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Bee Keeping: A study on Cost and Returns Aspects in Pathanamthitta District of Kerala

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ABSTRACT

The study entitled "Bee keeping: A study on cost and returns aspects in Pathanamthitta District of Kerala" was conducted in Pathanamthitta district of Kerala in the Agriculture year 2021-22. The study was carried out to analyze the cost and returns in different bee-keepers. The study made use of multi stage sampling and random sampling technique to select 60 respon-dents. Categorization of beekeepers was based on the number of beehives as small, medium and large apiary, which had 30 small beekeepers, 23 medium beekeepers and 7 large beekeepers. The primary data for the study was collected from respondents using pre structured interview schedules were widely used. Secondary data required for the study were collected from various sources like journals, bulletins, books, magazines and particular websites and other sources of secondary data includes various Government offices like Block office, Market office and District Agricultural office. It was found that average number of beehives of small, medium and large beekeepers was 38.26, 133.56 and 502.85 respectively. The overall average per hive productivity of honey was 12.81 kg. The overall average cost of production per hive was Rs 1180.93 with average gross income of Rs 2398.24 per hive. The average net income per hive was Rs 1217.31. The overall benefit-cost ratio reflected an economy scale as it was found to be 2.06. It was also observed that as the size of apiary increased the income also increased per hive and the cost of production per hive decreased with increase in size of apiary. Beekeeping is a business in which it requires minimal investment with high income, if the beekeeper have good knowledge and carries out proper management.

Keywords Apiary, Beekeepers, Economy of scale, Benefit-Cost ratio.

INTRODUCTION

Honey is aromatic, viscous material which is collected by the honeybees from nectars of plants. Which then the honeybee modifies and store them as a liquid dense. It is made up of dextrose levulose and sugar. Globally, there are more than 20,000 species of wild bees, many of which are solitary or which rear their young in burrows and little colonies, like mason bees..

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Beekeeping, or apiculture, is rearing of the social species of honey bees which live in large colonies of up to 100,000 individuals.

In India beekeeping is mainly practiced as a full-time occupation and an engrossing hobby to produce handsome income and table honey. Honeybees are a gift to mankind as beekeeping as multiple purpose that is pollination services and their cherished products such as beeswax, propolis, honey, bee venom, Each product has their widespread use in several small- and large-scale industries in India. India is ranked 8th in honey production till 2020-2021 data with a production of more than 1,20,000 MT's. Other countries like Turkey, USA, Russia, Ukraine< Mexico, Bulgaria, New Zealand, Spain, and Michigan are also the biggest honey producing countries in the world. India is having 12203 number of beehives in thousands and ranks first in the world (Statista 2020). Ninety percent pollination in agricultural crops in the world is being carried out by the bees itself, and without them, the total production in agricultural crops and fruits will be decreased to one fourth (Jain and Sihag1987, Vaidya and Mehta 1993). In India West Bengal, Uttar Pradesh, Punjab and Bihar contribute about 61% of India's total honey production (lotus arise 2021). India produces 1,20,000 MT's honey in the year 2019-2020 and exported 59536.74MTs in the year 2019-2020(National Bee Board 2020).

Southern part of Kerala is a hub for apiculture and commercial honey production, due to extensive rubber cultivation (Devanesan *et al*. 2011). Hence it is important to explore the entrepreneurial potential of an apiculturist in this area. The major source of production of honey in Kerala is rubber, cardamom, coconut and forest flora. In Kerala, the bee-keeping unofficially produces nearly 5 to 10 lakh kilograms of honey annually and engages farmers, semi-farmers and students. The major two types of honey are from rubber and forest. There is a great demand for honey in Kerala especially during COVID-19. Thus, the production of honey is more for the inhouse as well as outside market. The prices and production of honey keeps varying based on demand and supply. In Kerala during the covid 19 the sales of honey has increased as people got more aware about the health and nutritional benefits of honey and how important it is to increase our immunity to resist against diseases. Most of the beekeepers didn't even have to take their product to the market as most of the people came searching for the products at their houses so covid didn't affect this sector much.

RESEARCH METHODOLOGY

1. Local of the study
2. Research design
3. Sampling procedure
4. Statistical analysis of the data
5. Period enquiry
6. Methods of data collection

Local of the study

Pathanamthitta is a municipality situated in the Central Travancore region in the state of Kerala, India, spread over an area of 2,68,750 ha. It is the administrative capital of Pathanamthitta district. It is located on global map between 9.2648° North latitude, 76.7870° East longitude. Forest covers total area of 155214 ha of the district. Pathanamthitta District ranks the 7th in area in the State. The district has its borders with Allepey, Kottayam, Kollam and Idukki districts of Kerala and Tamil Nadu.

Research design

Ex post facto study or after-the-fact research.

Sampling procedure

A two-stage stratified multi-stage sampling technique was used for the sampling of present study.

Selection of district

Out of 14 districts present in the state of Kerala, Pathanamthitta district was selected purposely because this district has abundant rubber orchards and immense potential for boosting honey production. This district was endowed with highly diversified abundant bee flora and favorable ecological condition for apiculture. The large amount of honey received from the collection of nectar from the rubber orchards from Pathanamthitta.

Table 1.. Distribution of selected beekeepers in different groups.

Sl. No.	Block name of village	Konni			
		Small	Medium	Large	Total
1.	Aruvappulam	6	4	1	11
2.	Malayalpuzhya	8	4	2	14
3.	Mylapra	5	6	1	12
4.	Pramadom	4	2	1	7
5.	Konni	7	7	2	16
	Total	30	23	7	60

Selection of block

In order to select a block, a complete list of blocks was obtained from the Head Quarter of Pathanamthitta District. Out of 8 blocks, the key potential block is Ranni, Konni, Mallapaly. Block Konni was selected purposively for the present study, as it has large area of rubber and coconut orchard, its favorable climatic condition and hilly region makes it more suitable for bee keeping and high production of honey, and moreover it was easily accessible to researcher to visit the block.

Selection of villages

List of honey producing villages was prepared with the help of extension officer, KVK, Pathanamthitta, then Mylapra, Konni, Aruvappulam, Pramadom, and Malayalapuzha villages were selected randomly from 70 villages there by making 5 sample villages. The details are given below Table 1.

Selection of sample respondents

A complete list of all the respondents rearing bee was collected from KVK and Thiruvithamkoor honey production society. After this the respondents were arranged in ascending order according the number of bee hives and the respondents were than classified into different groups according to the number of bee hives.

A) Small beekeepers : Having less than 100 colonies
B) Medium beekeepers : Having 100-200 colonies
C) Large beekeepers : Having more than 200 colonies

Analytical tools

For the presentation of the results and to analyze the data suitable tabular and functional analysis were applied.

Estimation of cost and returns

The cost was computed using total variable and fixed cost concepts. This simple tabular analysis was done to work out various costs, gross returns and output-input ratio.

TC = TFC + TVC

Where,
TC =Total fixed cost
TFC =Total fixed cost
TVC=Total variable cost
In order to calculate the fixed cost, the following things were included :

a) Cost of bee hives and stand
b) Cost of bee colony
c) Cost of smoker
d) Cost of honey storage
e) Cost of honey extractor
f) Cost of farm equipment

Total fixed cost which included interest on the value of fixed capital and depreciation on equipments and machineries.

In total variable cost it includes:

a) Cost of foundation sheet
b) Cost of feed (sugar)
c) Cost of medicines
d) Cost of labor (Hired +family)
e) Cost of transportation
f) Miscellaneous items
g) Interest on working cost

Measures of farm profitability

a) Gross income= per kg price x yield per hive in kg
b) Net income= Gross income-Total cost
c) Benefit cost ratio: It is the ratio between the gross returns to the total cost

$$\text{Benefit cost ratio} = \frac{\text{Gross returns}}{\text{Total cost}}$$

Period of study

The study is conducted in the agricultural year 2021-2022.

Method of enquiry and data collection

Primary data: Primary data regarding production aspects (the cost and returns) was collected by interviewing them personally with the help of a pretested schedule.

Secondary data: All the necessary secondary data related to the topic were collected from various published sources like journals, bulletins, books, magazines and particular websites and other sources of secondary data includes various Government offices like Block office, Market office and District Agricultural office.

RESULTS AND DISCUSSION

Cost and returns from beekeeping

Profitability of any enterprise depends upon the cost and returns from the business. Farmers will only adapt those enterprises which are profitable. The cost of bee keeping consist of bee hive, colony, farm equipment's, honey extractor, farm equipment and tools, feeding and transportation cost which are shown in per hive basis.

Fixed cost

Category wise average investments made by the beekeepers have been shown in Table 2. The major items of investment include bee stand, colony, bee hive, honey extractor, feeder frame, farm equipment's, storage drums, ant wells, plastic covers. The total investment made by the small beekeepers was Rs.1531.89, followed by Rs 1469.98 and Rs 1401.90 beekeepers. The total fixed cost of beekeepers in the study area was Rs 1467.65 per colony. The major cost was incurred in bee colony and bee hive which has 40.54% and 33.73%. From the table 4.8 it is clear that per hive fixed cost for small farmer is maximum followed by medium and then large beekeepers. The colony cost and bee hive cost incurred for small beekeepers were 39.14% and 32.61%, in case of medium (40.52 % and 33.71%) and large (42.09% and 34.97%) beekeepers the percentage kept increasing. The other items like stand, honey extractor, feeder

Table 2. Average per hive cost on bee hive and tools of different groups of beekeepers. Figures in the parentheses indicates percentages.

Sl. No.	Item of expenditure	Size of honey bee rearers			
		Small (Rs)	Medium (Rs)	Large (Rs)	Sample average
1.	Stand	249.52 (16.28)	247.57 (16.85)	245.38 (17.50)	247.49 (16.86)
2.	Colony	599.63 (39.14)	595.33 (40.52)	590.12 (42.09)	595.02 (40.54)
4.	Bee hive	499.63 (32.61)	495.29 (33.71)	490.28 (34.97)	495.06 (33.73)
5.	Honey extractor	68.59 (4.47)	50.35 (3.42)	21.3 (1.51)	46.74 (3.1)
6.	Feeder frame	19.52 (1.27)	17.05 (1.16)	15.22 (1.08)	17.26 (1.17)
7.	Farm equipment's	62.71 (4.09)	38.48 (2.61)	20.76 (1.48)	40.65 (2.76)
8.	Storage drums	32.29 (2.10)	25.1 (1.70)	18.84 (1.34)	25.41 (1.73)
9.	Total capital cost	1531.89	1469.18	1401.9	1467.65
10.	Interest on fixed capital (11%)	168.50	161.60	154.20	161.44
11.	Depreciation on fixed capital (10%)	153.18	146.91	140.19	146.76
12.	Total fixed cost	321.69	308.52	294.39	308.205

Table 3. Cost of production per hive for different group of beekeepers (per hive). Figures in the parentheses indicates percentages.

Sl. No.	Item of expenditure	Size of honey bee rearers Small (Rs)	Medium (Rs)	Large (Rs)	Sample average
A.	**Annual expenditure**				
1.	Labour Cost				
	Family Labour	411.28 (32.95)	377.19 (31.28)	301.36 (27.67)	363.27 (30.76)
	Hired Labour	108.98 (8.73)	139.25 (11.54)	161.48 (1482.)	136.57 (11.56)
2.	Comb foundation sheets	49.70 (3.98)	45.95 (3.811)	40.70 (3.73)	45.45 (3.84)
3.	Sugar for feeding	184.55 (14.78)	182.53 (15.13)	175.10 (16.07)	180.72 (15.30)
4.	Transportation	42.92 (3.43)	35.67 (2.95)	30.50 (2.80)	39.68 (3.07)
5.	Medicines	36.89 (2.95)	33.26 (2.75)	25.67 (2.35)	31.94 (2.70)
6.	Miscellaneous	52.20 (4.18)	44.65 (3.70)	25.60 (2.23)	40.81 (3.45)
7.	Interest on working capital	39.89 (3.19)	38.63 (3.20)	34.21 (3.14)	31.93 (3.18)
8.	Total variable cost	926.41 (28.62)	897.13 (30.64)	794.62 (30.42)	741.77 (32.17)
9.	Fixed cost				
	Interest of fixed capital (11%)	168.50 (13.50)	161.60 (13.40)	154.20 (14.16)	42.47 (13.67)
	Depreciation (10%)	153.18 (12.27)	146.91 (12.18)	140.19 (12.87)	66.06 (12.42)
	Total cost	1248.11 (100)	1205.66 (100)	1089.02 (100)	1180.93 (100)

frame, storage drums and farm equipments (smoker, bee veil, bee brush, queen cage, knife, hive tools, honey strainer) constituted a proportion of 25.73%. The total fixed cost incurred by small, medium and large beekeepers were Rs. 321.69, Rs. 308.52 and Rs. 294.39. The overall average fixed cost was Rs. 308.20.

Cost of production per hive for different groups of beekeepers

In order to compare the cost among the three groups, cost per colony was also estimated and results have been presented in Table 3.

The per hive cost of production of honey has been worked out which includes all the item of expenditure involved during the whole year. The data revealed that averagely total average total cost per hive was found to be `Rs 1180.93. Average cost per colony was lesser for large beekeepers (Rs 1089.02), increased to 1205.66 in case of medium beekeepers and was worked out to be maximum at Rs 1248.11 for small beekeepers.

Group wise cost analysis of the beekeepers revealed that 73.91% of the overall mean total cost was the variable cost which included cost of labor, comb foundation sheets, sugar for feeding, transportation charges and other miscellaneous expenditures. Explicit costs are the payments made by the enterpreneurs for purchasing and hiring of inputs and input services.

The share of economic costs or explicit costs that include interest on working capital was only 3.18 % for overall mean. The fixed cost which constituted about 26.09% included value of interest on fixed capital and depreciation. As evident from the Table, the cost of honey production varied from Rs 1089.02 to Rs 1248 among the selected groups with an overall mean of Rs 1180.93. From the analysis further revealed that out of the total labour used, proportion of family labour was higher (30.76%) compared to hired labour (11.56%). Family labour cost incurred for small farmers was (Rs 411.28), then for medium beekeepers Rs 377.19 and Rs 301.36 for large farmers. Family labour cost incurred was more for small beekeepers as the family members are more involved in most of the works. In case of large beekeepers hired labour cost was highest about Rs 161.48 because the number of colonies were more and need more labours for management as family labour alone cannot manage everything.

Gross income from an apiary (per hive)

Group wise return from beekeeping has been presented in Table 3.

It may be observed from Table 4 that the average

Table 4. Group wise gross return from beekeeping (per hive).

Sl. No.	Size of apiary	Quantity (kg)	Amount (Rs)
1.	Small	6.51	1954.29
2.	Medium	7.92	2376.16
3.	Large	9.55	2864.32
	Sample average	7.99	2398.24

Table 5. Net return of different groups of beekeepers (per hive).

Sl.No.	Size group	Gross return (Rs)	Total expenditure (Rs)	Net income (Rs)
1.	Small	1954.29	1248.11	706.01
2	Medium	2376.12	1205.66	1170.46
3	Large	2864.32	1089.02	1775.30
	Sample average	2398.24	1180.93	1217.31

income per hive received from honey production was Rs 2398.24 and producing around 7.99 kg per hive. The large beekeepers produce more quantity of honey than small and medium beekeepers i.e., 9.55 kg per hive by large beekeepers then 7.92 kg and 6.51 kg per hive by medium and small beekeepers. This is because of the better knowledge and experience of the large farmers as compared to small and medium beekeepers. Also, the gross income received by the large beekeepers is Rs 2864.32 then followed by medium beekeepers Rs 2376.12 and small beekeepers Rs 1954.29. From the table it is clear that as the size of the apiculture increased the income also increased mainly because of better management, knowledge and experience of the large beekeepers.

Net income from an apiary (per hive)

The net returns per hive were obtained by deducting total costs per hive from gross returns per hive. The net returns per hive for different size categories are shown in Table 5.

The net returns per kg of the honey were Rs 706.01, Rs 1170.46 and Rs 1217.31 for small, medium and large beekeepers category, respectively. The net returns of hive were maximum in large beekeepers category. The overall average net returns were Rs 1217.31 per hive. The net returns in the large beekeepers category were greater than medium beekeepers categories. This can be attributed to the large farm size. So, from the above table its observable that with increase in apiary size there is increase in the net income.

Table 6. Benefit cost ratio of different group of beekeepers.

SI. No.	Size group	Benefit cost ratio
1.	Small	1.57
2.	Medium	1.97
3.	Large	2.63
	Sample average	2.06

Benefit cost ratio

Benefit-cost ratio (Table 6) is another parameter of looking at the efficiency of beekeeping enterprise. The benefit-cost ratio expresses the relationship between the unit cost and the proportionate returns.

In case of small size bee keepers gross returns were Rs 1954.29 and the cost of inputs used was Rs 2376.12 as explained in Table 5 and the benefit cost is 1.57 and in the same way the Table 6 shows that the benefit-cost ratio for medium sized and large sized beekeepers was 1.97 and 2.63, respectively. It indicates an investment of Rs 1.00 would fetch a return of 1.57, 1.97 and 2.63 for small, medium and large sized beekeepers, respectively. And in case of the overall different categories the benefit cost ratio obtained was 2.06. It means that an investment of Rs 1.00 would fetch a return of 2.06.

Measures of farm profitability (per hive)

In Table 7 we can see that the family labour income is more for the small beekeepers Rs 291.28 per hive then for medium and large farmers it is Rs 224.42 and 152.48. The family labour income is more for the small beekeepers because the most of the family

Table 7. Measures of farm profitability per hive in different group size.

Sl. No.	Size group	Measures of profit			
		Gross return	Net income	Family labor	Farm investment income
1.	Small	1954.29	706.01	411.28	874.51
2.	Medium	2376.12	1170.46	377.19	1332.06
3.	Large	2864.32	1775.30	301.36	1929.50
	Sample average	2398.24	1217.31	363.27	1259.78

members are engaged in the work and needs only few hired labour but in case of the medium and large farmers they require more hired labour because the size of the apiary is large and the family alone can't manage it. Farm investment income of small farmers is Rs 1068.18, medium beekeepers Rs 1899.56 and for large beekeepers it was Rs 2913.37. The sample average farm investment income was Rs 1960.37.

CONCLUSION

The abundant availability of rubber orchards, dense forest and good climatic condition favored the apiary. The study revealed there was an increasing trend of hive numbers with an overall productivity of 7.99 kg per hive. The per hive cost of production was highest for small apiary compared to medium and large apiary. The gross income and net income were highest for large apiary followed by medium and small apiary. The benefit-cost ratio of each group of apiaries was greater than one which indicating beekeeping is a profitable business. There is a great potential to obtain optimum profit with needed changes on resource use. This can be possible through subsidies from various agencies, insurance, extension facilities, access to loans.

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