Economic Efficiency of Beekeeping in Croatia

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Summary

Croatia has ideal ecological and climatic conditions for beekeeping. Beekeeping production is exclusively organized by family households and the production is measured by the amount of honey produced. The Croatian National Statistics Department reported that in 2005 there were 2,658 beekeepers in Croatia, 245,759 of honeybee colonies and 92.46 honeybee colonies per beekeeper. Honey production per hive was 15.9 kilos.

There are three categories of beekeepers: hobby beekeepers, full-time beekeepers and part-time beekeepers. Most frequently, they use Langstroth-Root and Albert-Znidersic hives. Only one third of beekeepers migrate their hives. The marketing of honey products is not well organized and the honey consumption per citizen is low. However, honey is one of rare agricultural products, where Croatia has reached self-sufficiency. Namely, honey exported in the year 2005 was 186 thousand kilos, whereas honey import in the same year was 41 thousand kilos.

Since Croatia is most likely to become an EU member in the near future, it is important to recognize the economic parameters of beekeeping production within Croatian economy. Data on economic parameters of beekeeping production in Croatia is very scarce and fragmented. Therefore, the aim of this investigation was to calculate basic economic parameters in Croatian beekeeping and to assess its economic strength. The primary assumption of this study was that the number of hives is the most important efficiency factor regarding productivity and profitability of beekeeping production. We further assumed that beekeepers with less than 50 hives cannot meet minimal conditions regarding these economic parameters.

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Introduction

Beekeeping in Croatia has a long tradition. It is organized in family households. According to Croatian Livestock Centre (2008) most of beekeepers have less than 150 hives (89 %). The marketing of honey products is not well organized with only 30 to 40 % of all honey being marketed in formal manner. Beekeepers mostly don't keep financial records and do not include their labour expenses in production price. Since Croatia is in a complex process of adopting legislation and rules in accession to EU, it is important to determine current economical characteristic, especially economic efficiency of beekeeping.

Materials and methods

A specially adapted questionnaire was used for the purpose of this investigation. The questionnaire was completed by 169 beekeepers who attended beekeepers' school during 2005 at one of three different Croatian locations. The questions were read aloud by the researcher, who also explained possible misunderstandings.

The questions focused on basic production costs that included the value of beekeeping equipment (honey extractor, table uncapping tube, uncapping knife, wax extractor and other beekeeping equipment) and fixed assets (hives and means of transport). The value of the hives was calculated by adding the costs of productive hives and reserve hives. The value of transportation was estimated by beekeepers themselves. Gross incomes were calculated as the sum of honey yield per beehive, sale of bee colonies, subventions and other incomes. The expenses were calculated by adding together all material costs, energy costs, labour costs, depreciation costs, investment costs and other indirect costs. Depreciation rate for beekeeping equipment was 5 %, whereas depreciation for hives and transportation means was 7 %. Costs of investment were calculated by multiplying 3.5 % with the value of basic means. The value of independent costs was calculated by multiplying 4 % by material cost and energy cost. The profit was calculated by subtracting all expenses from income.

The basic economic parameters investigated in our study were: efficiency, productivity and profitability. Efficiency was defined as higher income than outcome and was expressed by their ratio. If the income was higher than outcomes, the company experienced a profit. When income was lower than outcome, the company experienced a loss.

Productivity was measured by the effective use of production resources, usually expressed as a ratio of input and output. This research was focused on natural productivity, which represents labour costs in hours per unit of product in kilos and valuable productivity, which represents income per working hour.

Profitability represents total efficiency of the business. It provides feedback information in relation to investment. Profitability of investments was calculated by separating the value of basic means from profit. Profitability of business was calculated by separating incomes from profit.

The data was analysed using SPSS - 11.0. for Windows. Descriptive statistics, dependent t-test and univariate with multiple regression models were used to describe the relationship among variables. Statistical significance was considered at p value < 0.05.

Results

The mean number of hives was 55 and the number of nuclei was 11 per beekeeper. Honey production per hive was 28.2 kilos. Today, beekeeping in Croatia is mainly a hobby, much less frequently it is a part-time or a full time activity (Figure 1). More than a third of beekeepers deal with at least one other agricultural business. In our study, there were only 29.2 % migratory beekeepers, all other beekeepers remained in one location. Beekeeping was characterized by a high prevalence (19.1 %) of traditional Albert-Znidersic hives. Most baseline incomes were derived from honey sales and incomes from
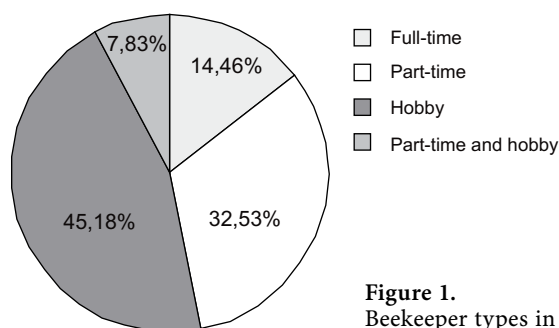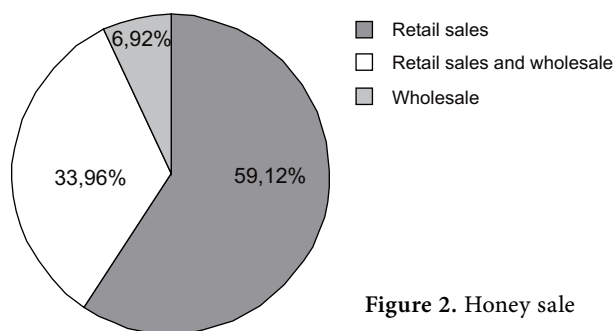
Figure 1.
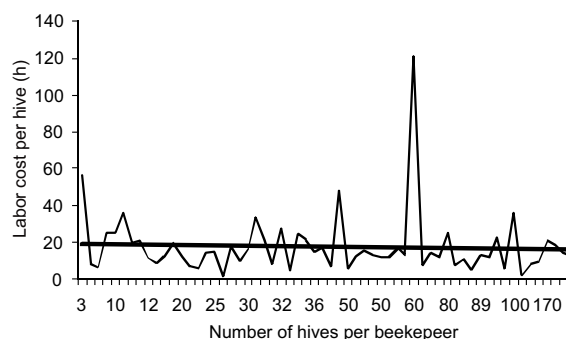Beekeeper types in Croatia

Figure 2. Honey sale

Figure 3. Labor cost per hive in dependence of the number of hives (p=NS)

Table 1. Differences in work productivity, efficiency and profitability in dependence of number of hives per beekeeper

Economical parameter		Number of hives	Amount ±SD	Number of hives	Amount ±SD	Number of hives	Amount ±SD
Work productivity	Natural (kg/h)	≤30	2.36±2.06	≤50	2.39±2.06	≤100	2.66±2,22
		>30	2.93±2.18	>50	3.28±2.19	>100	3.04±1.15
	Value (kn/h)	≤30	70.60±77.17	≤50	62.88±63.95	≤100	63.55±57.52
		>30	58.14±33.37	>50	63.57±33.72	>100	59.27±23.40
Efficiency	Total	≤30	111±47	≤50	116±50	≤100	120±48
		>30	126±45	>50	127±37	>100	117±18
Profitability	Profit (%)	≤30	8.09±32.74	≤50	9.71±36.55	≤100	10.78±33.14
		>30	12.52±31.15	>50	4.08±20.02	>100	10.44±11.75

For all parameters $p > 0.05$.

subventions, whereas other incomes were negligible. The beekeepers sale honey is depicted in Figure 2. The great majority of beekeepers honey sales were retail whereas only 6.92 % beekeepers honey sales were wholesale and all other honey sales were a combination (Figure 2). From all costs, the most important ones were labour, energy and material. Labour costs did not change with increase in number of hives (Figure 3).

Natural productivity of labour was, on average, 2.70 kilos/h, whereas the value of production was 63.13 kn/h (12.14 $/h). Total efficiency was 120 %. Profitability of investment was, on average, 10.55 %, whereas the profitability of the entire business was around 11.74 %. The number of productive hives did not have statistically significant influence on efficiency, productivity, nor profitability (Table 1). Production profitability was associated with honey production per hive and the method of honey sales. Migratory beekeeping, although very important from the technological point of view, did not influence profitability (Table 2).

Discussion

The basic economic parameter measurements of beekeeping production were similar and even superior to other agricultural production enterprises in Croatia. The number of hives did not influence efficiency, productivity and profitability parameters. The most influential factors impacting efficiency, productivity and profitability were honey production per hive and honey price.

Based on the characteristics of beekeeping production, such as the number of professional beekeepers, the number of hives, the number of hives per beekeeper and honey production per hive in the year 2001, Croatia was categorized as a European transitional country, standing between the developed and developing countries (Puškadija et al., 2001). However, honey production per hive and number of hives per beekeeper gradually increased in recent years. For example, 2001 production was 20 kilos of honey per hive and 22.7 hives per beekeeper (Štefanić et al., 2004), whereas at the time of our study in the 2005, production was 28.2 kilos of honey per hive and 66 hives per beekeeper. However the year 2005 was an average one in a climatic sense. According to this trend we may speculate that Croatia is moving towards the European developed countries in regard to beekeeping production. However, a poorly developed honey market and the discrep-

Table 2. Influence of migratory bee keeping on some of the economical parameters

Economical parameter		Migration	Value±SD
Work productivity	Natural (kg/h)	No	2.37±1.50
		Yes	3.40±2.97
	Value (kn/h)	No	56.77±28.08
		Yes	75.77±85.93
Efficiency	Total	No	126±49
		Yes	115±41
Profitability	Profit (%)	No	15.08±34.37
		Yes	8.88±18.96

For all parameters $p > 0.05$

ancy between retail sales and wholesale honey prices is still the major economic problem in Croatia (Dukić et al., 2004).

Results of this study found that production efficiency was 120 %. This production efficiency statistic places beekeeping in front of the average Croatian economic production efficiency, which is around 104 % (Zubak et al., 2007). Relatively high production efficiency is most probably the result of relatively small everyday costs, and a relatively high proportion of human labour, which is still considered inexpensive in Croatia. On the other hand, income from honey sale is satisfactory due to relatively high retail sale honey price. Although production efficiency is relatively high, it could rise further through activities which support lowered costs or increased incomes. The researchers contend this could be achieved by aggressively implementing modern technologies, especially focusing on the production of niche honey products with increased added value.

Up until now, new data was unavailable regarding Croatian beekeeping productivity. Today there is a trend in Croatian economics towards a continuous increase in productivity, yet this is mainly due to a decrease in the number of employees and unchanged production (Knjaz, 2006). In beekeeping, productivity is mostly dependent upon labour cost or technology. The calculated value productivity in our study was 63.13 kn/h (12.14 $/h). This value is quite a bit higher than the average hourly salary in Croatia. With modern technology or more rational usage of the present technology, beekeeping productivity could be further increased.

The calculated profitability of investment was, on average, 10.55 %, whereas the profitability of business was around

11.74 % in our study. Since profitability was higher than the average interest rate, which was at that time about 9.9 % (Međunarodni monetarni fond Republika Hrvatska, 2006), we could conclude that profitability of beekeeping in Croatia is satisfactory. These data support a good argument for stimulating new investment in beekeeping production in Croatia.

Some results from this study are quite surprising. First, the results show that migratory beekeeping did not influence the profitability, although it was related to honey production per beehive. The most likely reason for that is because migratory beekeeping significantly increases the investment costs and other costs, which profoundly impacts profitability. Second, labour costs were independent from the number of hives. This may be due to the increased number of hives by many beekeepers, without major changes in the technology used. Another explanation could be that the majority of beekeepers in Croatia are hobby beekeepers and for them, labour costs are not considered as outcomes, but rather as leisure and relaxation. Consequently, beekeepers do not try to rationalize labour costs and labour costs do not decrease with an increase in the number of hives.

The basic economic parameters were not dependent upon the number of hives according to the results of this study. They were dependent only upon honey price and honey production per hive. Honey prices differ greatly depending on the sales method. Due to much higher retail prices, beekeepers only sell honey wholesale that they could not sell at the retail level. Logically, beekeepers with a higher number of hives produce more honey that they could not sell at the retail level and therefore, they have to sell honey on the wholesale market. This results in a lower average honey price per kilo. Consequently, increasing the number of hives does not always result in better economic efficiency. These results also suggest that investment in marketing could substantially improve the price of honey.

In addition to the honey price, the basic economic parameters were primarily dependent upon honey production per hive. Honey production per hive was very dependent upon environmental influences and different procedures used by individual beekeepers, like technology, health, sanitation and other preventative actions, which are knowledge dependent. After all, beekeeping is an art, where different artists with the same tools will always find a different result.

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