

The Economic Efficiency of Bee Honey Production in Syria (Lattakia Governorate as a Model)

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Abstract

This study was conducted on a number of special apiaries in Lattakia Governorate, which is considered one of the most important honey bee keeping areas in Syria, with the aim of calculating the average costs and productive returns of the productive cell, and calculating some economic indicators for this type of agricultural project, using the descriptive economic analysis method, and adopting Average data on the costs and productivity returns of the studied apiaries in the economic calculations.

The average annual production costs of the producing cell were 55.57 USD, and the production yield attained 123.57 USD, with an average profit of 68 USD, while the average net production costs of honey produced at the cell level amounted to 43.37 USD, and the net profit was 26.06 USD.

On other hand, the relative net income per kilo of honey produced is 122.49% of the total net production costs, while the rentier and profitability coefficients compared to the production costs attained 137.56% and 122.37%, respectively, and economic efficiency was about 2.23, and the recovery period was about 2.35 years.

Keywords: honeybee, analysis, production costs, relative income, profitability coefficients and Syria.

I. INTRODUCTION

The economic importance of honeybee keeping is due to many products of high economic and nutritional value, especially the honey, In addition to provide jobs through the keeping process itself and its associated projects to provide production requirements and to dispose of and market them.

Natural honey is one of the first foods that human has depended on because of its nutritional value, as it contains more than seventy different substances with vital and functional value in the human body [1]. These different materials contain carbohydrates, dextrin, vitamins, hormones and antibiotics, and suspensions such as pollen and wax [2].

Among the different types of honey, citrus honey is characterized by its delicious taste that is palatable

to everyone especially children. It is characterized by its clear light color and low intensity and its contents of a high ratio of essential oils and vitamins such as vitamin "C" and Farnisol, which gives the honey an important role in fighting Cold, influenza, cough and bronchitis cases. Also it is used to treat blood pressure and purify it. Honey can be used in cases of kidney infections, ureters, bladder, kidney stones and rid them of harmful deposits. It is also recommended in the treatment of colic and muscle contraction. It strengthens the nervous system and is used to calm nerves and overcome insomnia and is characterized by a soothing nerve if taken a spoonful of it half an hour before bed, especially for children.

The number of honeybee hives in Syria was about 459,000 hive for the year 2017. The new hives constitute (74.94%), and the total production of honey in the same year reached about 2421 tons. Lattakia Governorate (study area) occupies an important place in honeybee keeping in Syria, it comes third in the number of hives raised by 13.44% of the total number of honeybee hives in the country, and first in the production of honey by 25.40% of the total honey production in the country for 2017 [3].

Exploitation money in honeybee keeping generates good profit during a short period of time, as the general economic efficiency of honeybee keeping projects in the coastal region of Syria has reached about 157%, with an annual profit rate of 71.29% of total costs [4]. While re.[5] found that the average annual profit achieved from honeybee keeping in the same region is 81.59% of the total invested capital, and 93.73% of production costs, and the period of capital recovery reached about 1.22 years.

Results of a study conducted in Yemen to analyze the costs and revenues of the apiaries indicated that the fixed and variable costs constitute about 12.7% and 87.3% of the total annual costs, respectively, and workers' wages came first with 49%, followed by the cost of feeding (25%), then wax costs (8.3%) of the total annual costs.

The ratio of net return to total investments and revenues amounted to 266% and 47%, respectively, and it was found that apiaries cover their costs with an economic surplus of up to 80% of the total costs,

and that the recovery period is equivalent to 3.7 years [6].

While re.[7] found that the general economic efficiency of honeybee keeping in Turkey is 1.24, at an annual profit rate of 24% of total annual production costs, and that variable costs constitute 46.85% of total annual costs, while the fixed cost ratio is 53.15%.

Due to the features that characterize bee honey, and the increased order for it because of the increase in population and raising in food awareness with the availability of optimal conditions for its production in Lattakia Governorate, and in light of the trend towards small projects to find employment opportunities for more people, it was appropriate to conduct an economic study to produce honey for the purpose of encouraging producing this important foodstuff, and emphasizing the economic efficiency of small enterprises and their role in enhancing family income and making the best use of the available capabilities.

In general, this research aims to study various aspects related to the costs of bee honey production, and to determine the efficiency of using available resources in its production, with a view to increasing income and achieving productive and economic efficiency, which needs the following:

1 Conducting an analytical study of costs and production returns.

2 Calculating a number of economic indicators such as economic profit, rentier coefficients, profitability coefficients, and recovery period.

II. MATERIALS AND METHODS

Data was collected through a special form that monitored the field reality through a direct personal communication for a number of beekeepers in Lattakia Governorate, for a period of one year, in 2019.

Descriptive economic analysis was used in this study, and due to the similar conditions surrounding the production process in the bees producing citrus honey in different areas of the province, sample of the study included twenty apiaries distributed in three departmental regions of Lattakia Governorate (8 apiaries in Lattakia region, 6 apiaries in Jableh region and 6 apiaries in Al-Haffah region).

The averages of the costs and the production returns of the studied apiaries were calculated, whereby the production costs and revenues were calculated for an apiary consisting of thirty hives producing the size of twenty frames per hive, and the

following equation were used in the economic calculations:

- The total productive costs: $CPF = \sum (MF + LF + IF + RF)$, where that: CPF: the annual total productive fees, MF: Material Fees, LF: Living Fees, IF: annual interest of the capital, RF: rent fees [5]
- Total economic return (TR) = amount of production x average of farm price [8].
- Annual net profit (P) = Total annual revenue - total annual cost
- Net total productive (NP) = total rent (TR) - material costs including rent and interest
- Rent coefficients for Production Costs: $(Rm.l) = 100 \times \frac{NP}{Tc}$
- Profitability coefficients for production costs: $(Em.L) = 100 \times \frac{B}{Tc}$ [9].

where: NP: Net total productive, Tc: total annual costs, B: Total annual profit

- Recovery period (Tr) = $\frac{C \cdot L}{B}$ [9].

where Tr: number of years required to recover the capital, CL: invested capital.

- Economic efficiency = the value of the total product ÷ annual production costs [10].

III. RESULTS AND DISCUSSION

A.) Productive Costs:

Material Fees (Mf):

Results indicated that the average of invested capital in purchasing the material requirements of the produced hive in the studied apiaries equals 148.57 USD, while the average of annual material costs amounted to 39.68 USD per hive, and it was found that the apiary packages constituted about 36% of the annual total costs, followed by nutrition costs (15.84%), then death costs by 9.60%. Annual depreciation of wood hives attained 8.85%, and transportation costs were 7.20% of total annual material costs (Table 1), where there is an increasing in relative importance of productive capital (bees packages) at the expense of nutrition costs, due to the dependence on feeding on nectar and pollen available in nature.

Table (1): Average of annual and book material costs for citrus honey production in Lattakia* Governorate

material costs		Purchasing cost (USD)		annual cost** (USD/ year)		annual costs(%)
Statement	Annual depreciation(%)	for productive hive	for apiary	for productive hive	for apiary	
Bee packages	33.33	42.86	1285.71	14.29	428.57	36.00
woody hives	14.46	24.29	728.57	3.51	105.36	8.85
Wire and wax	33.33	5.05	151.43	1.68	50.47	4.24
Beekeeper clothes	50	1.64	49.29	0.82	24.64	2.07
Tools and equipment	15.43	11.40	342.14	1.76	52.79	4.44
Feeding material	100	6.29	188.57	6.29	188.57	15.84
Medicines	100	1.43	42.86	1.43	42.86	3.60
death of bee colonies	100	3.81	114.29	3.81	114.29	9.60
freight cost	100	1.34	40.07	1.34	40.07	3.37
Transfer cost	100	2.86	85.71	2.86	85.71	7.20
Room (warehouse)	4	47.62	1428.57	1.90	57.14	4.80
total	-	148.57	4457.21	39.68	1190.47	100.01

* Source: sample data collected and calculated, 2019. ** Annual cost = purchasing cost x annual depreciation rate.

Wage Fees (Wf):

Results indicated that the average of wage of the technical worker for one working day in the studied apiaries according to the prevailing wages in 2019 amounted to about 11.43 USD, while the

average wage of the average worker was 8.57 USD, given that the workday equals 8 hours, and the results in table (2) refers that the average transaction wages for the producing hive are equivalent to 8.44 USD / year.

Table (2): Average of wages of the processes needed to produce citrus honey in Lattakia Governorate

Statement	annual cost (USD/ year)		The relative importance of wages (%)
	for productive hive	for apiary	
packages inspecting	4.29	128.57	50.78
packages feeding	1.07	32.14	12.69
medicine and treating	0.32	9.64	3.81
frames preparing	0.48	14.29	5.64
honey harvesting and sorting	2.00	60.00	23.70
honey packing	0.29	8.57	3.39
total	8.44	253.21	100.00

* Source: sample data collected and calculated, 2019.

Results in Table (2) explain that the periodic inspection of the packages came first in the importance of wages fees with a rate of 50.78%,

followed by harvesting and sorting fees (23.70%) of the total annual fees, and then the fees of sugar packages feeding takes the third place with 12.69 %

of the total annual process fees. It is noted that the relative importance of the fees of packages inspecting was higher, which is equivalent to almost half of the fees of the necessary work. That is due to the size and type of work required, as this process requires specialized technical labor.

Rent Fees (Rf):

Results indicated that the annual rent of the land donum is 171.43 USD / year, noting that the area occupied by the apiary is estimated at ($\frac{1}{2}$ donum).

The average of prevailing price of the land rent was depended in the areas of the studied apiaries, as follows:

- The annual rent of apiary = the apiary area × the rent of one donum = $\frac{1}{2} \times 171.43 = 85.71$ USD.

- The portion of one hive from the rent fees = the annual rent ÷ hives number = $85.71 \div 30 = 2.86$ USD.

The annual benefit of interest capital (If):

It calculates as followed: the annual benefit of interest capital (If) = the benefit fees × (the material cost + wage fees + rent fees) = $\frac{9}{100} \times (39.68 + 8.44 + 2.86) = 4.59$ USD / hive/ year.

Table 3 shows that the average of total costs of the hive produced in the studied apiaries equals 55.57 USD annually. It is noted that material costs were the highest of the total annual costs by 71.41%, followed by wages fees at 15.19%, while the ratio of each the annual benefit of the interest capital, and the rent fees attained about 8.26%, and 5.15% of the total annual production costs, respectively.

Table (3): Average of annual costs for citrus honey production in Lattakia Governorate

statement	annual cost (USD/ year)		relative (%) importance
	for productive hive	for apiary	
material fees (Mf)	39.68	1190.47	71.41
Wages fees (Wf)	8.44	253.21	15.19
Rent fees (Rf)	2.86	85.71	5.15
Interest capital fees (If)	4.59	137.65	8.26
Total productivity costs (CPf)	55.57	1667.04	100.00

* Source: sample data collected and calculated from tables 1 and 2.

B.) Productive Returns:

The returns of the studied apiaries are divided into main and secondary returns as follows:

• **The main return:** It includes the value of the produced honey, as it was found that the average of annual productivity of the hive amounted to about 15 kilograms, knowing that the average of price per kilogram according to the prevailing prices in 2019 amounted to 6.43 USD. Accordingly, this study found the following:

- Yield of the honey produced hive = average of hive productivity x average of kilo price = $15 \times 6.43 = 96.43$ USD/ year.
- The total yield of produced honey = honey hive yield x number of the produced hives = $96.43 \times 30 = 2892.86$ USD/ year.

• **The secondary return:**

The secondary yield includes the value of the beeswax produced and the value of packages produced annually, bearing in mind that the average amount of wax produced from one hive is equivalent to 1 kilogram / year, while the number of packages produced by natural packaging amounts to about 50% of the number of apiary hives, equivalent to 15 packages, Accordingly, the study found that:

- Yield of the wax-producing hive = average of hive productivity x average of kilogram price = $1 \times 5.71 = 5.71$ USD/ year.
- Total return of package produced = average number of packages x package price = $15 \times 42.86 = 642.86$ USD/ year.
- Share of package produced = total yield of packages produced ÷ number of hives produced = $642.86 \div 30 = 21.43$ USD/

year. Table (4) shows the average of total product in the studied areas:

Table (4): The average of total production (TR) of the studied apiaries in Lattakia

Products	Annual revenue (USD/year)		Relative importance of each product (%)
	for one hive	for an apiary	
honey	96.43	2892.86	78.04
wax	5.71	171.3	4.62
packages	21.43	642.86	17.34
total	123.57	3707.02	100.00

Source: sample data collected and calculated, 2019.

Table (5) showed that the total output of the producing hive is equal to 123.57 USD/ year, and that the percentage of honey's contribution to the total output of the producing hive is equivalent to 78.04%.

From the above, the present study concludes to:

- Economic Profit (P) = Total Revenue (TR) - Total Costs (TC) = 123.57 - 55.57 = 68 USD/hive/ year.
- Net total Production (NP) = Total Revenue (TR) - material costs including land rent and interest = 123.57 - 47.13 = 76.44 USD/ hive/ year.

C.) Costs and Net Profit:

• The net cost of produced honey = the ratio of the contribution of honey to the total production

$$\times \text{the annual costs of the hive} = \frac{78.04}{100} \times 55.57 = 43.37 \text{ USD/hive/ year.}$$

• Net production costs per 1 kilogram of produced honey = net cost of produced honey ÷ the average amount of honey produced from the hive = $\frac{43.37}{15} = 2.89 \text{ USD/1 kg.}$

• Net Profit of Produced Honey = Hive Return from Produced Honey - Net Production Costs of Produced Honey = 96.43 - 43.37 = 26.06 USD/hive/ 1 kg.

• Net profit per kilogram of produced honey = price per kilo of honey - net production cost = 6.43 - 2.89 = 3.54 USD/ 1kg.

• Net relative income per kilo of honey produced = (net profit per kilo ÷ net productive costs per kilo) x 100 = $100 \times \frac{3.54}{2.89} = 122.49\%$.

D.) Economic efficiency coefficients:

- Rentier coefficient compared to production costs:

$$Rm.l = \frac{NP}{Tc} \times 100 = \frac{76.44}{55.57} \times 100 = 137.56\%$$

This is a good indicator, as every hundred dollars is used by the beekeeper, with a net result of 138 dollars.

- Profitability coefficients compared to production costs:

$$Em.l = \frac{P}{Tc} \times 100 = \frac{68}{55.57} \times 100 = 122.37\%$$

It is also a good indicator in the field of agricultural investment, as the level of profit is equivalent to about 122 USD per hundred USD invested annually, while this indicator reached (71.29 and 93.73%) in honey production projects in the Syrian coast according to the results of re. [4] and [5], respectively.

- General economic efficiency = total product value ÷ total annual costs = $123.57 \div 55.57 = 2.22$.

It is a good indicator compared to its counterparts in other agricultural sectors, which indicates the efficiency of this type of project, while this indicator reached 1.09 in the field of beekeeping in Jordan [11], and 1.8 in beekeeping projects in the Yemen [6].

- Recovery Period:

First, we must calculate the capital invested at the level of one hive as follows:

The invested capital (C.L) = the purchasing cost of material supplies + annual work wages + the share of the land rent hive = 148.57 + 8.44 + 2.86 = 159.87 USD / hive.

$$Tr = \frac{C.L}{P} = \frac{159.87}{68} = 2.35 \text{ Years}$$

That is, the average time required to recover the capital invested in the studied apiary is

approximately two and three months, while it reached 3.7 years in honeybee keeping projects in the Yemeni city of Hadramaut [6], and 1.22 years in honey production projects in the Syrian coast [5].

IV. CONCLUSION

Honey production in Syria is considered an economically feasible project, as investment in this field generates good profit in a short period of time, and therefore more attention and care must be directed to this important food and economic product, and the need to encourage investment in this field by providing loans and financing appropriate, with the need to qualify the working cadres.

REFERENCES

- [1] Al Banbi, Mohammad Ali, 2001, "*Honeybees and its products*," Dar Al-Maarif publications, Alexandria, Egypt, 378pp.
- [2] Moukias, Khalil Ibrahim, and Al Ghoundi, 2005, "*Bees are silkworms*". Tishreen University Publications, Faculty of Agriculture, Syria, 391 pp.
- [3] Annual Agricultural Statistical Group. Statistics and Planning Directorate, Ministry of Agriculture and Agrarian Reform. 2017.
- [4] Yaakoub, Ghassan Khalil, 1996, "*Field and economic analytical study of beekeeping in the Syrian coast*." Tishreen University Journal for Studies and Scientific Research, Agricultural Science Series, 18 (6): 183- 194.
- [5] Darwish, Nidal, 2008, "*Study the economic importance of beekeeping in the Syrian coast*". Tishreen University Journal for Research and Scientific Studies, Biological Sciences Series, 30 (1): 119- 135.
- [6] Alwan, Abdullah Salem. 2009, "*A study of the productive and technical efficiency of honeybees in Hadhramaut*", Yemen. The Sixth Conference of the Arab Beekeepers Union, Kingdom of Saudi Arabia.
- [7] Saner, G., Engindeniz, S., Tolon, B. & Cukur, F. "*The Economic Analysis of Beekeeping Enterprise in Sustainable Development (A case study of Turkey)*." APIACT, V. 38, N. 1, 2004, 342-351
- [8] Khaddam, Mounzer; and Jahjah, Mohsen, 2004. "*Agricultural Economics*". Directorate of Books and University Publications, Tishreen University, Lattakia, Syria, 456 p.
- [9] Khaddam, Mounzer, 2000, "*Agricultural Economics*," Publications of the Ministry of Culture, Damascus, Syrian Arab Republic, 413 p
- [10] Al-Alawi, Ahmed; and Abdul Latif, Abdul Ghani. 2002, "*Agricultural Projects Analysis and Evaluation (Theoretical Part)*," Aleppo University Publications, Syrian Arab Republic, 404 pages
- [11] Shammout, Amin Osama. 2009, "*The economics of beekeeping in Jordan. PhD*" Thesis, University of Aleppo, Syria, 196 pages.