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### Cost and benefit of investment in integrated broiler farming – A case study

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#### KEYWORDS

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Net present value,  
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Internal rate of return.

#### A B S T R A C T

The cost and return analysis of different sizes of integrated broiler farms in Theni District of Tamil Nadu State has been carried out based on the primary data collected from 150 broiler farmers for the period Mar 2011 to Feb 2012. The study has shown that the total fixed investments per bird have been highest on small farms, followed by medium and large farms. The total cost of meat production per bird, returns per bird over the variable costs has been found highest on small broiler farms, followed by medium and large farms. On the basis of net present value, and internal rate of return, investment in broiler farming has been found profitable in all farm-sizes, it being most profitable on large farms, followed by medium and small farms. The small broiler farms have been observed highly sensitive to increase in costs and decrease in net returns. The study has observed that broiler farming is a profitable venture and has a bright future in the Tamil Nadu agro based industry for improving economic status of the farming community in general and in the study are in particular.

### Introduction

Broiler industry is one of the profitable agro-industries which can effectively tackle the problems of unemployment and underemployment in the rural areas, particularly of small and marginal farmers. Broiler industry can be adopted under a wide range of climatic conditions and can generally be combined conveniently with

other farm enterprises. The land and capital requirements for this enterprise being not large, it ensures a regular flow of income through the marketing of poultry products. In spite of a spectacular growth in the poultry sector during the past two decades, a huge gap exists between availability and requirement of poultry products. An increase

in per capita consumption by one egg and 50 grams of poultry meat can create employment for about 26,000 persons per year (Kazi, 2003). The present per capita availability of poultry meat is 1.8 kg against the requirement of 11 kg, as per the National Committee on Human Nutrition in India (www.indiastat.com, 2006). Therefore, to meet the domestic requirement, there is a need of about six-time increase in meat production. Increase in population growth, changing life-style, shifting of food habits, rapid urbanization, increased per capita income, awareness about health care, etc. are contributing towards rising demand of poultry products. Thus, the growth potential of this sector is bright due to regular flow of income throughout the year in the rural economy of the Tamil Nadu state. In India, the production of broilers increased from 1.89 lakh tones in 1989-90 to 23.13 lakh tones in 2009-10, at a compound annual growth rate of 13.21 per cent. In broiler production, India stands 5th in the world with 2.31 million tones of broiler meat, contributing Rs 9000 crore to the national economy.

Poultry farming assumes special significance in the state of Tamil Nadu due to integration of Poultry sector, conducive weather condition and available land area. The productivity and production of food grains, particularly of cereals in Tamil Nadu have already reached a point of saturation with little scope to increase, resulting in looking for subsidiary occupations like poultry farming. At the same time, due to limited scope of further addition to the net area sown and huge indebtedness, diversification of agriculture through allied activities like poultry farming has acquired added significance for solving the agrarian crisis of the state. Adoption of poultry farming (broilers), by farmers, will not only liberate them from the debt trap but would also meet the growing demand of poultry meat.

## **Materials and Methods**

Theni is one of the five leading broiler producing districts in Tamil Nadu and has the necessity to study the financial viability of broiler farming. Therefore, the present study was undertaken to look into the investment pattern, costs and returns structure, production efficiency and economic viability of different sized poultry farms in Theni District. Uthamapalayam, Bodinayakanur, Periyakulam, Auntipatti and Theni Taluk of Theni District of the state of Tamil Nadu. Three-stage random sampling technique with district as first, block as second, and the ultimate respondents as third stage sampling unit was adopted. Further, three blocks were selected randomly from each selected district and then all broiler farms from these districts were classified into three categories using cumulative cube root frequency method, viz. small (up to 5000), medium (5001 to 8000) and large (above 8000). A sample of 150 broiler farmers of different sizes namely 45 farms in small and large size and 60 farms in medium size was selected by probability proportional to size method. The primary data were collected by personal interview method for five batches of broilers from March 2011 to February 2012.

The depreciation was charged on the value of buildings as 5 per cent per annum and on equipments as 10 per cent per annum. The interest on fixed capital was charged @ 12 per cent per annum. The stock of poultry birds is an asset, but it was not considered as fixed capital as the size of the flock undergoes a rapid change. Interest on investment on poultry birds was charged @12 per cent per annum. The term working capital included investment on feed, labour, medicines and miscellaneous costs. The interest on working capital was charged @12 per cent per annum for the half the

accounting period. For analysis, simple averages and percentages were used. For studying the financial viability of poultry enterprise, net present value, benefit-cost ratio and internal rate of return were calculated using standard procedures.

## **Result and Discussion**

To find the production cost of broiler chicken the parameters were considered based on size wise annual average cost.

Table 1 illustrates the parameters to determine the cost of production of integrated broiler farming in Theni District. The average number of birds placed was 8475 birds in overall. In small, medium and large size farms are 4922, 7083 and 13886 birds respectively. The number batches in small is more than medium and large farms because the small farm can be made ready quicker than others. The mortality rate in small is lower than medium and large farms since the intensive care can be taken by the farmer. The average weight of broiler birds 2.19 kilograms in overall, in case of large farm it is lower than medium and small farms as the large farms require lot of labour and care, the economic scale; diminishing balancing works out.

### **Fixed Capital Investment Pattern on Different Broiler Farm-sizes**

The pattern of fixed capital investment for different broiler farm-sizes has been presented in Table 2. Fixed assets include Land, Broiler Shed, Equipment and Fittings, Pump set, and the like. It reveals that total fixed investment was maximum on an average in large farms (Rs 212767.03), followed by medium (Rs 129549.23) and small farmers (Rs.89754.82) with the overall

average of Rs 142576.25. The interest on fixed capital was to the tune of Rs 37311.1 (41.57%), Rs 53998.5 (41.68%) and Rs 93322.5 (43.86%) on large, medium and small broiler farms, respectively with the overall average of Rs 60789.48 (42.64%). The broiler sheds were the main item of costs in buildings. Further, among equipments, feeders plus drinkers were the main components of investment.

Figures in parentheses are percentage to the total.

### **Variable Cost on Different Broiler Farm-sizes**

The variable costs on different broiler farm-sizes have been presented in Table- 3.

A perusal of the table brought out that the total variable cost on an average was Rs 2333810.28, Rs 3256249.99 and Rs 26252752.44 on small, medium and large farms, respectively with the overall average of Rs.3878468.81. The major items of variable costs were feed (72.03%), followed by day-old chicks (17.04%) and miscellaneous items (10.93%). In size-wise analysis, the cost of feed was found to be Rs 1673480.00 (71.71%), Rs 2331015.30 (71.59%) and Rs.4230307.50 (72.45%) on small, medium and large broiler farms, respectively. Khan and Babu (2004) have reported the expenditure on feed constituted the most important item of cost among variable costs (61.81% in small and 58.30% in large farms). The cost of day-old chicks was Rs 393760.00 (16.87%), Rs.2331015.30 (17.14%) and Rs.1065056 (17.03%) and cost on miscellaneous items was Rs.134467.81 (5.76%), Rs.182775.55 (5.61%) and Rs.303459.485 (4.859%) on small, medium and large farms, respectively. The interest on working capital was to the extent Rs.132102.47

(5.66%), Rs.184319.04 (5.66%) and Rs.353929.38 (5.66%) on small, medium and large farms, respectively.

### **Cost per Broiler Chicken under Integrated Broiler**

Total variable costs per bird showed a more realistic picture of the variable cost on different broiler farm-sizes. The total variable cost per bird was the highest on small farms (Rs 101.23), followed by medium (Rs.98.27) and large (Rs.96.28) farms, with the overall average of Rs 98.56. The variable cost relatively decreased as the farm-size increased. Similar trends were found in the case of per bird feed cost, interest on working capital, labour charges, and the like. The per bird feed cost was Rs 72.59, Rs 70.35 and Rs 69.76 on small, medium and large broiler farms, respectively with the overall average cost of Rs 70.85. The per bird cost of day-old chicks was highest on small farms (Rs 17.08), followed by medium (Rs.16.84) and large (Rs.16.40) broiler farms. The per bird interest on working capital was Rs 5.73, Rs 5.56 and Rs 5.45 on small, medium and large farms, respectively. Thus, it may be concluded that per bird variable cost was lower on large farms due to the existence of economies of scale in these farms.

Total fixed cost for broiler farmers per bird depicted on different broiler farm sizes. The total fixed cost per bird was the highest on medium farms (Rs.3.91), followed by small farms (Rs.3.89) and large (Rs.3.27) farms, with the overall average of Rs.3.71. besides the cost of growing charge paid to broiler farmers is added the sum will be cost of production of the integrator or producer. The total cost of production per bird was Rs.113.93, Rs.111.36 and Rs. 108.99, on the overall average Rs.111.42.

the cost per bird was lowed in small, followed by medium and large size farms. The total cost of production per kilogram chicken was also computed by dividing the size wise average weight of broiler bird. It showed Rs.52.50, Rs.50.85 and Rs.49.32 in small, medium and large size farms on the average Rs.50.89.

Thus, it could be concluded that variable costs, total fixed costs and total cost of broiler production on per bird basis were highest on small farms, followed by medium and large farms. The total cost per bird decreased with increase in farm-size, indicating the existence of economies of scale on large farms.

### **Gross Returns on Broiler Farming for The Farmers in Integrated Broiler Farming**

The cost incurred by the farmer under Integrated Broiler Farming System, it is essential to analyse the return available to the farmers. Generally the return available to the farmers may consist of growing charge given by the integrator, return on sale of manure and gunny bags. The annual average weight of chicken grown, growing charge received, income from sale of manure and gunny bags are analysed and the results are given below.

The return on the broiler farming was consisted of growing charge, sale of manure and sale of used gunny bags. Gross return was Rs.222119.16, Rs.332322.34 and Rs.664766.48 in small, medium and large size farms, on overall average Rs.398994.62. The rate of growing charge paid was computed that was Rs.4.17 per kilogram. It was high in large farms and was less in medium and small farms. Sale of manure was higher in large farm that

**Table.1** Parameters to Compute Cost Of Production Per Chicken

S.No.	Particulars	Size of the Broiler Farm			
		Small	Medium	Large	Overall
1	Number of Birds reared per batch	4922	7083	13886	8475
2	Number of Batches reared per annum	5.5	5	5	5.15
3	Total number of birds reared per annum	24610	35415	69430	42378
4	Total number of mortality per annum	1553	2281	4485	2723.8
5	Total number of birds alive per annum	23057	33134	64945	39654.2
6	Mortality Rate	6.31	6.44	6.46	6.41
7.	Average Weight	2.17	2.19	2.11	2.19

**Table.2** Fixed Capital Investment Pattern on Different Broiler Farm-sizes

Sl.No	Fixed Cost	Size of the Farm			
		Small	Medium	Large	Overall
1	Rental Value of land	24000 (26.74)	36000 (27.79)	60000 (28.20)	39600 (27.77)
2	Depreciation on Fixed Assets	22234.16 (24.77)	31213.38 (24.09)	44835.9 (21.07)	32606.37 (22.87)
3	Repairs and Maintenance	6209.56 (6.92)	8337.35 (6.44)	14608.63 (6.87)	9580.40 (6.42)
4	Interest on Fixed Capital	37311.1 (41.57)	53998.5 (41.68)	93322.5 (43.86)	60789.48 (42.64)
	<b>Total Fixed Cost</b>	<b>89754.82</b> <b>(100.0)</b>	<b>129549.23</b> <b>(100.0)</b>	<b>212767.03</b> <b>(100.0)</b>	<b>142576.25</b> <b>(100.0)</b>

Source : Primary data

**Table.3** Variable Cost Pattern on Different Size of Broiler Farms

S.No.	Particulars	Size of the Farm			
		Small	Medium	Large	Overall
1.	<b>Variable Cost</b>				
	Chick Cost	393760.00 (16.87)	558140.40 (17.14)	1065056.20 (17.03)	660901.02 (17.04)
2.	Feed Cost	1673480.00 (71.71)	2331015.30 (71.59)	4530307.50 (72.45)	2793542.37 (72.03)
3.	Medicine Cost	28301.50 (1.21)	38640 (1.19)	59693.25 (0.95)	41854.43 (1.08)
4.	Shed Cleaning Cost	8722.22 (0.37)	11508.35 (0.35)	18677.80 (0.30)	12823.35 (0.33)
5.	Litter Cost	18055.53 (0.77)	25058.35 (0.77)	40688.90 (0.65)	27646.67 (0.71)
6.	Labour Cost	35333.37 (1.51)	46428.58 (1.43)	78569.69 (1.26)	52742.35 (1.36)
7.	Brooding & Heating	12466.65 (0.53)	16841.65 (0.52)	27455.55 (0.44)	18713.32 (0.48)
8.	Electricity Charges	8427.75 (0.36)	11758.29 (0.36)	18955.87 (0.30)	12918.40 (0.33)
9.	Miscellaneous Expenses	23160.79 (0.99)	32543.03 (1.00)	59418.30 (0.95)	37790.94 (0.97)
10.	Interest on Working Capital	132102.47 (5.66)	184316.04 (5.66)	353929.38 (5.66)	219535.97 (5.66)
	<b>Total Variable Cost</b>	<b>2333810.28</b> <b>(100.00)</b>	<b>3256249.99</b> <b>(100.00)</b>	<b>6252752.44</b> <b>(100.00)</b>	<b>3878468.81</b> <b>(100.00)</b>

Source: Primary data; Figures in parentheses are percentage to the total

**Table.4** Cost per Broiler Chicken under Integrated Broiler Farming in Theni District

S.No	Particulars	Size of the Broiler Farm			
		Small	Medium	Large	Overall
	<b>Variable Cost</b>				
1	Chick Cost	17.08	16.84	16.4	16.78
2	Feed Cost	72.59	70.35	69.76	70.85
3	Medicine Cost	1.23	1.17	0.92	1.11
1	Shed Cleaning Cost	0.38	0.35	0.29	0.34
2	Litter Cost	0.78	0.76	0.63	0.73
3	Labour Cost	1.53	1.4	1.21	1.38
4	Brooding & Heating	0.54	0.51	0.42	0.49
5	Electricity Charges	0.37	0.35	0.29	0.34
6	Miscellaneous Expenses	1.00	0.98	0.91	0.97
7	Interest on working capital	5.73	5.56	5.45	5.58
8	<b>Total Variable Cost</b>	<b>101.23</b>	<b>98.27</b>	<b>96.28</b>	<b>98.56</b>
	<b>Fixed Cost</b>				
9	Rental Value of land	1.04	1.09	0.92	1.02
10	Depreciation on fixed assets	0.96	0.94	0.69	0.87
11	Repairs and Maintenance	0.27	0.25	0.22	0.25
12	Interest on fixed capital	1.62	1.63	1.44	1.57
13	<b>Total Fixed Cost</b>	<b>3.89</b>	<b>3.91</b>	<b>3.27</b>	<b>3.71</b>
14	<b>Total Cost before Growing Cost</b>	<b>105.12</b>	<b>102.18</b>	<b>99.55</b>	<b>102.27</b>
15	Growing Cost per bird	8.81	9.18	9.44	9.15
16	<b>Cost of Production per Bird</b>	<b>113.93</b>	<b>111.36</b>	<b>108.99</b>	<b>111.42</b>
17	Average Weight of Chicken grown	2.17	2.19	2.21	2.19
	<b>Cost of Production per Kg</b>	<b>52.50</b>	<b>50.85</b>	<b>49.32</b>	<b>50.89</b>

Source: Primary data

Figures in parentheses are percentage to the total



**Table.5** Returns on Broiler Farming for the Farmers in Integrated Broiler Farming

S.No	Particulars	Size of the Broiler Farm			
		Small	Medium	Large	Overall
<b>I</b>	<b>Returns</b>				
1	Weight of Chicken grown	50029.35	72569.26	143528.45	87095.04
2	Growing Charge per kg	4.06	4.19	4.27	4.17
3	Total Growing Charge	203119.16	304065.20	612866.48	366421.77
4	Sale of Manure	10357.14	15285.71	28800.00	17861.42
5	Sale of Gunny bags	8642.86	12971.43	23100.00	14711.43
<b>6</b>	<b>Gross Return (3 + 4 + 5)</b>	<b>222119.16</b>	<b>332322.34</b>	<b>664766.48</b>	<b>398994.62</b>
7	Total Cost	193761.82	269433.88	445982.38	299696.81
	<b>Net Return (6 – 7)</b>	<b>28357.34</b>	<b>62888.46</b>	<b>218784.10</b>	<b>99297.82</b>
	<b>NPR</b>	<b>12.77</b>	<b>18.92</b>	<b>32.91</b>	<b>21.27</b>
	<b>ROI</b>	<b>7.60</b>	<b>11.65</b>	<b>23.44</b>	<b>13.97</b>

Source : Primary data

**Table.6** Pay - back Period of Broiler Farming in Theni District

Sl.No.	Particulars	Pay – back Period	Cut – off Year	Remarks
1.	Small Farming	3.72 Yrs	6.67 Yrs	Viable
2.	Medium Farming	3.18 Yrs	6.67 Yrs	Viable
3.	Large Farming	2.81 Yrs	6.67 Yrs	Viable

Source : Primary data

**Table.7** Net Present Value of Broiler Farming in Theni District

Sl.No.	Particulars	Net Present Value (Rupees)	Nature of NPV	Remarks
1.	Small Farming	196210.33	Positive	Acceptable
2.	Medium Farming	413132.52	Positive	Acceptable
3.	Large Farming	1033091.10	Positive	Acceptable

Source : Primary data

**Table.8** Internal Rate of Return of Broiler Farming in Theni District

Sl.No.	Particulars	Internal Rate of Return	Opportunity Cost of Capital	Remarks
1.	Small Farming	33%	15%	Viable
2.	Medium Farming	43%	15%	Viable
3.	Large Farming	53%	15%	Viable

Source: Primary data

amounted to Rs.28800.00 and it was less in medium and small farms. Sale of Gunny bags was amounted to Rs.14711.43 overall. In small farm it was lesser than medium and large farms.

Thus, it could be concluded that the return on broiler production per bird were highest on large farms, followed by medium and small farms. The return per bird increased with increase in farm-size, indicating the existence of economies of scale on large farms.

### **Capital productivity analysis**

Broiler chicken being one of easily available and consumable item the commercial production starts in 7<sup>th</sup> week. So, considerable investments were made over the period of rearing. Moreover, the benefits are realized as a stream over a long period of time. Therefore, it is necessary to know the present value of the expected future income to justify the investments made. A sound appraisal technique should be used to measure the economic worth of the investment in integrated broiler farming.

### **The Analytical Framework**

In the present study the following capital budgeting techniques are used to measure the economic worth of the investments in integrated broiler production.

### **Pay-back Period**

It measures the number of years required to recover the original cash outlay invested in the project. The maximum acceptable pay-back period is fixed by taking into account the reciprocal of the cost of capital. This can be termed as the cut-off point. Generally a project having a pay-back

period more than cut-off point is not estimated.

The pay-back period computed from Table 5.14 on the basis of undiscounted cumulative value for the investment made in small farming was 3.72 years whereas in medium farming it was 3.18 years. Comparatively large farming had 2.81 years in recovering the initial investment made in broiler farming. The difference in these three broiler farms due to more return in large and medium farming than small farming. The cut-off year at 15 per cent cost of capital is 6.67 years. The calculated Pay-back period is less than the cut-off year. Hence it may be concluded that the investment in broiler farming is a viable one.

### **Net Present Value**

Net present value is found by subtracting present value of costs from the present value of returns. A project whose net present value is greater or equal to zero is considered as a worthy investment. Symbolically,

$$NPV = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}$$

Where, the symbols used are the same as in the case of benefit-cost ratio.

It is the most valid technique of evaluating an investment project. It is generally consistent with the objective of maximizing wealth. The net present value of broiler production in small farming was computed on the basis of estimates.

It is found from Table 5.15 that the net present value was positive in all size broiler farming and large it is inferred that the capacity to generate more wealth is large in



broiler farming. Therefore, investment in broiler farming is economically beneficial.

### **Internal Rate of Return**

IRR is the rate of discount at which NPV is zero. If the IRR exceeds the cut-off rate (opportunity cost of capital) the investment is economically viable. Symbolically,

$$IRR = \frac{\sum_{t=1}^n (B_t - C_t)}{(1+i)^t} = 0$$

symbols used are the same as in the case of benefit-cost ratio.

National Bank for Agriculture and Rural Development (NABARD) considers an agricultural project which yields a return of 15 percent and above as an economically viable project. Hence in this study the required rate of return is taken as 15 per cent.

To compute the Pay-back period, Net present value, and Internal rate of return for integrated broiler farming, present value of cost and returns at 15 per cent discount factor were calculated and the results are presented in Table 5.16.

### **Conclusion**

The total fixed investments per bird have been found the highest on small farms, followed by medium and large farms. The total variable costs as well as total costs per bird have been found highest on small farms, followed by medium and large farms. The total cost of meat production per bird has been observed highest on small broiler farms, followed medium and large farms. The net returns per bird over the variable costs have been recorded the highest on large farms, followed by medium and small

farms. This increasing trend of net income with the farm size could be attributed mainly to the economies of scale on the large farms. The production efficiency of broiler farms has increased with farm-size due to better utilization of inputs. On the basis of net present value, benefit-cost ratio and internal rate of return, investment in broiler farming has been found most profitable on large farms, followed by medium and small farms. The small broiler farms have been observed highly sensitive to increase in costs and decrease in net returns. Thus, in nutshell, the broiler farming is a profitable venture and has a bright future in the study area of Tamil Nadu agriculture for improving economic status of the farming community.

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