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ANALYTICAL ASSESSMENT OF HONEY PRODUCTION AND CONSUMPTION IN UKRAINE
АНАЛІТИЧНА ОЦІНКА ВИРОБНИЦТВА ТА СПОЖИВАННЯ МЕДУ В УКРАЇНІ

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The article researched the analytical assessment of honey production and consumption in Ukraine. Due to its favorable geographical location and ability to produce high-quality beekeeping products, Ukraine is one of the most potent beekeeping countries in the world for both domestic consumption and export. To achieve the goal of the paper, general scientific methods of research, such as empirical, theoretical, and statistical, were used. There was conducted A review of scientific sources and publications related to the field of beekeeping. The article analyzes the honey market, i.e., scrutinizes the dynamics of the number of bee colonies, dynamics of honey production, the productivity of honey production from 1 bee colony in farms of all categories, enterprises, and households: dynamics of honey sales volume and average sales prices. Market analysis for the recent period includes the evaluation of the war's influence on the branch. The war in the country affects all branches of production, and beekeeping is no exception. There is observed destruction of apiaries and the impossibility of their maintenance in the occupied territories or where active hostilities occur. Damage caused by the war needs large sums of money to restore the beekeeping branch. Honey production is mainly concentrated in households (99% in 2022), and small part of its production belongs to enterprises (1% in 2022). Profitability from honey production in farm enterprises accounted for 3.3% in 2020. There could be an observed decrease since 2000, analyzing the dynamics of honey sales. In 2022, prices for honey increased and accounted for 5330 UAH per center, which is 1.6 times higher than in 2020. In the paper, a regression model was built, where the dependence of the average sales prices of honey from the quantity of sold honey was evaluated. Results confirmed the linkage between signs, i.e., the increase of 1 centner of the quantity of sold honey leads to the average sales prices decreasing by 0.29 UAH per centner. A seasonal factor could be observed, because the volume of sales is increasing and prices for agricultural products are decreasing. Special attention was paid to the production of organic honey, as Ukraine has a significant export potential for this product. Considering the favorable situation in the world market, where the price and demand for such honey is growing on the world market, Ukrainian producers will be able to increase the efficiency of their activities. However, organic beekeeping may also present production and market risks that must be minimized.
Keywords: *honey, beekeeping, market, production, Ukraine, quality, competitiveness, organic products.*

У статті проаналізовано динаміку виробництва та споживання меду в Україні. Завдяки вигідному географічному розташуванню та можливості виробляти високоякісну продукцію бджільництва Україна є однією з найпотужніших бджільницьких країн світу як для внутрішнього споживання, так і для експорту. Для досягнення мети роботи були використані такі загальнонаукові методи дослідження, як емпіричний, теоретичний і статистичний. Проведено огляд наукових джерел, публікацій, що стосуються галузі бджільництва. У статті проаналізовано ринок меду, зокрема розглянуто динаміку чисельності бджолиних сімей, динаміку виробництва меду, продуктивність виробництва меду з однієї бджолосім'ї в господарствах усіх категорій, підприємствах і господарствах населення; динаміку обсягів реалізації меду та середніх цін реалізації. Аналіз ринку за останній період включає оцінювання впливу війни на галузь. Війна в країні торкнулася всіх галузей виробництва, і бджільництво не є винятком. Спостерігається знищення пасік і неможливість їх утримання на територіях, які окуповані або де ведуться активні бойові дії. Збитки, завдані війною, потребують великих коштів для відновлення галузі бджільництва. Виробництво меду здебільшого зосереджено в домогосподарствах (99% у 2022 р.), а незначна частина його виробництва належить підприємствам (1% у 2022 р.). Рентабельність виробництва меду в агропідприємствах у 2020 р. становила 3,3%. Аналізуючи динаміку реалізації меду, можна спостерігати його зниження з 2000 р. У 2022 р. ціни на мед зросли і становили 5330 грн/ц, що в 1,6 разів вище, ніж у 2020 р. У роботі представлена регресійна модель, за допомогою якої була оцінена залежність середніх цін реалізації меду від кількості реалізованого меду. Отримані результати підтвердили зв'язок між цими ознаками, тобто збільшення на 1 ц кількості реалізованого меду призводить до зниження середньої ціни реалізації меду на 0,29 грн/ц. Це можна пояснити сезонністю виробництва, коли обсяги реалізації зростають, а ціни на сільськогосподарську продукцію знижуються. Особливу увагу було приділено виробництву органічного меду, оскільки Україна має великий експортний потенціал цього продукту. Враховуючу сприятливу кон'юнктуру на світовому ринку, де ціна та попит на такий мед зростає, українські виробники зможуть підвищувати ефективність своєї діяльності. Однак при веденні органічного бджільництва можуть також виникати виробничі та ринкові ризики, які потрібно мінімізувати.
Ключові слова: *мед, бджільництво, ринок, виробництво, Україна, якість, конкурентоспроможність, органічна продукція.*

Statement of the problem

Beekeeping belongs to the strategic direction of the development of agriculture in Ukraine. The beekeeping industry not only produces valuable food products and forms a raw material base for the food processing industry but is also crucial for pollinating crops and increasing their yield.

In 2022, over 63,000 tons of honey were produced in Ukraine - 8% less than in 2020. In particular, agricultural enterprises produced 576 tons of honey, 15.9% less than in 2021. In households, honey production decreased by 7.9% last year, compared to 2021, to 62.5 thousand tons. In the regional section, the leader in honey production last year was the Khmelnytsky region (6.6 thousand tons). Sumy (6.3 thousand tons) and Zhytomyr (6.2 thousand tons) also made it to the top three producers.

The highest growth rates of honey production in 2022 were in Sumy Oblast (34.9%), Ternopil Oblast (274%), and Khmelnytskyi Oblast (22.3%) [3].

Despite the challenges and consequences of the Russian war, the share of Ukrainian honey imported to European markets in 2022 was 24%, and Ukraine took second place among the exporting countries of the European Community. According to preliminary forecasts, the total amount of honey exported from Ukraine in 2023 will be 5-10% more than in 2022.

Analysis of recent researches and publications. The publications of scientists (Bilovodska O., Dankevych V., Dankevych E., Dukhnytskyi B., Zholynska G., Lutsiv N., Panasyuk Yu., Pyvovar P., Senyk L., Starostina A.) highlighted the results of research on the condition and problems of honey market development in Ukraine.

The basis for the active development of the honey market in Ukraine was a positive and stable tendency to increase its production in recent years. In addition, beekeeping in Ukraine is an export-oriented branch of the economy. In the study by Dankevych V. et al., the peculiarities of the export and import of honey in the conditions of the liberalization of world trade are considered, and prospects for Ukrainian exporters are substantiated. According to scientists, the competitiveness of Ukrainian honey in the foreign market was weak and formed mainly due to such factors as an increase in the volume of domestic honey production and a decrease in the purchasing power of Ukrainian consumers. These two economic prerequisites formed the export price of Ukrainian honey, the lowest among the leading players in the export honey market. The multifactorial correlation-regression analysis carried out by them allows us to conclude that the most significant factors influencing the export potential were the volume of honey production in Ukraine, the level of honey consumption per capita in Ukraine, honey production in the importing country, and the volume of honey consumption in the country - importers [2].

Lutsiv N. and others studied the requirements for honey in the EU and the main problems faced by domestic exporters, namely: insufficient legal and technical framework, concentration of production in unregistered, small households, inefficiency of honey quality control in the domestic market and lack of it due to the use of agrochemicals and pesticides, large amounts of counterfeiting, lack of investment in the marketing and image of Ukrainian honey, new technologies in beekeeping, etc. [8].

Sereda V.'s article contains a factor analysis of the business environment of the EU honey market. Based on this, a SWOT analysis of participants in the German honey market was conducted. As a result of the study, the authors proposed strategic measures to increase the competitiveness of the Ukrainian honey producer, including product and sales policy, positioning, and promotion [16].

Starostina A. and others reviewed the honey market of Ukraine in the context of the spread of the COVID-19 pandemic. They assessed the attractiveness of the international business environment of the Middle East for the export of honey from Ukrainian producers, identifying a potential market for the sale of Ukrainian honey using a filter model for selecting target markets [18].

According to Dudar T., for the expansion of Ukrainian honey sales markets and its entry into new segments of the world market, an essential factor is the organization of the honey business and the orientation of the strategy of the development of domestic beekeeping not on increasing the number of bee colonies and gross honey production, but on a more stable domestic market and modern technologies honey products. To solve the problems of sales by honey producers, the author proposes to consider cooperation as an effective form of cooperation in beekeeping. After all, world practice shows that by pooling their resources in cooperatives, small and medium-sized producers get the opportunity to apply the latest technologies, form their marketing channels for the sale of products, and therefore, strengthen their positions on the market, and as a result receive more excellent added value [4].

In the publication of Dukhnytskyi B. et al., a conclusion is made about the need for a gradual reorientation from purely raw products to goods with added value: honey from several cultures, with various additives or organic [5].

Organic honey is honey obtained because of organic production, certified following the requirements of standards and rules of organic production. In the EU countries, the production of organic honey is regulated by relevant regulations No. 889/2008 and No. 2029/91. In Ukraine, beekeeping is regulated by the Law of Ukraine, «On Beekeeping», and the quality and safety of honey are regulated by the state standard (DSTU 4497:2005). Organic honey production is subject to the

Resolution «On approval of detailed rules for the production of organic products (raw materials) of beekeeping» («Organic Standard», 2007; «Detailed rules of production of organic products (raw materials) of beekeeping», 2016); Law of Ukraine «On basic principles and requirements for organic production, circulation and labeling of organic products», 2018).

Currently, an inevitable expansion of the range of organic products (including honey) is observed in the domestic consumer market of Ukraine. At the same time, during the last five years, Ukrainian agricultural sector operators have been increasing the export volume of organic semi-processed and processed products (frozen berries and apple juice, sunflower oil, honey).

The purpose of the research

The purpose of the study is an analytical study of the dynamics of honey production and consumption in Ukraine, including the dynamics of volumes of organic beekeeping products. Considering the main factors of the formation of the level of supply and demand, the prospects for the further development of the beekeeping industry, including organic production, are substantiated.

Materials and methods of research

During the research, there were used different scientific methods to achieve the goal. An analysis of scientific sources, articles, and publications related to the honey sector was carried out to assess its current state. This analysis facilitates us to understand the main aspects of the topic and identify directions for further research.

There were also statistical data used to assess the state and dynamics of the beekeeping industry. These data included honey production in households, enterprises, and farms, data on the number of bee colonies in Ukraine, and other statistical indicators. This allowed us to obtain quantitative data for analysis. The use of various scientific methods allowed us to conduct a comprehensive study and answer questions that were stated.

Presentation of the main research material

Beekeeping is an essential branch of agriculture. Bees provide a valuable food product – honey, which is distinguished by high nutritional qualities and has medicinal properties. In addition to honey, bees also produce wax, which is a raw material for many industries and the production of artificial beeswax. Beekeeping plays a significant role in increasing the productivity of many cross-pollinated crops.

The research of scientific institutions and the practice of advanced farms have proven that pollination by bees increases the yields of sunflower, buckwheat, mustard, safflower seeds, alfalfa, clover, apple, and other fruit crops by 25-30 percent or more. Fig. 1 presented bee colonies in farms of all categories, enterprises, households, and thousand bee colonies. As we can see from the graph, the two curves almost coincide, i.e., the number of bee colonies in farms of all categories and households. This confirms that the primary producers of honey in Ukraine remain households.

The primary honey production is concentrated in eight regions: Vinnytsia, Donetsk, Dnipropetrovsk, Zaporizhzhia, Zhytomyr, Mykolaiv, Poltava, and Kirovohrad regions. These regions provide production of 70% of Ukrainian honey [8].

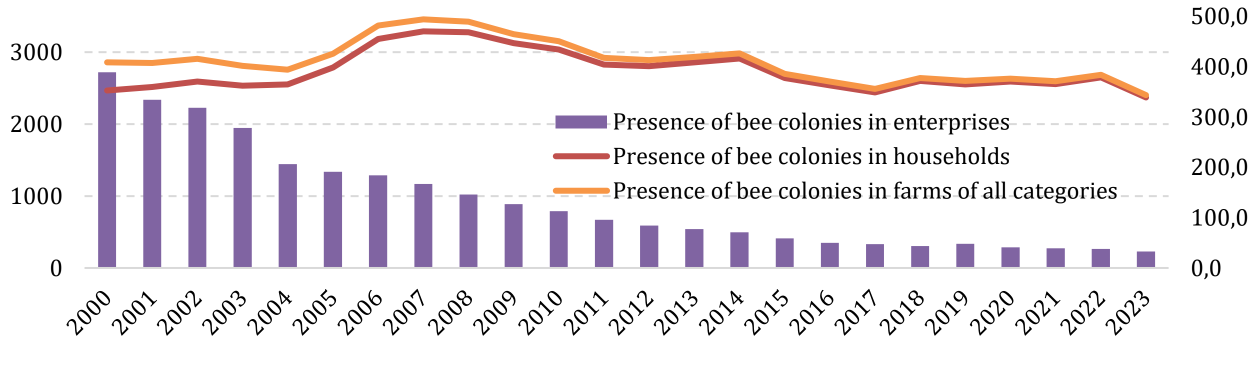

Fig. 1. Dynamics of the number of bee colonies in farms of all categories, enterprises and households, thousand bee colonies

Source: Own representation based on data of the State Statistical Services of Ukraine, 2023.

The war in the country and the economy's decline affected absolutely all branches of production, and beekeeping is no exception. The industry has suffered heavy losses, and large sums of money are needed to restore the lost beehives. For the last five years, we can observe losses in enterprises of all categories. However, from 2018 to 2020, farm enterprises had profitability from honey production, and in 2020, it accounted for 3.3%. The main negative factors of the current year (2023) are the destruction of apiaries and the impossibility of their maintenance in the territories that are occupied or where active hostilities are taking place. Fig. 2 represents the situation where almost all produced honey in the country is from households. In 2022, there were produced by enterprises of all categories 63079 t, where households produced 99.1% and only 0.9% – of enterprises. In 2000 we could observe less production in households – 93% and in enterprises – 7%.

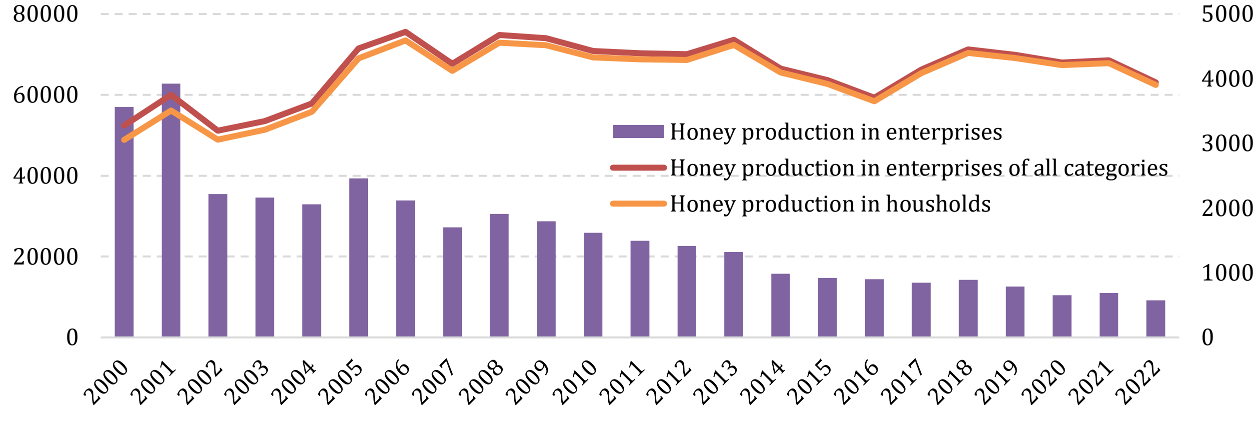

Fig. 2. Dynamics of honey production in farms of all categories, enterprises and households, thousand bee colonies, tones

Source: Own representation based on data of the State Statistical Services of Ukraine, 2023.

Nowadays, the industrial production of honey in agricultural enterprises, where at one time usually used at least 200-300 hives, decreased significantly compared to 2000. This is primarily related to organizational and technological problems. In particular, the weak mechanization of the main production processes caused the increase in the production cost and, therefore, its unprofitability in agricultural enterprises.

In the regional aspect, leaders in honey production in 2022 were the Khmelnytsky region (6.6 thousand t), Sumy (6.3 thousand t), and Zhytomyr (6.2 thousand t), which made them the top three producers in Ukraine.

The highest growth rates of honey production in 2022 were in the Sumy region (34.9%), the Ternopil region (274%), and the Khmelnytskyi region (22.3%). The State Statistics Service notes that the data are given without considering the territories temporarily occupied by the Russian Federation and part of the territories where hostilities are ongoing (continued).

It could be observed that honey production from 1 bee colony is lower than in households analyzing the productivity of honey production from 1 bee colony in farms of all categories, and this deviation during the researched period is minimal. In turn, when we evaluate productivity in enterprises, there could be observed less productivity than in households, and such a tendency remains until now. Since 2014, household productivity increased almost three times compared to 2005.

In recent years, Ukraine has held a leading position among honey exporters worldwide, successfully competing with such countries as China, India, Argentina, and Vietnam [7]. However, the war became the most difficult challenge for domestic producers of food products.

According to the data of the ITC Trade Map, in 2021, Ukraine exported 61.2 thousand tons of honey and earned 144.9 million US dollars. Thus, regarding the volume of product sales abroad, the country took fifth place after China, India, Argentina, and Vietnam [23].

Poland, Germany, Belgium, France, and Lithuania buy the most Ukrainian honey [9]. In 2022, despite the full-scale invasion of the Russian Federation, it was possible to export 48 thousand tons of honey. Indeed, Ukraine's share of honey imports to the EU in 2022 was 24%, which allowed it to take second place among exporting countries. In addition to Ukraine, the leading countries in honey supplies to the EU included China (36%), Argentina (10%), Mexico (7%), Turkey (4%), Cuba and Vietnam (3% each) [9].

The blocking of Ukrainian exports by Russia also led to a reduction in the volume of sales of domestic honey to foreign markets. In addition, most honey producers were in the territories of regions that were occupied or were damaged because of military operations. Therefore, domestic entrepreneurs expect that export volumes in 2023 may decrease compared to the last year [14]. The somewhat unfavorable situation is exacerbated by the fact that as of August 2022, only one honey processing plant was operating in Ukraine – in Vinnytsia, where all collectors bring their products [14].

According to data from the Ministry of Agrarian Policy and Food, since the beginning of 2023, Ukraine has exported 41 thousand tons of honey to EU countries and the USA during nine months of 2023. Ukrainian honey is supplied to Germany, Poland, Belgium, the USA, France, Lithuania, the Czech Republic, and Hungary [9, 18].

Evaluation of the honey market from Beehive company showed that the total amount of honey exported from Ukraine in 2023 would be 5-10% more than in 2022 compared to the forecast that other branch experts did. At the same time, Ukraine holds its position in the market and has the chance to increase the amount of exports, taking market share from other major players in the EU market.

The dynamics of honey sales volume and average sales prices are presented in Fig. 4, where the dynamics of honey sales have been decreasing since 2000. From 2012 to 2020, there was a decrease in prices, and in 2020, prices accounted for 3318 UAH per center. However, in 2022, prices for honey increased and accounted for 5330 UAH per centner.

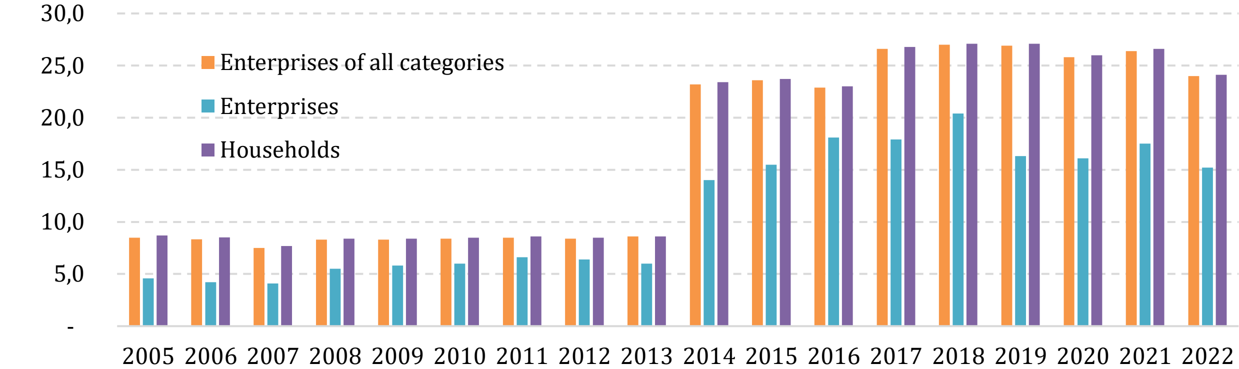

Fig. 3. Productivity of honey production from 1 bee colony in farms of all categories, enterprises and households, kg

Source: Own representation based on data of the State Statistical Services of Ukraine, 2023.

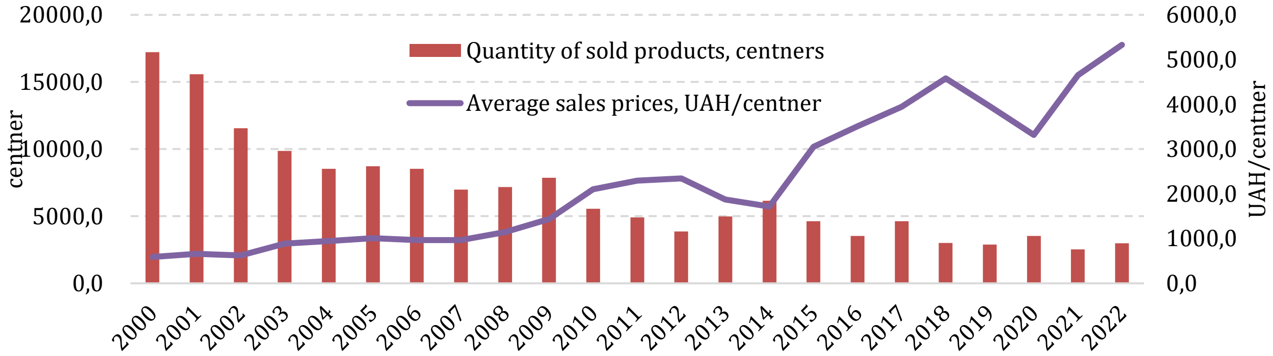

Fig. 4. Dynamics of honey sales volume and average sales prices

Source: Own representation based on data of the State Statistical Services of Ukraine, 2023.

Consider the dependence of the average sales prices of honey (P) from the quantity of sold honey (Q), building the regression between them (table 1). The data of variables is presented from 2000 until 2022, and the source of information is the State Statistical Services of Ukraine. The results confirmed the dependence of average sales prices of honey from factors that were included in the model, i.e., with the increase of 1 centner of the quantity of sold honey, the average sales prices of honey will decrease by 0.29 UAH per centner. Such tendencies, when the volume of sales is increasing, and prices for agricultural products are decreasing, could be observed by the season.

Table 1. Regression analysis results

Specification	Regression equation: P=4271.78-0.29*X
R	0.79
R2	0.62
P-value for parameter a1	0.00

Source: author's calculations.

Indeed, the regression analysis describes a close connection between these two variables, where the index R=0.79 indicates a tight linkage and determination coefficient $R2=0.62$, which means that the honey volume on the market determines price fluctuation by 62%. The significant model is confirmed by the P-value for the parameter a1, which is lower than the critical value of 0.05.

The honey supply to the domestic and world markets is characterized by its availability and movement, whereas Table 2 presents data for 2020. At the beginning of the year, honey stocks were equaled to 679.2 thousand kg. The indices of the volume of honey received during the year amounted to 449.5 thousand kg. The volume of products that were withdrawn during the year included different purposes, i.e., sold honey to processing enterprises, processed at its facilities, and transferred for processing on delivery conditions, realized on the markets, sold to the population at the expense of labor and land/property shares, spent on feeding, lost during storage. The most significant part belongs to the loss during the honey storage, which equaled 1.5% or 8966 kg in the volume of products that were withdrawn during the year. Indeed, this fact is confirmed that with improper storage, as well as in case of non-compliance with the technology of honey production, a loss of taste and valuable qualities of the product is possible. Since most of the produced honey comes from apiaries of households, where there is a low level of technical equipment and sometimes non-compliance with production technology, losses could be observed.

Table 2. Availability and movement of honey in enterprises in 2020

Indices	Honey volume, kg
Stocks at the beginning of the year	679235
Volume of products received during the year (including own production)	449491
Including the volume of products obtained in any other way, except for own production	4300
The volume of products that were withdrawn during the year, *including:*	581284
- sold to processing enterprises	3295
- processed at its own facilities and transferred for processing on delivery conditions	2615
- realized on the markets	1568
- sold to the population at the expense of labor and land/property shares	3124
- spent on feeding	1701
- lost during storage	8966

Source: data of the State Statistical Services of Ukraine, 2023.

Thus, after analyzing the beekeeping market, it is worth noting that honey production occurs mainly in households. On the one hand, honey production by households is low-mechanized compared to enterprises. However, such a situation can promote the production of organic honey both for domestic needs and for its export, thereby increasing the added value of honey production.

With the adoption of the Law «On Production and Circulation of Organic Agricultural Products and Raw Materials», a new development of organic farming and beekeeping began in the state. According to «Organic Standard», since 2009, registration of organic apiaries has constantly been increasing. Interest in organic beekeeping in Ukraine is proliferating. More than 80 apiaries are undergoing the process of organic certification. From the 2019 harvest, 300 tons of organic honey were exported, and its price was twice that of the regular product on the domestic market [15]. In 2020, Ukraine exported 834 tons of organic honey to the EU with a total value of 1,675 thousand US dollars (Table 3).

Table 3. Export of organic products from Ukraine to the EU in 2020

Name of product	Volume, tonnes	Export value, thousand US dollar
Apple juice	3 376	4 432
Honey	834	1 675
Birch juice	422	273
Salmon is chilled	85	1274
Ice	13	73

Source: data of the State Statistical Services of Ukraine, 2023.

Organic beekeeping is implemented and developed in more than sixty countries. It is based on the same principles as organic farming. Organic beekeeping is a more expensive activity than traditional conventional beekeeping. Accordingly, organic honey is of a higher quality and costs much more [17, 20].

The impetus for developing organic beekeeping was not only economic benefit but also the global crisis with bees in connection with the mass use of toxic chemicals in agriculture, which led to the death of bees. American beekeepers report the annual death of bees from 30 to 90% of bee colonies. Honeybees could disappear entirely in the UK in the next ten years. Beekeepers in Germany, Greece, Portugal, Spain, Poland, Canada, and Ukraine have the same problems [22].

Indeed, according to reports of many specialists and scientists in this sphere, the death of bees can lead to the disappearance of many plants. Almost 80% of all plants are pollinated by Apis mellifera honeybees and other wild bees, and the proportion of wild pollinators has declined significantly due to the widespread and uncontrolled use of pesticides in agriculture.

Organic honey is honey obtained as a result of organic production, certified following the requirements of standards and rules of organic production.

In the EU countries, the production of organic honey is regulated by regulations No. 889/2008 and No. 2029/91. In Ukraine, beekeeping is regulated by the Law of Ukraine, «On Beekeeping», and the quality and safety of honey are regulated by the state standard (DSTU 4497:2005). Organic honey production is subject to the Resolution «On approval of detailed rules for the production of organic products (raw materials) of beekeeping» («Organic Standard», 2007; «Detailed rules of production of organic products (raw materials) of beekeeping», 2016); Law of Ukraine «On basic principles and requirements for organic production, circulation and labeling of organic products», 2018) [6, 12, 13].

Ukrainian producers of organic products, oriented towards export, undergo certification following international standards. The most common are EU organic standards (EU et al. No. 834/2007 and EU Commission Regulation No. 889/2008) and US standards (NOP). It is worth noting that EU standards are used by market operators both for export and for positioning organic products in the domestic market of Ukraine. This legislative possibility is also enshrined in the latest amendments to the Law of Ukraine «On Basic Principles and Requirements for Organic Production, Circulation and Labeling of Organic Products» dated August 5, 2021. Depending on the target market, manufacturers may be guided by other standards, including COR (Canada), Bio Suisse (Switzerland), Bioland and Naturland (Germany), Soil Association (UK), and KRAV (Sweden). In addition, market operators are interested in the organic standards of Asia, in particular, Japan (JAS) and China.

Twenty-three certification bodies operate in Ukraine, 20 of which are included in the official list of certification bodies in the organic sphere for Ukraine following EU Regulation No. 1235/2008

(Annex IV), 9 have the right to certify following US standards (NOP), 2 – in accordance with the standards of COR (Canada) and 13 – according to the standards of Bio Suisse (Switzerland) [10, 15].

From the moment the owner applies to the acquisition of the status of an organic apiary, a transition period is established. In the future, the organic certification of the apiary will be carried out every year voluntarily. From the moment the owner applies to the acquisition of the status of an organic apiary, a transition period is established. In the future, the organic certification of the apiary will be carried out annually voluntarily. The main stages of obtaining the status of an organic apiary in Ukraine (incl. 1. Submission and consideration of an application for certification; 2. Certification contract; 3. Attestation of production of certified products; 4. Selection, identification of product samples, and testing; 5. Analysis of the results and decision-making on the possibility of issuing a certificate and license; 6. Issuance of a certificate and entry of certified products into the register; 7. Recognition of a certificate issued abroad or by an international body; 8. Information on the results of certification work; 9. Control) are covered in Gutsalenko's publication [1].

In general, according to the FAO, the cost of Ukrainian honey is one of the lowest in the world, despite its third place among world exporters, and it amounts to 2.0 US dollars per kilo. The main reason for the low price is that 99% of all honey is exported in barrels, unbranded, and with virtually no added value.

Another reason is that approximately 90% of exported honey is monofloral sunflower honey. This factor does not consider the consumer demand of the largest importing countries of organic honey. European consumers are looking for various honey varieties and innovative products with new, exciting flavors, such as honey with spices, nuts, berries, herbs, hot pepper, cream honey, etc. This approach to production and marketing can help increase the added value of Ukrainian honey and satisfy European consumers' demand for diversity and innovation in organic honey [15].

By reducing energy costs in agriculture, it is possible to simultaneously increase the competitiveness of beekeeping producers both in the domestic and international markets. Forests, unlike other agricultural lands, are much less exposed to the chemical effects of protection agents, so they can be considered with the most significant probability as potential areas for organic beekeeping [11].

With any economic activity, a risk is possible – an unforeseen event that will affect profit or lead to losses. This issue is especially relevant for producers of organic products and requires a more detailed analysis of the risks of such activities. According to a survey of American farmers, three categories of risks of organic production of agricultural products were identified: (1) risks like conventional agriculture; (2) risks that differ from those present in traditional agriculture and are temporary; (3) risks significantly different from conventional production. This classification can also be used for organic producers of beekeeping products [19].

In general, risks in organic beekeeping can be divided into two categories: production risks and market risks (fig. 5).

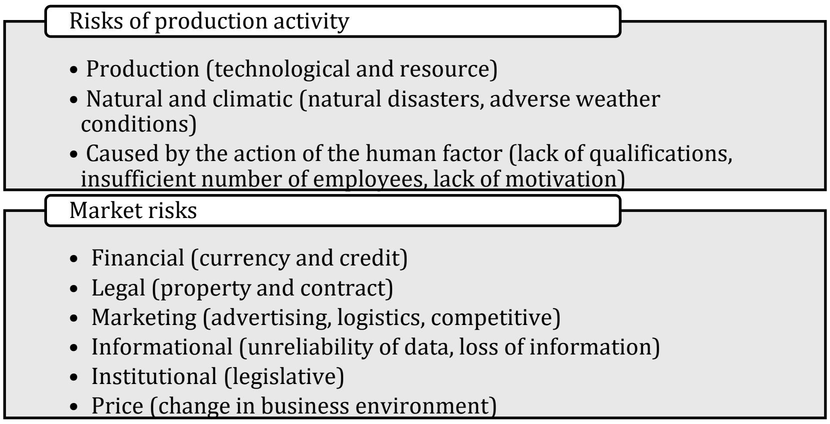

Fig. 5. Risks in organic beekeeping

Source: author's development

In general, the primary measures of risk management in organic beekeeping include modernization of production, which could lead to increased production efficiency; production of own organic wax and propolis to prevent unavailability of resources and loss minimization; adjustment of sales chains and systems quality control; establishment of communication with agricultural producers; joining into associations and cooperatives to ensure the exchange of experience and development support production [7, 21].

Indeed, the production of organic beekeeping products in today's conditions is characterized by many various risks. Also, several factors could hinder the development of organic production: imperfect regulatory and legal support; lack of financial support from the state; low level of awareness of consumers and producers regarding organic products.

It is advisable to introduce a system of minimization of different types of risks for the further development of organic production [1].

Conclusions and prospects for further research

The volume of world trade in honey has been growing in recent years, and almost the entire exported volume of Ukrainian honey is produced by households. Ukraine has a favorable location and can produce high-quality beekeeping products for domestic consumption and export.

Market analysis of the beekeeping branch was done to realize the article's purpose. The leading producers of honey in Ukraine remain households. It is confirmed by a higher number of bee colonies, honey production, and productivity of honey production from 1 bee colony. Evaluation of the productivity of honey production from 1 bee colony in farms of all categories showed that this index is more extensive in households than in enterprises. Such a tendency remains until now.

There were defined that honey production concentrated in regions that provide 70% of honey: Vinnytsia, Donetsk, Dnipropetrovsk, Zaporizhzhia, Zhytomyr, Mykolaiv, Poltava, and Kirovohrad regions. However, the war in the country heavily influenced the industry, where the destruction of apiaries and the impossibility of their maintenance in the occupied territories or where active hostilities are taking place. Due to that, in 2022, the top three producers in Ukraine were the Khmelnytsky region, Sumy, and Zhytomyr.

There could be observed a decrease in the volume of sales by analyzing the dynamics of honey sales and its average sales prices. Prices for honey in 2022 increased and accounted for 5330 UAH per center, which is 1.6 times higher compared to 2020. The results showed that honey prices influence the season of honey collection when the volume of sales is increasing, and prices for agricultural products are decreasing. Ukraine is one of the largest exporters of honey in the world. In 2020, domestic beekeepers sold 81.0 thousand tons of honey abroad, most of it to the European Union. It was a record and the second place in the world after China. In 2021, Ukraine exported 25% less compared to 2020. Due to the war, the export volume decreased and, in 2022, accounted for 61.2 thousand t and earned 144.9 million US dollars.

For further development of the beekeeping industry in Ukraine, the production of organic honey could take place, where Ukraine has a considerable export potential of this product. The article scrutinizes the potential and risks of organic honey production.

In summary, mechanization, and innovative technologies of honey production through the introduction of modern equipment production of honey variety will significantly increase the competitiveness of the branch.

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