



AN ECONOMIC ANALYSIS OF STATIONARY BEEKEEPING IN THE NORTHERN STATES OF INDIA

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ABSTRACT

Though apiculture was prevalent since time immemorial in India, its commercialization began only after the introduction of *Apis mellifera*. In today's time, beekeeping has become an integral part of integrated farming system (IFS) models. Hence, an economic study was taken up with sixty IFS adopter farmers of crop + dairy + beekeeping model for the northern states of Punjab and Haryana, with Punjab being one of the most potential states and Haryana falling in the category of potential states as per Khadi and Village Industries Commission (KVIC). The cost benefit analysis for Punjab and Haryana has been estimated as 2.46 and 2.06, respectively. The respective total honey production for Punjab and Haryana was found to be 6296.68 and 2956.62 kg from 304 and 143 beehives and their respective break-even point were also calculated as 1316.90 and 655.37 kg, indicating that the beekeeping is a highly profitable venture.

Key words: Beekeeping, Punjab, Haryana, integrated farming system, cost and return analysis, break-even point, profitability, economics, honey production, beehives

In India, beekeeping has been practised since ancient times in unorganised form but it was under the leadership of All India Khadi and Village Industries Board, that it was organised and developed to uplift the financial status of rural people. The three indigenous species of honeybees found in India are *Apis dorsata*, *A. cerana* and *A. florea* while exotic spp. *Apis mellifera* was introduced in 1987 for commercial apiculture. Beekeeping plays a vital role in agricultural diversification as it offers income and employment opportunities. Keeping this in view, Government of India had allocated Rs. 500 crore for National Beekeeping and Honey Mission (NBHM) for three years (2020-21 to 2022-23). Covid-19 pandemic has also witnessed surge in honey consumption due to its health inducing properties (Allsop and Miller, 1996; Crane, 1999; Jones, 2001; Molan, 2001; Ajibola et al., 2012; Al-Quassemi et al., 2003; NBB, 2020; Singh, 2021;). The Government of India has also planned to organise a series of events across the country to manifest the idea of sweet revolution as beekeeping is an integral part of integrated farming system (MoA&FW, 2021; NBB, 2022)

Currently, global market size of natural honey is US\$ 8.4 billion and is projected to reach US\$ 10.3 billion by 2025, with an expected compound annual growth rate of around 4.8%. Currently, India stands 6th (3.5%) in terms of global honey production and during the last decade, India's honey export have plummeted

from US\$ 56.2 million to US\$ 100.8 million which was much higher than the world's export growth. In order to strengthen India's honey production and export capacity, National Beekeeping and Honey Mission (NBHM) have formulated and released guidelines for beekeepers (Debroy, 2019; NBB, 2020; Chetri et al., 2021). Similarly, National Bee Board has collaborated with other nations as well as World Bank and Asian Development Bank to develop cutting-edge technology for beekeeping in India (Jha, 2020; IMARC, 2023). It was reported that India's export of honey had increased between 2013-14 to 2019-20 by 110% (GOI, 2021). As per KVIC, Punjab is considered to be one of the most potential states for beekeeping as it offers high number of beekeepers and the honey production is also found to be high. Out of the sixteen Integrated Beekeeping Development Centres (IBDCs) as role model of beekeeping setup across India, two of them were placed in Punjab and Haryana (MoA&FW, 2021; GOI, 2021; MoC&I, 2022). Therefore, the present study was taken up focussing on the economics behind beekeeping in Punjab and Haryana as these two states were being focussed upon by the KVIC.

MATERIALS AND METHODS

Primary data was collected from 60 respondents with a well-structured interview schedule i.e., 30 each from Punjab and Haryana during 2020-21. Beekeeping was widely adopted as a subsidiary enterprise alongside

crop + dairy in the northern states under study. The area under beekeeping was estimated to be 0.73 ha in Punjab while in Haryana, farmers were devoting 0.43 ha of land for apiary. It was observed that the farmers from Punjab were devoting more land towards beekeeping activity than those of Haryana. Therefore, instead of classifying the farms into different size categories calculations were carried out for overall farms. The total cost of beekeeping enterprise was calculated using the concepts of total variable cost, total fixed cost and capital investment. The returns were accounted for sale of honey, bee wax and colonies. Cost and returns analysis were calculated per Kg of honey and per Kg of beehive. Break even analysis and margin of safety were also assessed using the formulas-

$$\text{Break even point (y)} = \frac{\text{FC}}{\text{P}-\text{VC}}$$

where, y = Number of units of output; FC = Total fixed cost; P = Price/ unit of output; VC = Variable cost per unit of output; Margin of safety = Total Product-Product at Break Even Point. Break-even point (BEP) is the location of no profit and no loss, where total revenue is equal to total cost and below this point, there is zone of loss and above BEP, there is zone of profit making. So, as soon as the venture reaches BEP it starts yielding profits. Margin of safety is the quantity of output produced over and above the BEP which acts as cushion for any risks arising out of the production process (Reddy et al., 2019).

RESULTS AND DISCUSSION

Present study observed that the farmers were practicing beekeeping at stationary positions, as subcomponents of the IFS model of crop + dairy + beekeeping. It was observed that the beekeeping and crops were co-dependent on each other as the cultivated crops were helping the bees in collecting nectar and bees were augmenting the productivity through pollination of cross-pollinated crops. Similar observation was also recorded by Chauhan et al. (2017). *Apis mellifera* was found to be the widely adopted species as it has been established for commercial bee-keeping in Punjab and Haryana (Singh, 2000). The capital investment for undertaking the bee-keeping activity in Punjab as described in Table 1 was discovered to be Rs. 8,95,763 out of which the highest contributors were beehives (Rs. 5,47,200), honey bee frames (Rs. 2,86,560) and queen excluder (Rs. 54,340). The same pattern was observed for Haryana as well, with a total capital investment of Rs. 4,32,502. The total variable cost for apiary in

Punjab and Haryana were found to be Rs. 1,08,219 and Rs. 65,433, respectively. Out of which the highest contributors were sugar and wax foundation sheets. The results of the present study were in consonance with the results of the Kaur (2011).

The total fixed cost incurred in bee-keeping enterprise for Punjab and Haryana were calculated as Rs. 1,62,049 and Rs. 76,501, respectively, of which, the highest contributor was interest on capital investment. For Punjab, the gross returns obtained from selling honey, bee wax and colonies was calculated as Rs. 9,34,851. The average honey produced was 6298.68 kgs which when sold at an average price of Rs. 140.24, provided a gross return of Rs. 8,83,046. The sale of colonies and bee wax also added Rs. 36,418 and Rs. 15,387, respectively into the gross revenue. In Haryana, the average honey produced was estimated to be 2956.62 kg and when sold at an average price of Rs. 138.86/kg, provided a gross return of Rs. 4,10,556. Bee wax produced as a by-product of honey production is further used as thickener, emulsifier and is used as an input in the candles and cosmetics. Around 68.21 kg of bee-wax was also produced from the bee-keeping activity which generated an additional gross revenue of Rs. 7,225. The sale of colonies also added on to the revenues, thus, the overall gross returns thus generated by the beekeeping enterprise was Rs. 4,34,881.

While calculating the cost and returns for the bee-keeping activity was important to study the economics of honey production, calculating the break-even point (BEP) was also necessary for drawing inferences about the quantity of honey production which demarcates the juncture of no-loss and no-gain. Any quantity of output produced below the BEP is loss-making while any quantity of output produced above the BEP is profitable. In the case of Punjab, BEP happened to be at 1316.90 kg and the current production of 6296.68 kg was almost 4.78 times the BEP quantity. Hence, the 4979.78 kg of honey produced over and above the BEP was providing a gross return of Rs. 6,98,365 and was serving as margin of safety for beekeeping enterprise under IFS model of Punjab. In the case of Haryana, BEP happens to be at 655.37 kg and the current production of 2956.62 kg was almost 4.51 times the BEP quantity. Hence, 2301.24 kg of honey produced over and above the BEP was serving as margin of safety for the beekeepers. In case of Punjab, BEP was achieved at 20.901% while for Haryana, it was achieved at 22.17%. Similar result on BEP was also reported by Samadhan (2019). The average honey produced box in stationary position was found to be

Table 1. Cost-return analysis of beekeeping activity in Punjab and Haryana

(in Rs. per farm)				
Particulars	Capital investment			
	Punjab		Haryana	
	No./ qty.	Value	No./ qty.	Value
Bee-hive	304.00	547200	143.00	257400
Honey bee frames	1194.00	286560	600.60	144144
Honey extractor	1.00	1819	1.00	1819
Queen excluder	286.00	54340	127.00	24130
Smoker	1.80	171	1.80	171
Bee veil	5.40	378	3.20	224
Hive tool	4.40	330	4.70	353
Gloves	3.00	195	1.26	82
Uncapping knife	2.00	90	2.08	94
Containers	78.00	4680	68.10	4086
Total	--	895763	--	432502
Total variable cost				
Family labour (hours)	401.45	14051	390.45	13666
Wax foundation sheets (kg)	82.67	19841	43.80	10512
Jute mat (m)	194.38	2916	112.40	1686
Sulphur (g)	15.20	13376	8.60	7568
Sugar (kg)	653.60	52288	360.52	28842
Interest on variable cost (except family labour)	--	5747	--	3159
Total	--	108219	--	65433
Total fixed cost				
Interest on capital investment @ 12.00% p.a.	--	89576	--	43250
Depreciation (10% except honey bee frames)	--	60920	--	28836
Rental value of land (Rs. 9.5/ m ²)	--	11552	--	4415
Total	--	162049	--	76501
Gross returns				
Honey (in kg) (A)	6296.68	883046	2956.62	410556
Bee wax (in kg) (B)	145.27	15387	68.21	7225
Sale of colonies (in No.) (C)	20.23	36418	9.50	17100
Gross returns (D=A+B+C)	--	934851	--	434881
Net Returns	--	664584	--	292947
Output-input ratio	--	2.46	--	2.06
Average yield (in kg/ box)	20.71	--	20.68	--
Average price (Rs/ kg)	--	140.24	--	138.86
Break-even point (in kg)	1316.90	--	655.37	--
Margin of safety (in kg)	4979.78	--	2301.24	--

20.71/ kg and the market price that it fetched was around Rs. 140.24/ kg in Punjab. The results of the present study were in conformity with those of findings of Singh et al. (2016) and Singh et al. (2017). In case of Punjab, the total cost for apiary was found to be Rs. 2,70,267 and the gross returns thus generated were Rs. 9,34,851 thereby providing a net return of Rs. 6,64,584. The output-input

ratio was found to be 2.46 i.e., an investment of one rupee in the bee-keeping activity generates a return of around Rs. 2.46. The variable and fixed cost had a share of 40.04% and 59.56% within the total cost incurred for beekeeping activity. The results of the present study indicate that honey production is a profitable enterprise for the farmers and similar observations were made by

Kumar, (2019) and Arya et al. (2022). It has also been established by the present study that agricultural yield were indeed higher in crop + dairy + beekeeping IFS model (Tata trusts, 2002; Monga and Manoch, 2011; Stein et al., 2017; Duraimurugan and Reddy, 2019).

It has been revealed in the current study that beekeeping at stationary position yields lesser than the migratory beekeeping but stationary beekeeping is an integral part of IFS models, hence, increase in floral diversity should be of paramount importance for achieving the full potential of apiary. It was also observed that high capital investments are required in setting up the beehives hence, the government's initiative in commendable in promoting apiary for diversification through NBB. The high returns from apiary suggest that BEP is achieved early and hence farmers have more margin of safety in their disposal reflecting that they could tackle any risks that could arise in beekeeping venture. This could be concluded from the present study that beekeeping enterprise is a profitable venture under integrated farming system which could result in added returns through production of honey and its by-products as well as increasing the productivity of crops.

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AUTHOR CONTRIBUTION STATEMENT

Aniketa Horo: Conceptualization, data collection, analysis, writing, editing; J. M. Singh: Supervision, methodology, reviewing.

CONFLICT OF INTEREST

No conflict of interest.

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