,372	4,496	14,612

calculated to be salable during the second year (1974) of operation and 212,810,000 during the third year (1975) of operation.

9. Egg Processing

The cost of processing eggs during the second year (1974) of operation was calculated to be $6,547,603 and $13,161,694 during the third year (1975) of operation (Tables 26 and 27).

The summarized total cost of operating the complex was calculated to be $6,411,061 during the first year (1973) of operation, $60,912,576 during the second year (1974) and $101,191,339 during the third (1975), the fourth (1976) and the fifth (1977) years of operation (Tables 28, 29 and 30). Based on previous data revenue was calculated to be $129,339 during the first year (1973), $55,844,021 during the second year (1974), $116,872,850 during the third year (1975), $131,793,039 during the fourth year (1976) and $114,741,393 during the fifth year (1977) of operation (Tables 31, 32, 33, 34 and 35).

Based on these costs and revenues, profit before taxes was calculated to be $-6,281,722 during the first year (1973), $-5,068,555 during the second year (1974), $15,681,511 during the third year (1975), $30,601,700 during the fourth year (1976) and $13,550,054 during the fifth year (1977) of operation.

Table 26.--Calculated Cost of Processing Eggs--Second Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$11,910	$29,775	$47,640	$91,310	$180,635
Maintenance and Repairs	7,146	17,865	28,584	54,786	108,381
Insurance	3,575	8,940	14,304	27,416	54,235
Property Taxes	-	-	-	54,235	54,235
Salaries and Benefits	61,632	154,080	246,528	472,512	934,752
Utilities	7,531	34,590	64,476	125,287	231,884
Site Costs	4,215	4,215	4,215	5,620	18,265
General Administration	20,910	20,910	20,910	27,880	90,610
Standby Power	12,558	31,395	50,232	96,178	190,363
Supplies	142,018	652,260	1,215,828	2,362,561	4,372,667
Miscellaneous Costs	10,759	29,726	92,109	178,982	311,576
Total Expenses	$282,254	$1,003,442	$1,784,826	$3,496,767	$6,547,603

Table 27.--Calculated Cost of Processing Eggs--Third Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$83,355	$83,355	$83,355	$111,140	$361,205
Maintenance and Repairs	50,013	50,013	50,013	66,684	216,723
Insurance	25,005	25,005	25,005	33,340	108,355
Property Taxes	-	-	-	108,355	108,355
Salaries and Benefits	431,424	431,424	431,424	575,232	1,869,504
Utilities	108,498	108,494	108,494	144,664	470,158
Site Costs	4,215	4,215	4,215	5,620	18,262
General Administration	20,910	20,910	20,910	27,880	90,605
Standby Power	87,915	87,915	87,915	117,220	380,065
Supplies	2,045,976	2,045,976	2,045,976	2,727,968	8,865,896
Miscellaneous Costs	154,998	154,998	154,998	206,664	671,658
Total Expenses	$3,012,309	$3,012,309	$3,012,309	$4,124,767	$13,161,694

Table 28.--Calculated Total Cost of Operating Complex--First Year.

Type of Expense	Quarter				Total
	1	2	3	4	
Depreciation	$66,762	$98,745	$141,722	$634,678	$941,907
Maintenance and Repairs	30,540	36,968	47,233	153,492	268,232
Insurance	11,022	17,175	25,258	85,418	138,873
Property Taxes	-	-	-	151,631	151,631
Salaries and Benefits	91,266	107,292	166,636	380,499	745,693
Medication	1,632	1,632	9,192	119,361	131,817
Feed Ingredients	43,337	124,681	211,326	1,922,217	2,301,561
Feed Overhead	84	272	419	3,976	4,751
Telephone	924	924	924	1,228	4,000
Legal Fees and Audit	1,155	1,155	1,155	1,535	5,000
Public Relations	4,614	4,615	4,615	6,155	20,000
Supplies	1,436	1,549	18,918	38,789	60,692
Vehicle Operations	3,496	3,568	4,627	8,211	19,900
Pullet Removal	-	-	-	-	-
Hen Removal	-	-	-	-	-
Utilities	1,137	1,300	23,526	211,737	237,700
Miscellaneous	4,972	5,047	9,106	16,178	35,304
Breeder Chicks	672,000	-	-	672,000	1,344,000
Total Expenses	$934,376	$404,923	$664,657	$4,407,105	$6,411,061

Table 29.--Calculated Total Cost of Operating Complex--Second Year.

Type of Expenses	Quarter				Total
	1	2	3	4	
Depreciation	$1,030,140	$1,555,936	$2,093,272	$3,594,831	$8,274,179
Maintenance and Repairs	227,588	337,502	452,147	767,437	1,784,674
Insurance	130,612	199,126	266,370	452,882	1,048,990
Property Taxes	-	-	-	577,321	577,321
Salaries and Benefits	489,301	682,601	884,601	1,495,778	3,552,508
Medication	134,751	145,285	155,274	225,901	661,211
Feed Ingredients	4,237,671	6,803,845	9,209,463	16,255,165	36,506,144
Feed Overhead	9,143	14,750	20,049	35,441	79,383
Telephone	924	924	924	1,228	4,000
Legal Fees and Audit	1,155	1,155	1,155	1,535	5,000
Public Relations	4,615	4,615	4,615	6,155	20,000
Supplies	174,810	688,416	1,255,163	2,420,227	4,538,616
Vehicle Operations	8,619	10,860	12,979	20,796	53,254
Pullet Removal	103,680	103,680	103,680	138,240	449,280
Hen Removal	-	-	-	-	-
Utilities	312,079	426,752	544,380	902,054	2,185,265
Miscellaneous	32,279	64,568	140,149	263,755	500,751
Breeder Chicks	-	-	-	672,000	672,000
Total Expenses	$6,897,367	$11,040,242	$15,144,221	$27,830,746	$60,912,576

Table 30.--Calculated Total Cost of Operating the Complex--Third Year.

Type of Expenses	Quarter				Total
	1	2	3	4	
Depreciation	$3,131,552	$3,141,360	$3,141,360	$4,188,480	$13,602,752
Maintenance and Repairs	664,390	666,293	666,293	888,387	2,885,363
Insurance	392,419	393,462	393,462	524,614	1,703,957
Property Taxes	-	-	-	1,583,392	1,583,392
Salaries and Benefits	1,287,659	1,288,590	1,288,077	1,733,308	5,597,634
Medication	179,286	178,429	177,882	239,356	774,951
Feed Ingredients	13,852,287	13,791,493	13,728,911	18,416,702	59,789,393
Feed Overhead	30,227	30,080	29,982	40,183	130,472
Telephone	924	924	924	1,228	4,000
Legal Fees and Audit	1,155	1,155	1,155	1,535	5,000
Public Relations	4,615	4,615	4,615	6,155	20,000
Supplies	2,091,418	2,091,329	2,091,270	2,788,485	9,062,502
Vehicle Operations	17,051	16,993	16,954	22,643	73,691
Pullet Removal	103,680	103,680	103,680	138,240	449,280
Hen Removal	120,000	120,000	120,000	160,000	520,000
Utilities	765,236	766,838	766,752	1,023,114	3,321,940
Miscellaneous	229,487	229,660	229,621	306,244	995,012
Breeder Chicks	-	-	-	672,000	672,000
Total Expenses	$22,871,386	$22,824,899	$22,760,938	$32,734,116	$101,191,339

Table 31.--Cash Flow Summary--First Year.

Income	Quarter				Total
	1	2	3	4	
Commercial shell eggs	-	-	-	-	-
Excess hatching eggs	-	$16,660	$79,231	$33,448	$129,339
Spent fowl	-	-	-	-	-
Total Income		$16,660	$79,231	$33,448	$129,339
CASH EXPENDITURES ($)					
Maintenance and Repairs	30,529	36,968	47,233	153,492	268,232
Insurance	111,022	17,175	25,258	85,418	138,873
Property Taxes	-	-	-	151,631	151,631
Salaries and Benefits	91,266	107,292	166,636	380,499	745,693
Medication	16, 32	16, 32	91, 92	119,361	131,817
Feed Ingredients	43,337	124,681	211,326	1,922,217	2,301,561
Feed Overhead	84	272	419	3,976	4,751
Telephone	924	924	924	1,228	4,000
Legal Fees and Audit	1,155	1,155	1,155	1,535	5,000
Public Relations	4,615	4,615	4,615	6,155	20,000
Supplies	1,436	1,549	18,918	38,789	60,692
Vehicle Operations	3,494	3,568	4,627	8,211	19,900
Pullet Removal	-	-	-	-	-
Hen Removal	-	-	-	-	-
Utilities	1,137	1,300	23,526	211,737	237,700
Miscellaneous	4,973	5,047	9,106	16,178	35,304
Breeder Chicks	672,000	-	-	672,000	1,344,000
Total Cash Expenditures	867,614	306,178	522,935	3,772,427	5,469,154
Capital Investments	5,111,000	1,022,000	5,164,800	13,962,200	25,260,000
Cash Required	5,978,614	1,328,178	5,687,735	17,734,627	30,729,154
Cash Surplus-Quarter	-5,978,614	-1,311,518	-5,608,504	-17,701,179	-
Cash Surplus-Year	-5,978,614	-7,290,132	-12,898,636	-30,599,815	-30,599,815

Table 32.--Cash Flow Summary--Second Year.

Income	Quarter				Total
	1	2	3	4	
Commercial shell eggs	$1,833,840	$8,700,480	$15,388,920	$29,690,820	$55,614,060
Excess hatching eggs	26,562	92,677	26,562	-	181,216
Spent fowl	-	48,745	-	-	48,745
Total Income	$1,860,402	$8,841,902	$15,415,482	$29,726,235	$55,844,021
CASH EXPENDITURES ($)					
Maintenance and Repairs	227,588	337,502	425,147	767,437	1,784,674
Insurance	130,612	199,126	266,370	452,882	1,048,990
Property Taxes	-	-	-	577,321	577,321
Salaries and Benefits	489,301	682,828	884,601	1,495,778	3,552,508
Medication	134,751	145,285	155,274	225,901	661,211
Feed Ingredients	4,237,671	6,803,845	9,209,463	16,255,165	36,506,144
Feed Overhead	9,143	14,750	20,049	35,441	79,383
Telephone	924	924	924	1,228	4,000
Legal Fees and Audit	1,155	1,155	1,155	1,535	5,000
Public Relations	4,615	4,615	4,615	6,155	20,000
Supplies	174,810	688,416	1,255,163	2,420,227	4,538,616
Vehicle Operations	8,619	10,860	12,979	20,796	53,254
Pullet Removal	103,680	103,680	103,680	138,240	449,280
Hen Removal	-	-	-	-	-
Utilities	312,079	426,572	544,380	902,054	2,185,265
Miscellaneous	32,279	64,568	140,149	263,755	500,751
Breeder Chicks	-	-	-	672,000	672,000
Total Cash Expenditures	5,867,227	9,484,306	13,050,949	24,235,915	52,638,397
Capital Investments	17,574,000	18,693,000	16,893,000	22,224,000	75,384,000
Cash Required	23,441,227	28,177,306	29,943,949	46,459,915	128,022,397
Cash Surplus-Quarter	-21,580,825	-19,335,404	-14,528,	-16,733,680	-
Cash Surplus-Year	-21,580,825	-40,916,229	-55,444,696	-72,178,376	-72,178,376

Table 33.--Cash Flow Summary--Third Year.

Income	Quarter				Total
	1	2	3	4	
Commercial shell eggs	$26,028,300	$26,028,300	$26,038,300	$34,704,400	$112,789,300
Excess hatching eggs	26,070	90,961	26,070	34,760	177,861
Spent fowl	890,064	938,809	890,064	1,186,752	3,905,689
Total Income	$26,944,434	$27,058,070	$26,944,434	$35,925,912	$116,872,850
CASH EXPENDITURES ($)					
Maintenance and Repairs	664,390	666,293	666,293	888,387	2,885,363
Insurance	392,419	393,462	393,462	524,614	1,703,957
Property Taxes	-	-	-	1,583,392	1,583,392
Salaries and Benefits	1,287,654	1,288,590	1,288,077	1,733,308	5,597,634
Medication	179,286	178,427	177,882	239,356	774,951
Feed Ingredients	13,791,493	13,791,493	13,728,911	18,416,702	59,789,393
Feed Overhead	30,227	30,080	29,982	40,183	130,472
Telephone	924	924	924	1,228	4,000
Legal Fees and Audit	1,155	1,155	1,155	1,535	5,000
Public Relations	4,615	4,615	4,615	6,155	20,000
Supplies	2,091,418	2,091,329	2,091,270	2,788,485	9,062,502
Vehicle Operations	12,051	16,993	16,954	22,643	73,691
Pullet Removal	103,680	103,680	103,680	138,240	449,280
Hen Removal	120,000	120,000	120,000	160,000	520,000
Utilities	765,236	766,838	766,752	1,023,114	3,321,940
Miscellaneous	229,487	229,660	229,621	306,244	995,012
Breeder Chicks	-	-	-	672,000	672,000
Total Cash Expenditures	19,138,834	19,683,539	19,619,578	28,545,636	87,588,587
Capital Investments	4,456,000	-	-	-	4,456,000
Cash Required	24,195,834	19,683,539	19,619,578	28,545,	92,044,587
Cash Surplus-Quarter	2,748,600	7,374,531	7,324,856	7,380,276	-
Cash Surplus-Year	2,748,600	10,123,131	17,447,987	24,828,263	24,828,263

Table 34.--Cash Flow Summary--Fourth Year.

Income	Quarter				Total
	1	2	3	4	
Commercial shell eggs	$29,466,000	$29,466,000	$29,466,000	$39,288,000	$127,686,000
Excess hatching eggs	29,513	102,974	29,513	39,350	201,350
Spent fowl	890,064	938,809	890,064	1,186,752	3,905,689
Total Income	$30,385,577	$30,507,783	$30,385,577	$40,514,102	$121,793,039
CASH EXPENDITURES ($)					
Maintenance and Repairs	664,390	663,293	666,293	888,387	2,885,363
Insurance	392,419	393,462	393,462	524,614	1,703,957
Property Taxes	-	-	-	1,583,392	1,583,392
Salaries and Benefits	1,287,654	1,288,590	1,288,077	1,733,308	5,597,634
Medication	179,286	178,427	177,882	239,356	774,951
Feed Ingredients	13,852,287	13,791,493	13,728,911	18,416,702	59,789,393
Feed Overhead	30,227	30,080	29,982	40,183	130,472
Telephone	924	924	924	1,228	4,000
Legal Fees and Audit	1,155	1,155	1,155	1,535	5,000
Public Relations	4,615	4,615	4,615	6,155	20,000
Supplies	2,091,418	2,091,329	2,091,270	2,788,485	9,062,502
Vehicle Operations	17,051	16,993	16,954	22,693	73,691
Pullet Removal	103,680	103,680	103,680	138,240	449,280
Hen Removal	120,000	120,000	120,000	160,000	520,000
Utilities	765,236	766,838	766,752	1,023,119	3,321,940
Miscellaneous	229,487	229,660	229,621	306,244	995,012
Breeder Chicks	-	-	-	672,000	672,000
Total Cash Expenditures	19,739,834	19,683,539	19,619,578	28,545,636	87,588,587
Capital Investments	-	-	-	-	-
Cash Required	19,739,834	19,683,539	19,619,578	28,545,636	87,588,587
Cash Surplus-Quarter	10,645,743	10,824,244	10,765,999	11,968,466	-
Cash Surplus-Year	10,645,	21,469,987	32,235,986	44,204,452	44,204,452

Table 35.--Cash Flow Summary--Fifth Year.

Income	Quarter				Total
	1	2	3	4	
Commercial shell eggs	$25,537,200	$25,537,200	$25,537,200	$34,049,600	$110,661,200
Excess hatching eggs	25,578	89,244	25,578	34,104	174,504
Spent fowl	890,064	938,808	890,064	1,186,752	3,905,689
Total Income	$26,452,842	$26,565,253	$26,452,842	$35,270,456	$114,741,393
CASH EXPENDITURES ($)					
Maintenance and Repairs	664,390	663,293	663,293	888,387	2,885,363
Insurance	392,419	393,462	393,462	524,614	1,703,957
Property Taxes	-	-	-	1,583,392	1,583,392
Salaries and Benefits	1,287,659	1,288,590	1,288,077	1,733,308	5,597,634
Medication	179,286	178,427	177,882	239,356	774,951
Feed Ingredients	13,852,287	13,791,493	13,728,911	18,416,702	59,789,393
Feed Overhead	30,227	30,080	29,982	40,183	130,475
Telephone	924	924	924	1,228	4,000
Legal Fees and Audit	1,155	1,155	1,155	1,535	5,000
Public Relations	4,615	4,615	4,615	6,155	20,000
Supplies	2,091,418	2,091,329	2,091,270	2,788,485	9,062,502
Vehicle Operations	17,051	16,993	16,954	22,643	73,691
Pullet Removal	103,680	103,680	103,680	138,240	449,280
Hen Removal	120,000	120,000	120,000	160,000	520,000
Utilities	765,236	766,838	766,752	1,023,114	3,321,940
Miscellaneous	229,487	229,660	229,621	306,244	995,012
Breeder Chicks	-	-	-	672,000	672,000
Total Cash Expenditures	19,739,834	19,683,539	19,619,578	25,545,636	87,588,587
Capital Investments	-	-	-	-	-
Cash Required	19,739,834	19,683,539	19,619,578	25,545,636	87,588,587
Cash Surplus-Quarter	6,713,008	6,881,714	6,833,264	6,724,820	-
Cash Surplus-Year	6,713,008	13,594,722	20,427,986	27,152,806	27,152,806

DISCUSSION

The analysis was based upon the data presented in the preceding budgets. During the first year of operation (1973) total revenue was calculated to be $129,339 while total operating expenses were calculated to be $6,411,061. Therefore, the complex had an annual loss of $6,281,722. This loss was assumed to be the cost of starting up the business and was capitalized. Hence, at the end of the first year (1973) the complex had a total of $31,541,722 in capitalizable assets.

During the second year (1974) of operation the complex had $55,844,021 in total revenue and $60,912,576 in total expenses. Therefore, total loss was calculated to be $5,068,555 and was capitalized. Hence, at the end of the second year the complex had $111,994,277 in capitalizable assets.

During the third year of operation (1975) the complex had $116,872,850 in total revenue and $101,191,339 in total operating expenses. Therefore, profit before taxes was calculated to be $15,681,511. At the end of the third year net worth was calculated as follows:

Capital investments	(1973)		$25,260,000
Capitalized loss	(1973)		6,281,722
Depreciation	(1973)	(-)	941,907

Capital Investments	(1974)		75,384,000
Capitalized Loss	(1974)		5,068,555
Depreciation	(1974)	(-)	8,274,179
Capital Investments	(1975)		4,456,000
Depreciation	(1975)	(-)	13,602,752
Replacement Capital	(1975)		13,602,752
Net Worth	(1975)		107,229,441

The annual replacement capital was assumed to be equivalent to the annual depreciation starting from the third year (1975) of operation. This was money put aside to cover future expenses in the replacement of depreciable assets. Since replacement capital was assumed to be equivalent to depreciation, net worth was calculated to be the same at the end of the third, fourth and fifth years of operation.

The annual rate of return was calculated as follows:

$$\frac{\text{Profit Before Taxes}}{\text{Net Worth}} \times 100$$

In 1975 the annual rate of return was calculated to be 14.62 percent $\left(\frac{15,681,511}{107,229,441} \times 100\right)$. During the same period the annual rate of return for Michigan's egg producers was 5.50 percent according to Kelsey and Brown (1977).

In 1976 the complex had $131,793,039 in total revenue and $101,191,339 in total operating expenses. Therefore, profit before taxes was calculated to be $30,601,700. Net worth was $107,229,441, therefore, the rate of return was calculated to be 28.54 percent $\left(\frac{30,601,700}{107,229,441} \times 100\right)$. During the same period the annual rate of return for Michigan's egg producers was 6.60 percent according to Kelsey and Brown (1977).

In 1977 the complex had $114,741,393 in total revenue and $101,191,339 in total operating expenses. Therefore, profit before taxes was calculated to be $13,550,054. Net worth was $107,229,441, therefore, the rate of return was calculated to be 12.64 percent $\left(\frac{13,550,054}{107,229,441} \times 100\right)$. During the same period the annual rate of return for Michigan's egg producers was 19.50 percent according to Kelsey (1978).

Since there was a loss during the first two years of operation (1973 and 1974) there was no return on investment shown. The difference between the rate of return realized by Michigan's egg producers and the simulated complex may be due to the fact that, although the average price for a dozen eggs may have been the same the cost of inputs may have been different. The cost of inputs was assumed to be constant throughout the life of this study while in reality the egg producers had different costs each year.

SUMMARY

The objective of this study was to analyze the economic feasibility of establishing an egg producing complex that would produce enough eggs to supply each of Michigan's 9,000,000 residents with 280 eggs annually. The data presented in the preceeding tables, based on assumptions given in the study, provide the basic information necessary to making a decision as to the feasibility of establishing such an enterprise. The data and assumptions upon which the cost and income were calculated were applicable to conditions in Michigan. Therefore, it can be concluded that it is economically feasible to establish a completely integrated egg production operation in Michigan provided the following conditions as shown by the data presented in the study can be met.

1. A total work force of 655 personnel in the skilled, semi-skilled, and unskilled categories are available and can be employed.
2. That investors are willing and able to raise $102,778,191 during the first two years. This figure includes both funds for capital investment and working capital until the complex can generate enough income to provide its own operating capital.

At the end of the third year (1975) of operation the simulated proposed complex had a rate of return on net worth of 14.62 percent. During the same period Michigan's egg producers had a rate of return on net worth of 5.50 percent. At the end of the fourth year (1976) of operation the complex had a rate of return on net worth of 28.54 percent as compared to 6.60 percent for Michigan's egg producers. At the end of the fifth year (1977) of operation the complex had a rate of return on net worth of 12.64 percent as compared to 19.50 percent for Michigan's egg producers.

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