Economics of broiler production in North Eastern hill region (NEHR) of India

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ARTICLE INFO

ABSTRACT

The study analyzed the cost and returns of broiler poultry farming and constraints faced by broiler farmers in North Eastern Hill Region (NEHR) of India. The study was based on primary data collected from 120 broiler farmers in Manipur and Mizoram states in the year 2022-23. The costs and returns were computed based on CACP cost concepts and Garrett's ranking technique was used to identify the constraints. The study revealed that total cost of broiler production per farm was ₹ 381989 for NEHR and was higher in Manipur than Mizoram. The cost of broiler feed was the major item of variable cost, with a share of 63.72 per cent, 64.49 per cent and 62.18 per cent respectively in NEHR, Manipur and Mizoram. Gross farm income from broiler production in NEHR was ₹ 417626 and net farm income was estimated to be ₹ 50881. Net income was relatively higher in Mizoram (₹ 61079) than Manipur (₹ 40684). The overall benefit-cost ratio was 1:1.14 in the study area. Price fluctuations in the market was the serious problem in the region. On the basis of net farm income, benefit cost ratio, family labour income and farm business income, broiler farming was found to be profitable in NEHR. The study suggests proper vaccination to broiler birds and training on broiler management to broiler farmers to reduce mortality and increase returns.

1. Introduction

Broiler poultry farming has exhibited significant growth in recent decades. It occupies an important place among various livestock enterprises *viz*., dairy farming, piggery, sheep and goat rearing and others. Poultry is an important component of farm economy in India. Depending on farm size, broiler farming may be the primary source of family income or supplementary income and productive employment for small and marginal farmers throughout the year. In India, broiler farming has transformed from traditional to scientific agri-based farming over a period of three to four decades (Kumar and Rai 2006). The transformation was due to development of high-yielding broiler birds (body weight of 2.4 to 2.6 kg at 6 weeks), and package of practices on nutrition, management and disease control, resulting in spectacular growth rates in broiler production by 10 to 12 per cent per annum (Kumar *et al.,* 2018). Globally, India ranks 3rd in egg production and 7th in poultry meat production. It is estimated that 260 million layers produce approximately 3.4 million tonnes of eggs and 3000 million broilers produce approximately 3.8 million tonnes of poultry meat per annum (Rajesh 2019).

The NEHR of India comprises of eight states, namely Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim which occupy about 8 per cent of total land area and 3.8 per cent of the country's population. The consumption of meat is comparatively higher in this region because of social and religious acceptance. Chicken is the most preferred meat in this region (Feroze *et al*., 2010). The NEHR is home for 243.50 lakh livestock and 692.25 lakh poultry, accounting for 4.5 per cent of total livestock and 8.1 per cent of poultry birds in India. Manipur stands 3rd in livestock population and 2nd in poultry population among all states in northeastern (NER) region of India (Baishya *et al*., 2020). Poultry population in Manipur is 2.9 million. Poultry sector has special significance due to higher production and consumption of broiler meat with rising income levels, which signifies that broiler farming is one of the potential agri-enterprises in Manipur (Kemrin *et al*., 2019). Due to the high preference for meat in people's diets, livestock farming plays an important role in the mixed farming system of Mizoram

(Lalmuansangi *et al*., 2021). The total livestock and poultry population in Mizoram is 0.36 million and 2.04 million respectively (GoI 2019). These indicate that there is more demand for poultry meat in this region. Against this background, the study was undertaken to analyse the economics of broiler farming and constraints faced by broiler farmers in NEHR.

2. Materials and Methods

The study was conducted in two states of the NEHR. A multistage sampling technique was adopted. Out of the eight states in NER of India, two hilly states namely, Manipur and Mizoram were selected purposively based on poultry population. Imphal West district in Manipur and Aizawl district in Mizoram were purposively selected on the basis of higher broiler production. Haorangsabal block in Imphal West district and Aibawk block in Aizawl district were selected randomly for the study. A cluster of villages were selected randomly to cover 60 sample broiler farms each in Manipur and Mizoram. The sample size was 120 broiler farms. Primary data was collected by personal interview using pre-tested questionnaire in 2022-23.

The cost and returns of broiler production was worked out based on CACP cost concepts as follows:

a) Cost A_1 = All actual expenses in cash or kind incurred in broiler production. It includes: (i) Wages of labour (ii) Cost of feed (iii) Cost of chicks (iv) Health cover charges (v) Cost of litter material (vi) Electricity and water charges (vii) Land revenue (viii) Depreciation on farm implements (ix) Interest on working capital

b) Cost A_2 = Cost A_1 + Rent paid for leased in land under poultry enterprise

c) Cost B_1 = Cost A_2 + Interest on value of owned fixed capital assets (excluding land)

d) Cost B_2 = Cost B_1 + Rental value of owned land (net of land revenue) and rent paid for leased in land

e) Cost C_1 = Cost B_1 + Imputed value of family labour

f) Cost C_2 = Cost B_2 + Imputed value of family labour

g) Cost C_3 = Cost C_2 + 10% of cost C_2 to (on account of managerial functions performed by farmer)

Returns from broiler farming

The per farm returns from broiler production was calculated using the formula:

i. Gross farm income (GFI) = Value of broiler sold + Manure + Empty gunny bags (quantity x price)

ii. Net return = GFI – Total cost

iii. Farm business income = GFI – Cost A_2

iv. Family labour income = GFI – Cost B_2

v. Net farm income = GFI – Cost C_2

vi. Farm investment income = Farm business income – Imputed cost of family labour

vii. Benefit-cost ratio:

a. On the basis of total cost = GFI ÷ Cost C_2

b. On the basis of paid out cost = GFI ÷ Cost A_1

To identify the constraints faced by broiler farmers, they were asked to rank the constraints enlisted in the interview schedule. Garrett's Ranking technique was used to analyze the data by using the formula:

$$\text{Percent Position} = \frac{100\,(R_{ij} - 0.5)}{N_j}$$

where,

R_{ij} = Rank allotted for i^{th} items by j^{th} individual

N_j = Number of items ranked by j^{th} individual

The table given by Garrett and Woodworth (1969) was used to convert percent position into scores. Then for each factor, the scores of individual farmers were added and divided by the total number of farmers. The overall ranking was obtained by assigning ranks in the descending order of mean score.

3. Results and Discussion
Per farm variable and fixed cost of broiler production in NEHR

The details of total cost of broiler poultry production in the study area is presented in Table 1. The per farm total cost of production was higher (₹ 509840) in Manipur followed by Mizoram (₹ 254139). In NEHR, the average total cost was ₹ 381989/farm. The share of fixed cost to total cost was higher in Mizoram (5.76 %) than Manipur (5.15%). The share of variable cost was higher than fixed cost and it was 94.65, 94.85 and 94.24 per cent respectively in NEHR, Manipur and Mizoram.

Among the items of variable cost, cost of feed accounted for 63.72, 64.49 and 62.18 per cent respectively in NEHR, Manipur and Mizoram. Major items were interest on working capital, contributing 10.14, 10.16 and 10.10 per cent in NEHR, Manipur and Mizoram, respectively. Cost of day-old chicks accounted for 17.37, 17.55 and 17.00 per cent in NEHR, Manipur and Mizoram. The other items of variable cost such as wages, cost of litter, electricity and water charges, health cover charges, expenses on sanitation and miscellaneous cost contributed less than 5 per cent of total cost.

Among the items of fixed cost, depreciation on broiler shed (₹ 14937) contributed the maximum share of 3.91 per cent to total cost, followed by depreciation on broiler equipment (₹ 3097) with a share of 0.81 per cent to total cost. The depreciation on broiler shed in Manipur and Mizoram contributed around 4 per cent share in each to the total cost. The broiler farmers in NEHR invested more on variable items (94.65 per cent) than fixed items (5.35 per cent).

Table 1. Per farm variable and fixed cost of broiler production in NEHR

(₹/farm)

Sl.No.	Particulars	Manipur	Mizoram	NEHR
A	**Variable Costs**			
1	Wages of labour	5598	5884	5741
		(1.10)	(2.32)	(1.50)
2	Cost of day-old chicks	89469	43216	66343
		(17.55)	(17.00)	(17.37)
3	Cost of feed	328816	158027	243421
		(64.49)	(62.18)	(63.72)
4	Cost of litter material	382	1331	856
		(0.07)	(0.52)	(0.22)
5	Electricity and water charges	1980	2625	2302
		(0.39)	(1.03)	(0.60)
6	Health cover charges	3815	1746	2780
		(0.75)	(0.69)	(0.73)
7	Expenses on sanitation	821	385	603
		(0.16)	(0.15)	(0.16)
8	Miscellaneous charges	903	618	761
		(0.18)	(0.24)	(0.20)
	Total working capital	431784	213830	322807
		(84.69)	(84.14)	(84.51)
	Interest on working capital@12%	51814	25660	38737
		(10.16)	(10.10)	(10.14)
	Sub-total (A)	483598	239490	361544
		(94.85)	(94.24)	(94.65)
B	**Fixed costs**			
1	Depreciation on broiler shed	19272	10602	14937
		(3.78)	(4.17)	(3.91)
2	Depreciation on broiler equipment	3565	2629	3097
		(0.70)	(1.03)	(0.81)
3	Other miscellaneous costs	1020	87	553
		(0.20)	(0.03)	(0.14)
	Total fixed capital	23857	13317	18587
		(4.68)	(5.24)	(4.87)
	Interest on fixed capital@10%	2386	1332	1859
		(0.47)	(0.52)	(0.49)
	Sub-total (B)	26242	14649	20445
		(5.15)	(5.76)	(5.35)
	Total Cost (A+B)	**509840**	**254139**	**381989**
		(100.00)	**(100.00)**	**(100.00)**

*Figures in parenthesis indicate percentage to total cost

Cost of broiler production in NEHR based on CACP cost concepts

Table 2 depicts various costs incurred in broiler production according to cost concepts given by Commission on Agricultural Costs and Prices (CACP). Total cost of production, $i.e.$ cost C_3 was ₹403419/farm in NEHR whereas in Manipur and Mizoram, it was ₹ 537877/farm and ₹ 268962/farm respectively. The direct cost or paid out cost involved in broiler production $i.e.$ cost A_1 was ₹358742/farm in the study area. Similarly, for Manipur and Mizoram, it was ₹481981/farm and ₹ 235503/farm respectively. The costs A_1 and A_2 were equal because there was no case of leased in land in the study area. The cost B_1 was estimated to be ₹ 360786/farm and cost B_2 was ₹ 362210/farm. Cost C_1 was ₹ 365322/farm for the overall NEHR.

Table 2. Cost of broiler production in NEHR based on CACP cost concepts

(₹/farm)

Sl. No.	Cost concepts	Manipur	Mizoram	NEHR
1	Cost A_1	481981	235503	358742
2	Cost A_2	481981	235503	358742
3	Cost B_1	484605	236967	360786
4	Cost B_2	485522	238898	362210
5	Cost C_1	488062	242581	365322
6	Cost C_2	488979	244511	366745
7	Cost C_3	537877	268969	403419

Per farm returns from broiler production in NEHR

The gross farm income per farm was ₹ 417626 in NEHR and it was higher in Manipur (₹ 529663) than in Mizoram (₹ 305590). Net returns over total cost was estimated to be ₹ 35637/farm and farm business income and family labour income were ₹ 58885 and ₹ 55417, respectively. Net farm income and farm investment income were estimated to be ₹ 50882/farm and ₹ 54350/farm, respectively. Overall, benefit-cost ratio was 1:1.139 and was higher in Mizoram (1:1.249) than Manipur (1:1.083).

Table 3. Per farm returns from broiler production in NEHR

(₹/farm)

Sl. no.	Particulars	Manipur	Mizoram	NEHR
1	Gross farm income	529663	305590	417626
2	Net return (GFI-TC)	19823	51452	35637
3	Farm business income	47682	70088	58885
4	Family labour income	44141	66693	55417
5	Net farm income	40684	61080	50882
6	Farm investment income	44225	64475	54350
7	Benefit-cost ratio			
	a. On the basis of total cost	1.083	1.249	1.139
	b. On the basis of paid out cost	1.099	1.298	1.164

Constraints faced by broiler farmers in NEHR

The result of Garett's ranking reveals that (Table 4), price fluctuation was the most serious problem that ranked first with a mean score of 87.61. This might be due to the smaller size of the farm, demand for poultry meat throughout the year and unorganized market in the region. High rate of mortality due to various diseases was another important constraint (mean score 79.98) and ranked second. Lack of vaccination practices and lack of scientific knowledge on broiler farming, poor quality chicks, *etc*. may be the reasons for high mortality in the study area. The broiler farmers felt that the disease attack risk was a major constraint with a mean score of 78.13 and ranked 3rd. Poor quality feed ingredients, high feed cost, high prices of medicines and vaccines, non-availability of chicks, non-availability of feed, high chick cost, insufficient veterinary care were other constraints faced by broiler farmers of NEHR. The lack of hatchery and feed producing units forced growers to procure inputs from Assam and this might be the reason for the above-mentioned constraints.

State wise, high price of medicines and vaccines (mean score 83.32) was the most serious problem faced by broiler farmers of Manipur and ranked 1st, whereas the same constraint was found to be less serious (mean score 64.32) in Mizoram and ranked 8th among all the constraints. High feed cost was another important constraint (mean score 82.95) faced by Manipur farmers, whereas it was ranked 6th (mean score 65.55) in Mizoram. The price fluctuations in the market (mean score 82.10) ranked 3rd in Manipur and was the serious problem in Mizoram (mean score 93.12) and ranked 1st. High rate of mortality due to various diseases ranked 2nd (mean score 84.98) in Mizoram whereas it was less serious in Manipur. Disease attack risk was also a major constraint faced by the broiler farmers of Mizoram (mean score 83.68). The other constraints were found to be less serious in both Manipur and Mizoram.

Table 4. Constraints faced by broiler farmers in NEHR

Sl. No.	Constraints	Manipur		Mizoram		NEHR	
		Mean Score	Rank	Mean Score	Rank	Mean Score	Rank
1	Price fluctuations in the market	82.10	III	93.12	I	87.61	I
2	High rate of mortality due to various diseases	74.97	VII	84.98	II	79.98	II
3	Disease attack risk	72.58	IX	83.68	III	78.13	III
4	Poor quality of feed ingredients	81.42	V	68.33	IV	74.88	IV
5	High feed cost	82.95	II	65.55	VI	74.25	V
6	High price of medicines and vaccines	83.32	I	64.32	VIII	73.82	VI
7	Non-availability of chicks	82.05	IV	63.67	X	72.86	VII
8	Non-availability of feed	80.40	VI	64.70	VII	72.55	VIII
9	High Chick cost	74.70	VIII	66.25	V	70.48	IX
10	Insufficient veterinary care	72.57	X	63.78	IX	68.18	X
11	Lack of access to credit and extension services	69.95	XI	63.40	XI	66.68	XI
12	Lack of proper heating and cooling system	66.43	XII	62.85	XII	64.64	XII
13	High labour cost	65.07	XIII	62.45	XIII	63.76	XIII

4. Conclusion

From the study, the share of variable cost was found to be higher than fixed cost. Farmers invested more in feed among the variable items. The fixed assets like broiler shed and broiler equipment were made from locally available resources with less expenditure. On the basis of benefit cost ratio, net farm income, farm business income and family labour income, broiler farming is profitable in the overall NEHR. Price fluctuations in the market, high rate of mortality due to various diseases and disease attack risks were serious problems faced by broiler farmers of NEHR. Hence, ensuring proper vaccination and training in broiler farming may help broiler farmers adopt scientific poultry rearing practices and enhance returns from broiler farming.

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