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Honey bee: a consumer's point of view

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ABSTRACT

This article concerns the way bee products are perceived by customers. It is mainly focused on honey, which is considered the main output product of beekeeping. Beekeeping is a very popular activity in the Czech Republic. Based on current data there are over 48 thousand people engaged in beekeeping in the Czech Republic. Hand in hand with the increasing number of beekeepers the popularity of bee products – especially honey – among Czech consumers is also growing. Recently, the consumption of honey in the Czech Republic has been slightly increasing. A big problem today is that honey sold in Czech supermarkets is frequently falsified. At the same time, it is increasingly popular to buy honey directly from beekeepers. The aim of this research was to describe the situation about the honey market in the Czech Republic, and also to examine the relationship between consumers on the one hand, and honey/beekeepers on the other. We have also considered customer's trust in organic honey and honey sold in supermarket chains. Results show that consumers view bee products as generally healthy and prefer to buy bee products from a beekeeper because of greater convenience as locally sourced honey is perceived to be of higher quality. The majority of consumers agree with paying a higher price for a product of higher quality. The article confirmed the hypothesis that most people think that bee products sold by a beekeeper are healthier than those bought at ordinary shops.

KEY WORDS: beekeeping products, consumers, honey buyers' behaviour, market analysis, honey, Czech Republic

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1. Introduction

Beekeeping is a very popular activity in the Czech Republic. Based on current data there are over 48 thousand people engaged in beekeeping in the Czech Republic. As the graph in Fig. 1 shows – after a huge drop in the number of beekeepers after the Velvet Revolution, their current number is between 50 and 60 thousand. Despite the fact that the average number of beekeepers has dropped, the average number of bee colonies per one beekeeper has increased. As the Fig. 2 shows – there is currently approximately 1 bee colony per beekeeper.

Hand in hand with an increasing number of beekeepers the popularity of bee products – especially honey – among Czech consumers is also growing. Over time, the consumption of honey in the Czech Republic has been slightly increasing. The average Czech citizen consumes 0.7 kg of honey per year. In Greece, the leader in honey consumption per capita, people consume 1.7 kg of honey per year. In Germany, it is 1.2 kg per year.

The Czech Republic mostly import honey from Germany, China, and Bulgaria. Czech honey is exported mainly to Slovakia, Romania, and Poland. Europe as a whole is only partially self-sufficient in honey production. The main suppliers of honey for Europe are Argentina, China, and Mexico (SITUATIONAL AND OUTLOOK REPORT ON BEES, November 2013). Honey is relatively cheap in the Czech Republic in comparison with neighbouring countries or worldwide. The average price of one kilogram of honey is $ 8.

The aim of this article is to describe the situation in the honey market, and also to examine the relationship between consumers on the one hand, and honey and beekeepers on the other.

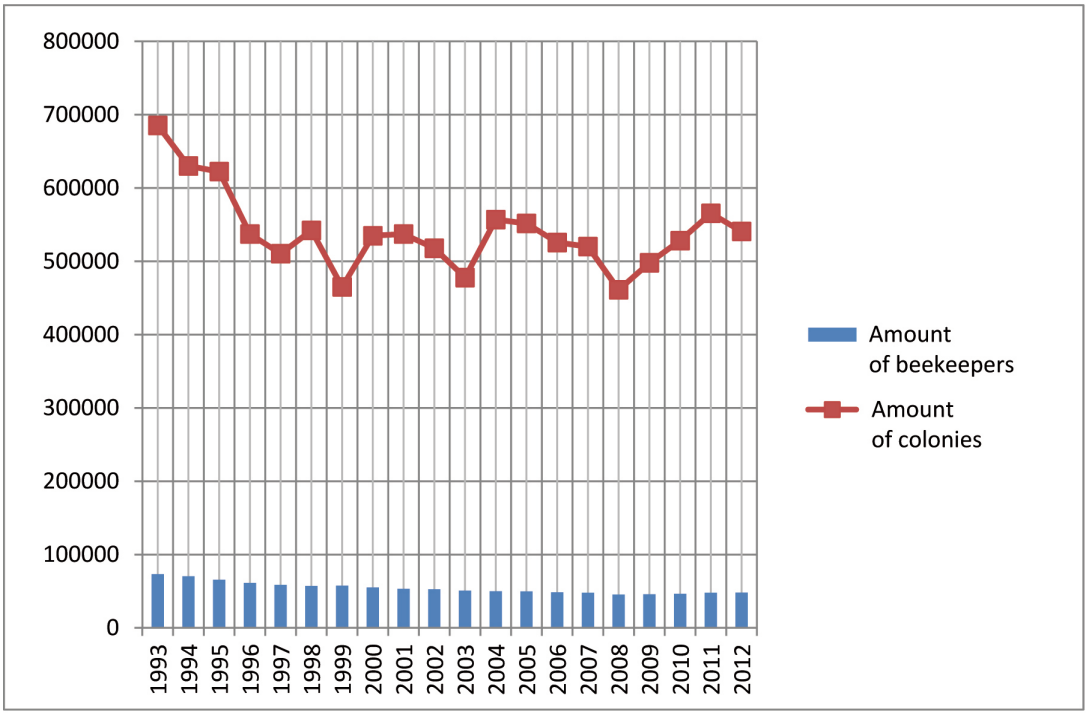

Fig. 1. Number of beekeepers and number of bee colonies in the Czech Republic since 1993 (Situational and outlook report on bees, November 2013)

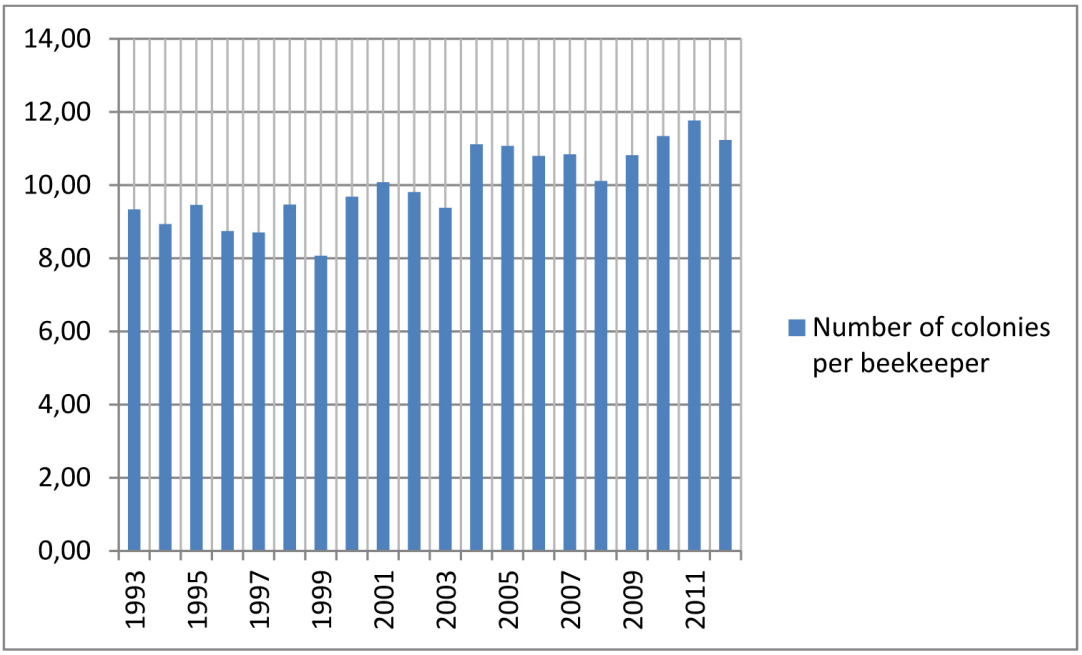

Fig. 2. Change in the number of bee colonies per beekeeper the Czech Republic (Situational and outlook report on bees, November 2013)

2. Situational overview – honey and the falsification of its contents

Bee honey – a thick sweet and sticky liquid – is a product of bee activity. It is made by the thickening of sweet juices, mainly from blossom nectar (blossom honey), and insect exudates, so-called honeydew, which is most frequently secreted by aphids (honeydew or forest honey). Whereas blossom honey is light, honeydew honey is dark, which is caused by dyes contained in the sap of forest tree species (RYŠAVÝ, 2014). In the Czech Republic we also distinguish mixed honey which naturally originates at the time of honey flow when raspberries and linden trees blossom.

Honey is a natural product. It is not permitted to add anything to it. Falsifying, or other forms of tampering, with honey are strictly prohibited. Based on the origin of the honey, it must be clearly indicated on the packaging whether it is blossom

honey (meadow honey) or honeydew honey (forest honey). The country of origin is also mandatory information which must appear on the label. In compliance with Public Notice 76/2003 Coll., of the Department of Agriculture, the country of origin must be clearly indicated on the packaging even if the honey was imported to the Czech Republic and then packed here, and in the case of when foreign honey is mixed with Czech honey.

Inaccurate indication of the country of origin is one of the most frequent cases of falsifying honey details in the Czech Republic. Honey sold in Czech supermarkets often visually evoques honey of local origin. However, in fact this is often imported honey, most frequently from China. In general, Chinese products are perceived negatively by Czech consumers (FOREJTOVÁ, 2012). Inadequate legislation, however, enables very relaxed labelling of the country of origin, which leads sellers to label such honey as a "mixture from EU and non-EU countries".

The situation regarding falsification of honey in the Czech Republic is very confusing. According to a report issued by the State Inspection for Food and Agriculture (SZPI) almost half of the honey sold in retail stores is falsified (ŠTOLL, 2013). Besides the above-mentioned problem with indicating the country of origin, the most frequent ways of falsifying honey are with the addition of sugar, cheap syrups and dyes, which are used for darkening light honey or colourless sugar solutions (OPLETALOVÁ, 2014). Adding dyes in the Czech Republic has two sources. First, it is the above-mentioned darkening of sugar solutions, which are then sold as "baking honey" (DUBEN, 2012). At the same time food dyes are used for darkening blossom honey. The reason is that Czech consumers consider honeydew honey as of a higher quality and are prepared to pay more for it (PLAVECKÝ, 2015). It is frequently mentioned in discussion forums of Czech beekeepers that beekeepers should not reveal the basis of the origin of honeydew honey, since it might tarnish the image of this product (VYDRA, 2002).

Falsified honey details made from syrups, or other sugar solutions, meets the demand of consumers. This is because consumers in the Czech Republic consider liquid honey as honey of a higher quality than that where the process of crystallization has already taken place (SEMERADOVA, 2013). However, the fact is that crystallization first occurs in light honey (blossom honey) which comes from blossom nectars containing more glucose crystals. Those, together with many pollen grains, cause early crystallization (BERNÁTEK, 2013). Due to its composition, honeydew honey crystallizes later, no earlier than several months after harvesting the honey. Within one year after harvesting all types of honey should crystallize. If this has not occurred, it is very likely that such honey is falsified, or that the natural process of honey maturation has been affected.

Inadequate interventions into the natural process of maturation of honey mean that its quality is significantly affected. Most frequently crystallization of honey is inhibited by intensive warming. However, when reaching temperatures above 50°C enzymes and some vitamins are destroyed – the higher the temperature, the higher the level of destruction. At the same time the content of hydroxymethylfurfural (HMF) – a substance potentially carcinogenic to humans – in honey increases (PAŽOUT, 2012).

3. Situational overview – the current condition of small Czech beekeepers

The main problem of Czech beekeeping, or Czech beekeepers, is the effectiveness of their activity. The Czech Republic is one of the European countries with medium suitable conditions for agriculture, which also affects beekeeping (PETEROVÁ, 2010). Home demand for honey is only half-covered by home production (ŠERÁKOVÁ, 2013). The rest is imported from countries which have both favourable climatic conditions and their economy and political situation enable the sale of honey at very low prices (ŠERÁKOVÁ, 2013). Honey is mostly imported from countries such as Argentina, China, and Mexico (SITUATIONAL AND OUTLOOK REPORT ON BEES, 2013).

Beekeeping is a specific form of agricultural production in the Czech Republic since it is connected with the tradition of small beekeepers who are mostly engaged in beekeeping as a hobby (ŠERÁKOVÁ, 2013). In this case a beekeeper's yields from selling honey are only a form of pocket money and supplementary to their main income, or increasingly often to their pension (HŮLA, 2012). In the case where beekeepers undertake beekeeping as their main entrepreneurial activity, it is very risky with investment returns in years. As Miloš Zástěra showed in a model example in Včelařství (Beekeeping), a specialist magazine, in the case of standard beekeeping with 10 or 20 bee colonies in thin-walled beehive boxes and an average honey flow of 35 kg of retrieved honey per bee colony, investment costs will be return no sooner than the thirteenth year of beekeeping (ZÁSTĚRA, 2013). Be aware that this calculation includes subsidies which Czech beekeepers receive from the government.

It is clear that beekeepers try and save money on the production of honey. There are many legal ways to make the production of honey more effective, such as making beehives, frames, tools, and equipment themselves. Often there are situations when some beekeepers, in an attempt to maximize their profit, try to make production more effective using ways on the verge of being illegal or downright illegal.

Some beekeepers, in order to maximize profits, use the same practices as sellers in supermarkets. They load honey, pillage bee colonies, treat them badly, etc. (SMOLÍK, 2015). Some beekeeper impostors even steal whole bee colonies together with hives from bee houses (KOLOMÝ, 2012). Thus the quality of honey from beekeepers can often be dubious.

Czech beekeepers also have problems with the death of bee colonies, which may occur for several reasons. Just like beekeepers in surrounding countries, Czech beekeepers are also struggling with a massive invasion of the Varroa Destructor mite. This mite was introduced into Czechoslovakia in 1976 and has been spreading ever since. Despite the generally accepted fact that spreading of this mite cannot be stopped without man's intervention (PETERSEN, 2015), some studies have mentioned (LINHART ET AL., 2008) that bees are able to do away with this mite. It is based on the natural diversification of bee work. If the mother lays into a virgin work and the old work is used for storing honey, Varroa Destructor cannot move onto new bees in time. A similar effect can also be seen in the natural ability of bees to do away with Sacbrood Bee Virus. In an effort to maximize their profits Czech beekeepers use frames which often older than three years. Such old frames are the breeding ground both for mites and other spores of dangerous infections (LINHART ET AL., 2008).

At present when every ounce of honey is vitally important to the beekeeper, it is impossible to renew the work every year. With the ratio of 3 kg of honey to 1 kg of wax (Langstroth, 2004) Czech beekeepers can easily calculate their financial losses. However, it is very shortsighted in terms of profits, as massive spreading of varroasis (the disease caused by the mites) or, which is worse, the development of Sacbrood Bee Virus. In such cases Czech regulations are merciless – all bee colonies in the apiary must be burned, including those which were not infected.

Besides these definitive solutions, standard varroa treatment might be even more dangerous. Czech practice is very strict in this respect and beekeepers must "treat" varroasis even in the case where the bee colony is not affected at all (NOVÁK, 2012). Treatments, which are designated for treating bees, are basically poisons which affect both the bee colony and its production. The most frequently used treatment is pyrethroid, or rather its residues, which remain in beehives and of course also on unchanged combs. Despite the fact that correct application of protective treatment should prevent honey from intoxication, frequently incorrect treatment procedure does not guarantee this (CENTNER, 2012).

In the Czech Republic honey can be sold in three ways – it is bought-out, retailed, and sold directly. Both the beekeepers and their customers increasingly prefer backyard sales, when the beekeeper sells honey directly to his/her customers. Whereas in the first two cases honey is subject to inspection, it does not have to be inspected in the case of direct sales, thus customers do not have a real possibility to verify the quality of the honey other than to believe the beekeeper or the labels on the jars of honey.

4. Labelling honey

In terms of quality, the honey label can be very important for consumers since it assures them that the honey they are buying meets the criteria of the institution labelling it. In the Czech Republic there are two registered trademarks to be used on honey labels. The trademark of the Czech Beekeepers Association "Czech Honey" depicts a bee in a comb and the letters CSV. It has existed since 2000 and may be employed by members of the Czech Beekeepers Association who have met the standards of the association. The other trademark is the sign "Czech Honey" showing a bee on the background of the traditional Czech colours – white, red and blue. This trademark, which was registered in 2010, belongs to the company Medoexport. It is used to label honey tested by this company. Other trademarks can be freely registered since the name Czech honey is a general name which cannot be owned by only one subject on the market.

4.1. BIO honey in the Czech Republic

Rules for keeping bees in ecological agriculture are set by Council Directive (EHS) 2092/91 on ecological agriculture. An ecological beekeeper is defined in compliance with Act 242/2000 Coll., on ecological agriculture, as a person who is not an ecological entrepreneur, keeps bees in ecological agriculture, and is registered in compliance with this law. Everything is backed by the Department of Agriculture of the Czech Republic.

Ecological production of honey must meet strict requirements. Bee hives must be located within three kilometres from ecologically grown crops, or natural vegetation, or crops treated using methods with a low impact on the environment.

On the website "Register of Ecological Entrepreneurs" there are 15 subjects registered as ecological beekeeper, 7 of which are registered with a valid certificate for this line of business, and may label specified products mentioned in the certificate as "eco" or "bio", or as transitional products.

5. Methodology

The chosen method for the survey was based on the perception of bee products as seen by the customers. Based on previous experience and research, the following hypotheses were chosen:

H1: Customers view bee products as generally healthy.

H2: Buying bee products from a beekeeper is perceived as more convenient and the honey is perceived as higher quality.

H3: The customer agrees with paying a higher price for a product of higher quality.

H4: People think that bee products sold by a beekeeper are healthier than those bought at ordinary shops.

Testing of the hypotheses, which would enable their subsequent verification, was set up according to the statistical processing of answers to the relevant survey questions. Hypotheses were confirmed if most answers to the relevant questions were within the reliability interval. Conversely, hypotheses were falsified when the answers to the relevant questions were outside of the reliability interval, or were mostly negative. For the first hypothesis the relevant question was question 2, for the second hypothesis the relevant questions were questions 3 and 4. For the third hypothesis the relevant question was question 7, and for the fourth hypothesis the relevant question was question 5.

College students helped collect the answers within three months (April through June 2015). The method of asking direct questions was in the presence of the distributors of the questionnaire. The distributors also answered possible questions of the respondents. It was an unstructured questionnaire whose goal was also to ask questions regarding the purchase and perception of bee products and beekeepers.

Most answers could be evaluated using a dichotomous scale with yes-no options. Only a few questions could be evaluated using a polytomous scale; that was where it was not logically possible to choose only between two answers.

A total of 512 completed questionnaires were collected. Some questionnaires were not complete – for example some answers were missing, but were included anyway in the evaluated sample. There were 184 men and 328 women among the respondents. The largest age group was between 21-30 years of age (168 respondents), and then groups aged 41-55 (166 respondents), 56 and more years of age (96 respondents), up to 20 years of age (44 respondents) and 31-40 years of age (38 respondents). The survey was in Czech so only Czech-speaking people were questioned.

6. Results and discussion

The survey undertaken outlines the consumers situation in striking contrast with the established facts. If the current state of small-scale beekeeping is economically unsustainable in the long run, we can assume that the number of beekeepers trying to cut back on costs at any price will increase. This will result in jeopardizing the bee population and also the end user, since the consumers have no idea what the real situation in honey production is like. There are almost 77% of Czech consumers who buy honey at least once a year. At the same time, a similar sized group of people (72% of those we questioned) claim that they try and adhere to healthy lifestyle principles. Such people buy honey at least once a year.

Regardless of their lifestyle, most consumers are automatically convinced that bee products are healthy, as almost 97% of the consumers we questioned thought so. We also found that people are convinced that sweetening using honey is definitely healthier than sweetening with sugar (WHORISKEY, 2015). However, current research has refuted this assumption. According to a new study it does not matter if a person uses honey for sweetening beverages or high-fructose corn syrup (RAATZ ET AL., 2015).

Consumers who buy honey directly from beekeepers do so for two reasons. First, because of its retail price, even though the price is not always lower than that in supermarkets. 87.5% of the consumers we questioned are convinced that buying directly from beekeepers is advantageous. Since IRS inspections are difficult to carry out, beekeepers often do not admit the real amount of honey they sold, thus the sale price can be lower than the sales tax which customers normally have to pay in shops.

The second reason why consumers tend to buy directly from beekeepers is that consumers are convinced such honey is not only of a higher quality (95.7% of consumers) but it is also considered to be

healthier, as 92% of the consumers we questioned thought this. This opinion may support the current trend of supporting bio and local products. It can also be a response to reports and articles in the media which denounce honey sold in supermarkets as of low quality (e.g. MOCKOVÁ, 2014).

The behavior of the consumers we questioned is understandable, which is clear from our survey. Most consumers, almost 92%, think that it is important that producers make products with respect to the environment around us, which, according to the media, is not true about the honey sold in supermarkets (SEDLÁKOVÁ, 2013). At the same time, 75% of consumers care that the products and services they buy were made with respect to the environment. However, at the moment they were supposed to pay more for such a product, only less than 60% would be prepared to do so. This answer, however, must be taken with a pinch of salt since it is possible that some of the consumers we questioned wanted to appear better. We can assume that the percentage of consumers willing to pay more for an environment-friendly product would in fact be lower.

Based on the processed answers it was also possible to verify the proposed hypotheses. According to the results mentioned in Table 2 it is evident that all the hypotheses were confirmed since most of the answers to the relevant survey questions asked were positive and found within the preset reliability intervals.

Table 1. List of dichotomous questions the respondents were asked

1	Do you buy bee products?
2	Do you think that bee products are healthy?
3	Do you think that buying directly from a beekeeper is more advantageous than in a normal shop?
4	Do you think that bee products bought directly from a beekeeper are of higher quality than those offered in normal shops?
5	Do you think that bee products bought directly from a beekeeper are healthier than those offered in normal shops?
6	I try and adhere to healthy lifestyle principles.
7	I am willing to pay more for an environment-friendly product or service.
8	I care that the products and services I buy are made with respect to the environment.
9	I think it is important that producers make their products with respect to the environment around us.

Table 2. Results of dichotomous questions

No.	% Yes	% No	Standard estimate terror (%)	Reliability interval - min	Reliability interval – max
1	76.90	23.00	0.01861	0.733	0.806
2	97.26	2.73	0.0072	0.958	0.986
3	87.50	12.50	0.0146	0.846	0.9036
4	95.70	4.29	0.0089	0.939	0.974
5	92.18	7.81	0.01186	0.8986	0.9451
6	72.15	27.84	0.0198	0.6826	0.7604
7	59.52	40.48	0.2186	0.5523	0.638
8	74.90	25.09	0.0191	0.711	0.7866
9	91.79	8.20	0.1212	0.8941	0.9417

7. Conclusion

The article fully describes the current situation about the honey market in the Czech Republic, with consumers buying directly from beekeepers because they believe that this honey is of a higher quality and at the same time is cheaper, which is seemingly an ideal situation for every consumer. However, it drives beekeepers into an extreme situation since the sale price does not correspond to their costs. No business with a 13-year investment return is sustainable in the long run, as it subsequently forces beekeepers to try and cut back on costs which not always respect the natural needs of bee colonies. They take away as much honey as possible and subsequently fill in stock in the form with high-fructose corn syrups (HFCS) or sugar solutions. They use the frames until the combs are completely black, change the mothers more frequently than once every three years,

some even steal bee colonies together with beehives (KOLOMÝ, 2012), and some beekeepers do not hesitate to falsify honey, as mentioned above.

The basic economic relationship between offer and demand says that if there is a high demand on a market, which in the case of honey there definitely is, then the price of the product increases accordingly. The price of honey in the Czech Republic is slowly increasing, but is still far behind prices in West European countries (BUŘINSKÝ, 2013). Czech beekeepers might now wish to make use of this situation, which leads consumers to believe that honey bought directly from beekeepers is of a higher quality and healthier, and simultaneously increase the price of honey. Otherwise they will soon lose their advantage.

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