European Honey Market

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Abstract

The EU beekeeping sector faces significant challenges, marked by competition from low-cost imports, rising production costs, and widespread fraud. In 2022, the EU produced approximately 286,000 t of honey, covering only about 60% of its demand. The EU relies heavily on imports, with China alone accounting for 36% (68,000 t) of the total imported honey. However, a recent study by EU authorities found that 46% of the analysed samples of imported honey from non-EU countries were suspected of not complying with the Honey Directive. Common fraudulent practices include the addition of sugar syrups and mislabelling of the geographical origin, resulting in prices as low as 1.4 €/kg.

Environmental pressures, such as climate change and loss of nectar and pollen sources coupled with rising production costs (*e.g.*, a 62% increase in feed costs from 2021 to 2023), have further strained EU beekeepers. These factors have driven some local producers to the brink of extinction, mainly commercial operations specialising in the sale of honey in drums. Despite a temporary surge in demand for honey during the COVID-19 pandemic, inflation and reduced purchasing power have led to a decline in consumer sales. We recommend stricter enforcement of measures to ensure honey authenticity and further quality standards, improved traceability, and financial support for EU beekeepers to safeguard the sector and maintain market stability and consumer trust.

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Introduction to the EU Honey Market Situation

The European honey market has been under significant scrutiny following the release of the "From the Hives" report by the European Commission (European Commission, 2023). This investigation, long demanded by European beekeeping associations, shed light on alarming inconsistencies and suspicions of fraud in the honey market, primarily concerning imports from China, but not only. These findings have resonated like a shockwave across the sector, underscoring the challenges posed by the so-called "fake" honey, which significantly undercuts local producers with lower-priced and often adulterated products.

The ramifications of these market conditions are particularly severe for European beekeepers, especially those who depend solely on honey production for their livelihood. Many beekeepers are grappling with a slew of challenges: increased colony mortalities in some countries (Gray *et al.*, 2019, 2020), escalating production difficulties due to environmental changes such as temporal lack of nectar and pollen sources on the one hand and overlapping time windows of different important nectar sources for honey production on the other due to climate impacts (IPBES, 2019), new threats from invasive species (Mutinelli *et al.*, 2014; Requier *et al.* 2022, 2023) and competitive pressures (Ždiniaková *et al.* 2023). Furthermore, these producers are not insulated from broader economic pressures, such as increased production costs, exacerbating their financial instability.

This report utilises macro- and microeconomic data concerning honey trade and production to provide a clear, objective view of the beekeeping sector's current market conditions and health. By analysing detailed trade data, production volumes, and import/export trends, the report aims to provide stakeholders with a comprehensive understanding of the factors affecting the honey market. This analysis is crucial for devising strategies to support the EU’s beekeeping sector, ensuring its

sustainability and resilience against fraudulent practices and market disruptions.

Material and Methods

The work carried out is based on analysing existing trade exchange databases. These are mainly Eurostat international trade - EU trade since 1999 by CTCI[1] (DS-059331)(Eurostat, *n.d.*)[2] and Trade Map - Trade statistics for international business development[3], which were consulted in April and May 2024 for data relating to imports and exports of honey listed under the appellation "Natural Honey". Trade can be intra-community or extra-community. These correspond to the total imports and exports made by each Member State on the internal market and aggregated at the EU level. Therefore, these give an idea of honey flow within the European market. Differences between imports and exports are due to encoding errors or the absence of declarations in one direction or the other. Intra-community exports (export of honey within countries of the EU) are calculated by subtracting the value (in Euros) and quantities (in t or kg) of exports to extra-EU countries from the total value and quantity of exports. Intra-community imports (imports of honey within countries of the EU) are calculated by subtracting the value and quantities of imported honey from extra-EU countries from the total value and quantity of imports in the EU. The slight price variations may be due to honey remaining in customs for a few months with a change in honey price. These flows include honey produced in the EU and imported from third countries, which is re-exported directly or after blending and/or packaging.

Trade prices are calculated by dividing the value in (Euros) by the amounts (in kg or t) exported or imported.

Data relating to production come from FAOSTAT statistics (crops and animal products - livestock primary - natural honey[4]). Recent data (2022) are often missing and have been supplemented by data transmitted by DG Agri during the Civil Dialogue Group (CDG) "Animal Production - Honey"[5], which includes the productions of recent years in its presentations on the honey market.

Four production costs have been considered in the analyses to evaluate the microeconomic analysis of beekeeping operations: Fuel, Labour, Feed and Veterinary Medicinal Products. The former was extracted from the

[1] Standard Classification for International Trade or SITC is a nomenclature of goods established by the United Nations.

[2] https://ec.europa.eu/eurostat/comext/newxtweb/setupdimselection.do - Cproduct code: 0616. Name of the database used for commercial exchanges: DS-059331 - EU trade since 1999 by CTCI

[3] https://www.trademap.org/Index.aspx - CN product code: 0409

[4] https://www.fao.org/faostat/fr/#data/QCL - Product code: 02910

[5] Civil Dialogue Groups (CDGs) are consultative groups set up by the European Commission (DG Agriculture and Rural Development). They constitute a forum for exchange between stakeholders and the European Commission.

Weekly Oil Bulletin published by the European Commission[6], which considers average prices with diesel and Euro-super 95 taxes. Labour costs were obtained from Eurostat data on agricultural labour input statistics (aact_ali01)[7]. Data on the cost of production of feed and veterinary products has been extracted from a survey carried out among European beekeepers by Copa-Cogeca in 2024[8], with the collaboration of other EU beekeeping associations, EPBA[9] and BeeLife[10]. A total of 1,314 survey responses were analysed, including information provided by individual beekeepers, their cooperatives (in Italy and Spain), and national administration (Hungary). The three latter cases were excluded from the analyses, and only those answers from beekeepers who have more than 150 colonies, which is the threshold defined by the EU for professional beekeepers who put honey on the market (in bulk, direct sale or short supply chain) and can earn a living from it (n=185). The relative differences in the values with respect to 2021, the start of the study period, have been considered. Furthermore, the reports on the Beekeeping Programmes included in the Common Agricultural Policy (CAP) include absolute data about the overall production costs per kg of honey produced in 2023 (Table 1)(Agriculture and Rural Development ISAMM-CM, n.d.).

6 https://energy.ec.europa.eu/data-and-analysis/weekly-oil-bulletin_en accessed on 25/10/2024.

7 https://ec.europa.eu/eurostat/databrowser/view/aact_ali01/default/table accessed on 25/10/2024.

8 Data to be demanded by Copa-Cogeca Honey Group.

9 European Professional Beekeeping Association

10 https://bee-life.eu

Results

1. Macroeconomic overview

1.1. Production trends

Over the past two decades (2002 to 2022), the honey production trends in China and other countries exporting honey to the European Union (EU) and the EU have displayed distinctive patterns (FAOSTAT, 2024). China has significantly increased its honey production, maintaining its position as the world's leading producer. This growth has been marked by an upward trajectory, particularly notable since the early 2000s. In 2022, for example, China produced approximately 461,900 t of honey. The honey production in China seems to have reached a plateau in the past decade. It showed a peak production in 2016 with 555,000 t, while it is unclear if this might be a data error in the statistics. China tops global production charts and exports significant quantities worldwide, influencing global prices and market dynamics (Figures 1a, 1b).

In contrast, the EU has experienced more modest changes in honey production volumes over the same period. Although it remains the world's second-largest honey producer, its production has grown less dramatically despite

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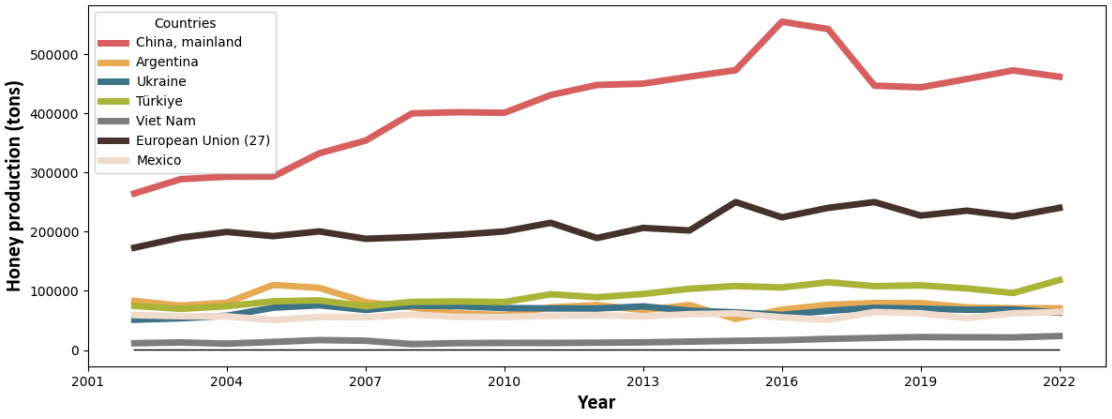

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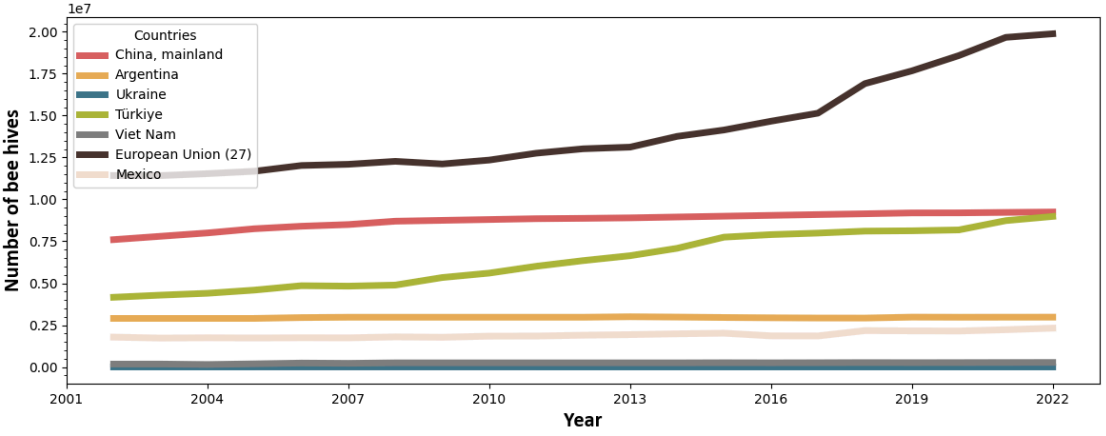


Figures 1(a) and 1(b). (a) Evolution of honey production in countries trading with the EU (in t); (b) Changes in the number of hives in the EU and in the main countries from which the EU imports honey. Notes. Data on Ukrainian hives from FAOSTAT are missing.

a significant increase in bee hives numbers. Table S1 in Annex 1 shows the details of production and beekeeping demographics for 2022. After two years of low harvest, the EU experienced two good harvesting years in 2022 and 2023. However, the amount of honey produced remained insufficient to meet EU demand. It must be noted that the EU relies heavily on imports due to its production meeting only about 60% of its demand.

These diverging trends underline the different dynamics in the China and the EU honey markets. China's substantial growth in honey production could be attributed to a slight increase in bee colonies (although only half as many as in the EU) (FAOSTAT, 2024) and, mainly, productivity improvements per colony.

However, many field experts question the feasibility of these figures and beekeeping associations have long questioned the authenticity of the honey imported from this country, both based on the export quantities and prices. Furthermore, the validity of the production data available is questionable in light of the existing data inconsistencies. Is it possible to sell honey at prices lower than 1.4 €/kg, considering production and trade costs (see later)? The EU's production has been and still is influenced by factors such as agricultural production, crop composition, and climate change, which are factors that surprisingly would not have affected Chinese production. Or maybe they would have, but other reasons would explain these trends? The analysis of FAOSTAT data over the past two decades (*FAOSTAT*, n.d.) reveals significant heterogeneity in honey production across different years and locations. This reflects not only the intrinsic characteristic of beekeeping - being dependent on climate and environment but also the possible impact of public policies affecting the agro-environmental landscape (being farmers without being landowners).

From the data spanning from 2002 to 2022, we observed:

- World honey production has had positive trends since the period considered (2002).
- Production in China fluctuates substantially but has a general upward trend. The mean annual production was about 420,000 t.
- 2022 was a good production year in the **EU**.
- In the EU, **Spain,** the largest EU producer, showed more stability in production, with an average annual output of around 32,266 t and a high in 2018 of 36,394 t. See Data S1 in Annex 1 for detailed EU Member States (MSs) production data.
- **Romania,** the second largest EU producer, had an average annual production of approximately 22,600 t, with a good 2017 (30,177 t), but a better 2021 (30,831 t). See Data S1 in Annex 1 for detailed production data of the different MSs.

For more updated information on production trends, we need to use data shared at the CDG Animal Production - “Honey” from October 2024 (Data S1). There was a drop in production in 2020, mainly due to the poor harvest in Poland, Czechia and Hungary and in 2021, it was mainly linked to the poor harvest in Germany, Hungary, Italy and France. A critical EU producer, Hungary, has observed decreasing harvesting trends since 2018. The 2022 harvest was overall good (EU production was estimated at 285,700 t, an increase of 18% and a difference of 42,828 t from the previous ten-year average). Data for 2023 is not yet available for Europe (CDG Honey, 2024).

The European Commission defines a beekeeper as professional when he/she manages 150 hives or more. Spain and Romania often top the list of producing countries within the EU (Table S1). They show a respective average number of hives per beekeeper of 80 and 73,

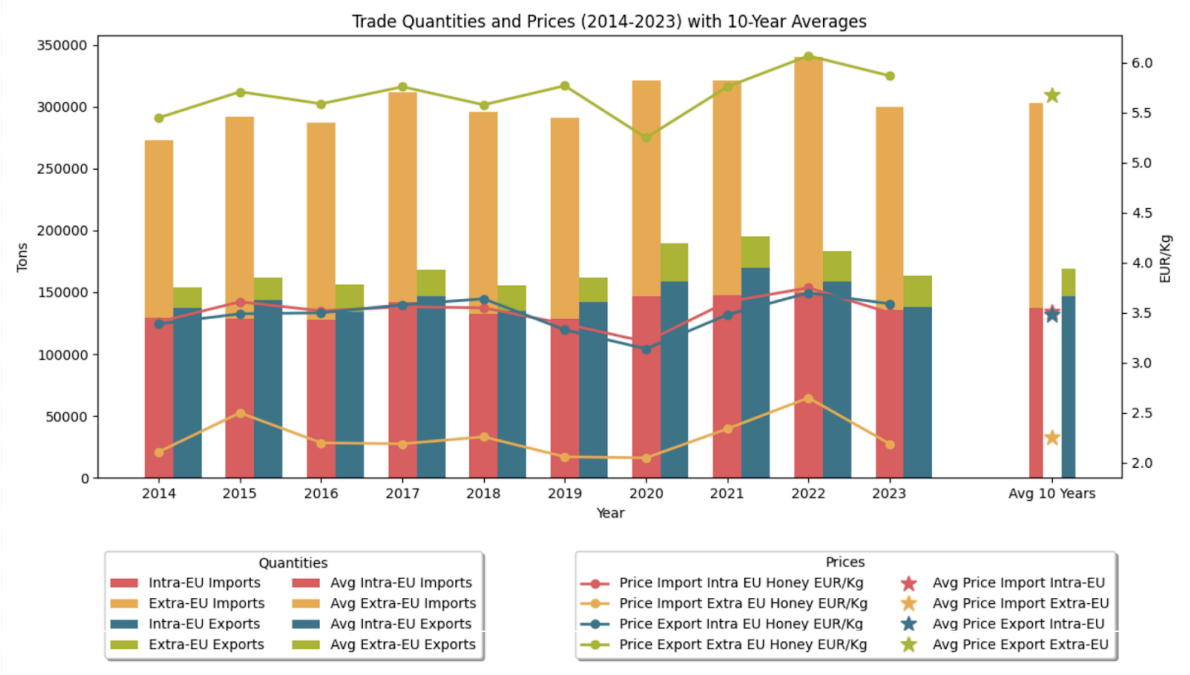


Figure 2. Total import and total export amounts in tons of honey in the EU. Line variables show the respective prices (€/Kg). Note. Avg 10 years stands for the average of the 10 years of data. The low import prices of non-EU honey are remarkable in comparison with those of the intra-community trade. A peak of imports can be observed in 2022 with higher prices, with a subsequent drop the following year. The authors estimate that an important part of the extra-EU honey imported is re-exported on the intra-EU market. However, data is missing on this regard. As a result, the sum of Extra and Intra-EU imports would overestimate the traded honey volumes.

as well as a significant number of beekeepers. However, beekeepers in Greece, Cyprus and Bulgaria keep more colonies on average (2022). Large countries such as France, Italy and Germany are among the EU's major producers but have proportionally fewer beekeepers whose main income comes from beekeeping, resulting in a lower average number of hives per beekeeper (<28 on average). The northern EU countries are characterised, above all, by high productivity per hive, which allows them to produce large quantities with a fairly limited number of hives (between 22 and 34 colonies/beekeeper).

1.2. Trade of honey in the EU

Quantities

MSs may import honey directly from third countries (non-EU or extra-EU). The honey can then be consumed domestically, but some MSs also operate as transit countries, for they import and re-export honey to other MSs (intra-EU). As a result, MSs can also indirectly import non-EU honey. Additionally, an intra-community trade of EU honey exists, *e.g.*, Germany buys honey produced in Spain or Romania. The European market is not self-sufficient, and almost 40% of the honey

consumed is imported each year (Percentage calculated based on production data provided by MSs and import data). In the past, imports just compensated for the lack of European production. In 2022, however, imports increased (+9.8% compared to previous years, *i.e.*, 190,444 t compared to 174,912 t in 2020 and 173,511 t in 2021, Figure 2). At the same time, 2022 was a good production year in the EU.

In 2023, despite an overall reduction in imports of 14%, some EU countries still imported large quantities of non-EU honey (Germany 41,000 t, Poland 23,300 t). It should be noted that Belgium, a very small producer (± 2,700 t), is the second largest importer of non-EU honey (31,400 t in 2023). We also note important imports of non-EU honey by Spain (15,700 t), France (7,700 t), Portugal (7,700 t) and the Netherlands (6,500 t) (Figures 3a and 3b). Interestingly, the entry of non-EU honey into the EU has shifted over the last 10 years. While the share of imports to Germany decreased, countries such as Poland and Portugal significantly increased their imports of non-EU honey, the latter not being a key import player in 2014 (0.54% of the EU imports in 2014). This shift has important implications, as seen in Table 1, when considering the import prices.

The main origins of non-EU honey in 2023 were China (60,200 t; 37% of total imports), Ukraine (45,800 t; 28%), Argentina (20,400 t, 13%), Mexico (10,700 t; 7%), and the following with less than 3% share each: Cuba (4,700 t), Vietnam (4,700 t), Brazil (300 t), Chile (2,500 t) and others (with a total of 11,600 t).

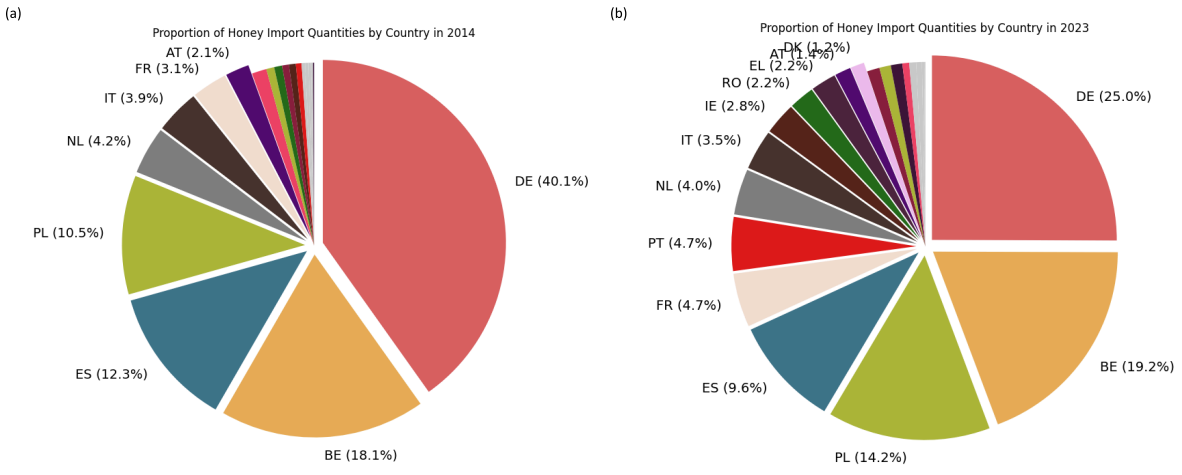
In terms of export volumes, the average annual export from 2014 to 2023 fluctuated around 25,000 t, with a noticeable surge in 2020. In 2023, the largest exporters in order of total exported quantity were Spain, Belgium, Germany, Romania, Hungary, Greece, France, Poland, Italy and Austria (together accounting for >87% of exports). These countries show robust export activity, indicating strong production capacities (*e.g.*, Spain, Hungary, France or Romania) and/or favourable trade conditions (*e.g.*, Germany). Still, compared to imports, exports to non-EU countries remain low.

Trade Prices

Looking at trade prices of the last ten years, there are three significantly different price levels: (1) directly imported non-EU honey with a ten-year average of 2.26 €/kg; (2) honey traded within the EU, fluctuating around 3.50€/kg, and (3) honey exported to third countries, reaching an average of 5.68 €/kg (Figure 2). A slight price drop was observed in 2023, and the quantities traded were reduced. The difference between the honey prices sold outside the EU and honey sold on the internal market is key to assessing the market situation.

Two countries out of the eight largest importers (importing 85% of the honey in 2023), Germany and France, stand out from the crowd with average import prices of more than 2.50 €/kg over the ten years (Table 1). We could assume that buyers from these countries are looking for good quality honey and/or specific types of honey (*e.g.*, thyme honey from Greece, calluna heather honey from France, orange blossom honey from Italy or Spain, *etc.*). Countries like Finland, Luxembourg or Malta have 10-year-average import prices of 3.99, 7.84 and 20.64 €/kg, respectively, but with low quantities, indicating possible imports of special honey (*i.e.*, manuka honey, *etc.*) and high consumer purchase power. These countries import significantly less honey from a country like China, and their import prices are generally higher, given the required quality.

The average EU export price of honey to non-EU countries in 2023 was 5.87 €/kg, with a 10-year average of 5.68 €/kg. Finland (10-year average of 11.20 €/kg and 1,783 kg) and Estonia (10.02 €/kg, 45,565 kg) lead the ranking of export prices over the ten years. The data suggests that premium pricing in these countries could be due to speciality products, limited supply, special efforts to "clean" the



Figures 3a and 3b. Distribution of non-EU honey imports by EU MSs in 2014 (3a) and 2023 (3b) (Source: Eurostat). Note: Both Figures show the countries contributing to 95% of the import quantities: total absolute quantity 143,235.42 Tons in 2014, and total absolute import quantity of 163,706.71 t in 2023.

market with honey authenticity tests or higher production costs than in other EU MSs. Still, these countries are not key players in the EU honey market. The trends indicate a fluctuating but stabilised trajectory in honey export prices among the largest EU exporters.

Intra-community market

On average, European honey sold to third countries represents only 13% of the total exports of the different MSs (the rest being intra-community exports). The ten-year average of honey traded on the internal market corresponds to 82% of the volume of imported non-EU honey (average of 166,232 t). Intra-EU exports should be equal to intra-EU imports, but unfortunately, we see in the data a difference close to 6.5 % in the long term (Figure 2). It should also be mentioned that a good part of non-EU honey imported in one MS is resold to other MSs. If we add up the exports of the main honey-producing countries that export mainly their domestic honey (RO, BG, EL, ES, IT, FR, HU, LT), the total is 72,609 t, representing half of the intra-EU trade. It is essential to know that Spanish consumers prefer light honey, most often coming from South America, and, as a result, Spanish beekeepers sell their darker honey in markets where consumers appreciate this type of honey (*e.g.*, Germany)[11]. The countries exporting non-EU honey to the domestic market (*i.e.*, serving as "transit" countries) are mainly Germany, Belgium, Poland and Portugal.

Table 1. Import prices of non-EU honey in 2023 and as the average of the last 10-years, and average cost of production, ordered by descending import prices in 2023.

Country	Import Price of non-EU honey in 2023 (€/Kg)*	Import Price of Non-EU honey average of 10 years (€/Kg)*	Average cost of production (€/Kg)**
DE	2.98	2.78	6.90
FR	2.72	2.51	5.27
IT	2.63	2.47	3.88
NL	2.06	2.28	8.00
ES	1.88	1.81	2.73
BE	1.84	2.11	10
PL	1.59	1.63	3.15
PT	1.21	1.43	5.15

Note. * Source: Eurostat International Trade, 2024. ** Source: National apiculture programmes for 2020-2022, 2022.

2. Fraud and trade activity

2.1. Adulteration of honey and other forms of fraud

The detection of adulteration and other forms of fraud in the honey market are key issues for fair trade competition and maintaining the economic viability of EU beekeepers and the positive image of honey among consumers. As shown in the last Commission's report, we face a severe situation (European Commission, 2023). Following Vousinas (2019), fraud is based on six elements: (1) the "stimulus" -

11 https://ruralcat.gencat.cat/documents/20181/336940/DLFE-24734.pdf/

incentive or pressure to commit fraud; in the honey case, the search for ever-increasing margins of different economic actors of the chain; (2) the "capacity" - the technical ability to - for example, have access to difficult-to-detect syrups required by the operator to commit fraud; (3) the "opportunity" - the opportunity to commit fraud such as lack of control or enforcement of regulations; (4) the "ego" - characteristic of human behaviour allowing one to maintain a certain leadership, control, market share or enrich oneself; (5) the "collusion" - agreement between people to commit fraud, which seem to be already happening in the case of the honey market (French case[12] and OLAF current investigation following the results published in the report "From the hives"); and (6) the "rationalisation" - the justification of the actions of fraudsters.

In the EU, Honey Directive 2001/110 defines the criteria that any honey must meet to be considered and sold as "honey". Here we summarise the cases that can be considered as not meeting the criteria of the Directive:

1) addition of sugar syrup or any other elements (enzymes, pollens, dyes, *etc.*) whether during nectar flow, post-harvest treatments or blending;
2) harvesting of unripened honey;
3) filtering using resins to retain certain undesirable elements such as antibiotics or, more simply, filters that significantly remove pollen without mentioning it (remark: filtered honey will be taken back as "honey intended for the industry" following a recent amendment of the Honey Directive[13]);
4) incorrect geographical and/or botanical origin;
5) significant degradation of enzymes naturally present in honey;
6) excess of HMF (hydroxymethylfurfural - product of degradation of fructose in an acidic environment).

Except for 1) and 3), non-compliance with the Honey Directive is not fraud *per se*. Still, it may also be the unintended consequence of sub-optimal or even careless honey handling.

As a practical example of honey adulteration, the four following elements have been identified by the European Commission as determinants to establish a case of fraud[14]:

[12] Case N 1705/2023 from 5 July 2023 at the Perpignan judicial court.

[13] European Union. 2024. Directive (EU) 2024/1438 of the European Parliament and of the Council of 14 May 2024 amending Council Directives 2001/110/EC relating to honey. 2001/112/EC relating to fruit juices and certain similar products intended for human consumption. 2001/113/EC relating to fruit jams. jellies and marmalades and sweetened chestnut purée intended for human consumption. and 2001/114/EC relating to certain partly or wholly dehydrated preserved milk for human consumption. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AL_20 2401438

[14] According to a presentation provided by DG SANTE. at the conference Beekeeping. an agricultural sector under threat. European Parliament 23rd May 2023.

1) violation of EU rules, *e.g.*, addition of any food ingredient to honey or the removal of pollen or constituents particular to honey without proper labelling, *etc.*;
2) have the intention to fraud, *e.g.*, food chemists mimicking honey with sugar syrups or ultra-filtration;
3) deception of customers, *e.g.*, customers buying a product that does not conform to specifications or customers buying sugar syrups at the price of honey due to wrong or misleading labelling or other respective information;
4) economic gain, *e.g.*, fraudsters crashing prices for direct economic gain or additional market shares. For example, this calculation could be as follows: the price of imported honey ≈ 2.32 €/kg in 2021, and the price of sugar syrups ≈ 0.40 to 0.60 €/kg. If the syrup is mixed with honey in a 1:9 ratio, we can calculate a gain of 172 and 192 €/t of adulterated "honey".

2.2. About the current situation

An investigation recently published by OLAF[15], DG SANTE[16] and JRC[17], shows that 46% of analysed imported honey samples were suspected of not complying with the provisions of the Honey Directive 2001/110, meaning suspected to be fraudulent (with a higher percentage of imported Chinese honey) (Ždiniaková et al. 2023; DG Santé. 2023). Twenty-five other cases have been noted in the JRC's "Food Fraud Monthly Report" since 2016 (77 Report issues published) on the EU and international market[18]. However, the reports on the EU coordinated action 'From the hives' indicate that in many MSs, the authorities are unable to identify honey adulteration due to a lack of modern analysis methods.

We hypothesise some consequences of the fraud impacts on the honey market and beekeeping sector:

- Professional beekeeping operations go out of business, leading to severe financial problems for families and making rural areas less attractive.
- Reports of adulterated honey lead to a loss of confidence among deceived consumers and a loss of honey's good image. This is followed by a change in purchasing behaviour that is difficult to reverse.
- Further consequential economic costs exist, especially for agriculture, such as lower pollination performance due to fewer beekeepers and beehives.
- Beekeeping operations producing "genuine" honey lose their market position in competition with adulterated

[15] EU European Anti-Fraud Office.

[16] Directorate-General for Health and Food Safety of the European Commission.

[17] EU Joint Research Centre.

[18] Source: https://knowledge4policy.ec.europa.eu/

cheaper honey. This incentivises these companies to reduce the quality of their honey and possibly commit fraud. The reduction in their margins resulting from the reduction in market prices is linked to the supply of low-cost honey until the cessation of activity.

Unfortunately, there is no comprehensive analysis of fraud's impact on the honey market for beekeepers, honey packers, and other market players.

2.3. Link between fraud and honey imports

As we have previously seen with the trade and production figures, several EU countries seek to import large amounts of honey at low import prices (*e.g.*, Belgium, Poland and Portugal).

In the last 10 years, a shift has also been observed in the importing countries (*e.g.*, from Germany to Poland or Portugal). This shift has increased honey imports from countries with very low export prices. This is increasing the price pressure on the internal market. These importers import honey even when large honey stocks are available on the EU market, which contributes to pulling down EU commercial producers' prices.

This situation does not just happen in the EU. The same trends can be observed in the USA, another net importer of honey mainly from India. Twenty years ago, India did not export any honey. Today, it sells large and growing quantities at ever-lower prices (Phipps 2023). There is an apparent inconsistency between the volumes of honey exported by India to the USA and the anomalies, disasters and serious adverse weather conditions in Asia in 2023 and recent seasons. There is suspicion that the product imported may not be honey. The price collapse and competition with adulterated honey threaten the survival of beekeepers globally.

3. Consumer Purchase Power

Consumers are increasingly interested in the origins of their food, which bolsters the appeal of honey, as bees directly produce it from nectar or honeydew (Schindler, 2022). Furthermore, honey is a natural product often found in medicine cabinets, such as a traditional cold remedy. During the COVID-19

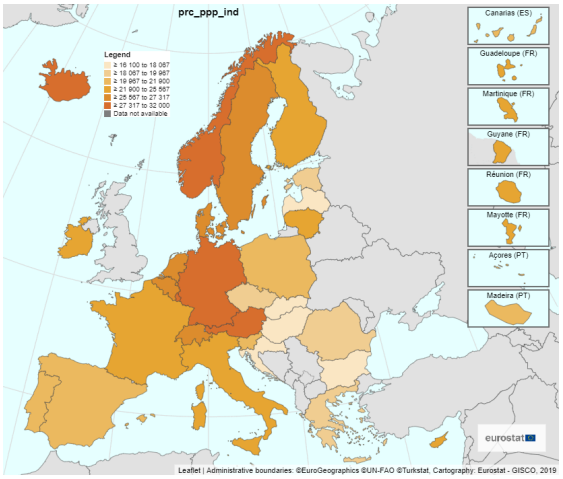


Figure 4. Purchasing Power Parities (PPPs), price level indices and real expenditures for European Standard of Accounts (ESA) 2010 aggregates. Source: Eurostat, 2024: https://ec.europa.eu/eurostat/databrowser/view/PRC_PPP_IND__custom_10616248/default/table?lang=en&page=time:2022

pandemic, there was a notable increase in honey consumption. As people sought ways to strengthen their immune systems and alleviate symptoms associated with respiratory illnesses, honey became a popular choice. As a result, products and honey sales (or even hive products in general) were positively impacted. For example, in Italy, honey sales increased by 11% (Ismea. Sept. 2023). This trend was only short-lived.

Furthermore, honey competes with various other spreads, such as jam, nougat cream, and other cream-based products available in supermarkets. Its leading competitive edge lies in its natural composition and the absence of added ingredients or preservatives, which makes it a preferred choice for health-conscious consumers or consumers with a more profound culinary awareness. However, specific market data comparing honey directly with these products is not publicly accessible.

Many European consumers who pay closer attention to the food they eat look for local honey first. However, in bad production years[19] beekeepers may be unable to supply packers or retailers with their usual honey volumes. As a result, buyers look for other honey sources and get a taste of buying cheap imported honey. Thereby, some consumers are getting used to low honey prices that do not reflect the real costs of production. When production increases again the following year, beekeepers often find it difficult to sell their honey to the buyer as before. Furthermore, retailers are pushing hard for low prices, which may suit consumers but is devastatingly affecting EU beekeepers, who face increasing production costs.

A downward price pressure ("price war") affects the quality of imported honey. In addition, high inflation in 2022 and 2023 may have led consumers to switch to cheaper, lower-quality honey and other products. The EU's average Consumer Price Index (CPI) has varied significantly over the past ten years, remaining relatively stable until 2019 (average inflation rate of around 1.63%). After its reduction to 0.48% in 2020 due to the COVID-19 pandemic, CPI has increased by 2.55% (2021), 8.33% (2022) and 6.30% (2023) due to post-pandemic recovery dynamics and geopolitical tensions. However, some countries like Hungary, Estonia, and Lithuania have experienced the highest inflation rates with 17%, 12%, and 11% respectively, while other countries maintained inflation rates around 2-3% (Eurostat 2024). Consequently, the Purchase Power of consumers has been reduced after the pandemic (Figure 4).

[19] bad years of production in beekeeping are linked to various factors: climatic (multiplication of extreme climatic events such as drought. frosts. heatwaves. *etc*.). health (varroosis. Asian hornet) and environmental (degradation of environmental quality. scarcity of resources. *etc*.)

Since local products only sometimes regain their market position in good production years, new commercial approaches are necessary, often involving aligning (low) prices with the competitors. While, in general, the prices of food in supermarkets have increased in recent years (e.g. in November 2024, the Consumer Price Index for food in Germany was 134.5 compared to the base of 100 in 2020 (Statistisches Bundesamt, 2024)), increase in the shelf prices of honey has also been reported from some countries (*e.g.* Austria). However, a higher price increase was observed, especially for cheap products, often supermarket brands, compared to the price increase of other products, a phenomenon called C*heapflation* (Cavallo & Kryvtsov, 2024). This could explain the reports from some packers and beekeeping cooperatives that they have not received higher prices when selling honey to retailers (personal communication). Also, retailers had to cover higher costs, and some might have taken the opportunity to increase their margins. The upshot: despite rising supermarket prices, beekeepers were not making more money by using this marketing option. In the context of inflation and loss of consumer purchasing power, beekeepers have to match the honey price of retailers to ensure their sales.

4. Microeconomic analysis of the situation - Costs of production

From the four costs of production considered: fuel, labour, feed, and veterinary medicinal products (VMPs), all but labour increased from

Table 2. Estimation of consumption and stocks of honey between 2014 and 2023 in europe, considering the hypothesis of a honey stock of 60,000 t in 2014

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Import of Extra EU honey (t)*		143,235	163,237	159,506	169,118	162,701	162,272	174,588	173,514	190,445	163,707
Export of EU Extra EU honey (t)*		16,577	17,583	21,866	21,182	20,238	19,604	30,788	25,426	25,032	24,852
Production honey (t)**		206,197	264,113	229,055	245,993	265,608	237,719	236,848	227,732	276,850	240,066
Honey in the market (t)*		329,881	396,401	362,400	388,929	395,571	374,887	380,648	378,371	442,263	374,461
Consumption (t)		371,280	374,335	375,180	378,250	379,100	379,100	420,801	387,137	364,725	347,264
Stock (t)	60,000	18,601	40,667	27,887	38,566	55,037	50,824	10,671	1,905	79,443	106,641
Honey consumption per capita (Kg/hab)****		0.73	0.86	0.79	0.86	0.80	0.77	0.67	0.60	0.75	0.94

*Source: Eurostat; ** FAOSTAT;*** Calculation; Consumption calculation = Population / Consumption per habitant; Stock = Calculation of Quantity of honey in the market - consumption ; **** Consumption = (Production+Imports-Exports)/Population, using FAOSTAT data.

2021 to 2023 (Agricultural Labour Costs seem to have decreased by 2 and 3%, in 2022 and 2023, with respect to 2021, respectively, Figure 5, (Eurostat, 2024)). Feed shows the largest increase (62% in 2023 with respect to 2021), followed by VMPs (42%). It should be mentioned that VMPs have a small impact on the overall accounting of beekeeping operations. These figures are to be taken cautiously, for they are based on surveys. However, fuel is based on official Commission data and shows increases of 28% and 20% in 2022 and 2023, respectively, regarding 2021. Tables 1 and S1 show the average cost of production for honey per country in 2023. The prices paid per kg are far from compensating for the increases in production costs experienced since 2021.

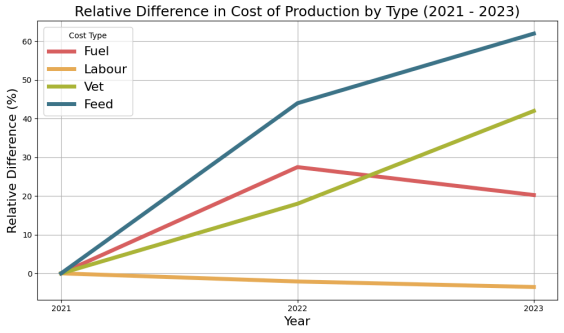


Figure 5. Evolution of production costs affects beekeeping operations, including fuel, labour, feed, and VMPs. Source: Fuel: European Commission, Energy; Agricultural Labour: Eurostat; Feed and VMPs: Copa-Cogeca.

5. Summary of the situation

The total quantity of honey entering the EU market each year can be assessed as the sum of production plus the extra-community imports minus the exports to third countries. Table 2 summarises what has been discussed so far, showing the increase in honey available on the EU market in 2022 with a peak of 70,000 t (from 402,000 t in 2021 to 472,000 t in 2022). A similar peak had already been observed in 2015 (see above). Today, the quantity of honey produced and imported from non-EU countries exceeds demand despite a notable import reduction in 2023.

Discussion

The current situation shows how beekeepers who sell their honey in bulk can either not sell at all, or only at unsustainable prices. Large producer countries such as Spain have been experiencing this situation for some time, and the trend is now affecting other producer MSs. The reasons have already been described:

- Too much honey is imported, including adulterated honey and “honey” that does not meet the definition of honey as a natural product according to the EU Honey Directive.
- The import prices are too low for EU beekeepers to compete. Some of the prices are most probably dumping prices.
- There are too many stocks of cheap imported honey.
- The demand for honey decreased.

- Honey production costs in the EU have risen significantly in a short period of time.

As a result, the EU is experiencing a loss of beekeeping operations or reduced income, especially for professional beekeeping operations, many of whom work at a loss and whose honey stocks have not been bought by honey packers. The loss of economic viability, mixed with the uncertainty in annual production and the potential negative impact of environmental stressors (*e.g.*, climate change, extreme weather events, loss of nectar and pollen sources, pollution, *etc.*), pushes many beekeepers to reduce their operations, diversify or stop their activities. This not only has a catastrophic effect on local honey production, but also on agricultural production and the ecosystem due to the loss of pollination services.

Several bilateral trade agreements currently under discussion (*e.g.* the trade agreement with India) or already in force (e.g. the Autonomous Trade Measures for Ukraine) may contribute to maintaining the critical situation of European beekeepers. Other trade agreements currently under discussion (e.g. with Mercosur) may worsen the situation. For example, the Mercosur agreement provides a tariff-free quota of 45,000 t of honey after a gradual tariff reduction over five years. As the EU has only imported around 30,000 t from Mercosur in recent years, the agreement could lead to an increase of 15,000 t of imported honey. Although imports from South America tend to be more expensive than those from Asia or Eastern Europe, they are still a cheap alternative to EU honey. The US even imposes anti-dumping duties on some honey exporters in Argentina and Brazil (as well as exporters in China, India and Vietnam) (Federal Register, Daily Journal of the United States Government, 2022).

We must also realise that the abolition of customs duties will not improve the situation of beekeepers in the Mercosur states, some of whom are already being offered far too low prices for their honey by exporters. They will not sell their honey at a higher price once the tariffs are abolished. Instead, European beekeepers will have to compete with honey at even lower prices. European beekeepers will, therefore, be further penalised.

Moreover, European beekeepers can no longer face unfair competition from countries such as China and others that do not respect honey as a natural product. This situation is exacerbated by certain importers and packers, *e.g.* from the UK, who import large quantities of cheap honey from China. However, it is widely known that this is not natural honey (*Honey Authenticity Project*, 2024). The exporters and importers of this fake honey continue to fight at the EU and global level against improvements in honey quality criteria and fraud detection methods at the expense of EU beekeepers.

It must be acknowledged that the data available to carry out the analyses for this report were limited, and some of the data available are of questionable quality. For

example, the methodology for calculating the cost of production described by MSs in National Beekeeping Programs needs to be clarified. We also found no framework of investigation for the elements necessary to carry out an in-depth market analysis of this sector (*e.g.*, at the EU level: consumption data (European Parliament, 2019), a standard procedure for assessing production costs, production data available in a shorter delay, *etc.*). There were also other limitations, such as the lack of differentiation between the levels of activity of beekeepers.

For professional beekeepers to survive in the EU, they need an income that allows them to live confidently. Higher honey prices, which consider the quality of the product, the good externalities and the work invested, are one way of doing this. However, most beekeepers agree that honey should not become a luxury product. Honey should continue to be affordable for people with limited means. This raises the question of alternatives to higher honey prices. One possibility is to financially recognise the social benefits of domestic beekeeping. Pollination is one of the most important of these. The value of pollination by honey and wild bees in the EU was estimated at €14,6 billion about 15 years ago (Leonhardt et al., 2013). The Conference on the Future of the European Agricultural Sector, held in Brussels on 28 November 2024, concluded that beekeepers should receive adequate compensation for this service. Honeybees also play an important role as prey in natural food webs, the carbon cycle, environmental education, cultural heritage and aesthetic values.

Last but not least, promoting and protecting local honey production would align with the EU Commission's Green Deal. Avoiding long transport routes reduces CO_2 emissions and potential environmental hazards. Beekeeping also supports agricultural production. For example, in some areas, the number of colonies is far from sufficient to cover the recommended colony number for crop pollination. Even with the presence of wild pollinators, agricultural production, therefore falls short of its potential and cannot be further increased by using fertilisers and pesticides (Reilly et al., 2020). Protecting domestic beekeeping, therefore, also means protecting nature and the climate.

Conclusions and Recommendations

Considering the situation, we propose several recommendations to improve the beekeepers' situation, for their operations will become unprofitable without a change in the situation. These recommendations are targeted to decision-makers and actors in the honey supply chain.

- The sector is experiencing a critical situation that requires emergency measures to help beekeepers cope with their dramatic economic situation. Beekeepers should be entitled to access funds from the crisis envelopes available

under the CAP for each MS in these situations to cover sudden fluctuations in the market's functioning and help them with their liquidity.

- An open market can only be sustainable if the product's intrinsic quality can be guaranteed. Otherwise, if price is the only basis for purchasing decisions, then products of questionable quality will easily find their way onto the market, and the EU beekeeping sector will be severely affected. Therefore, effective measures to disincentive fraudsters must be implemented.

- The fight against adulterated honey must be reinforced by increasing control. However, in order to detect honey fraud, modern analytical methods need to be harmonised and standardised at the EU level and become official methods so that authorities can use them efficiently. A common EU database for authentic honey is needed to support this process. Furthermore, existing methods need to be continuously developed and new promising methods should be tested in order to be included in the official toolbox to push back honey fraud.

- EU and international traceability must be established as soon as possible as an important tool against fraud.

- The creation and use of a Honey Fraud Mitigation Guidance[20] by all the actors in the honey sector (manufacturers, retailers, food services, traders, *etc.*) should be encouraged. The actors should be pushed to develop a honey fraud control plan that includes audits, supply chains, fraud histories, geopolitical considerations, economic anomalies, *etc.* These elements help define the frequency and type of controls that need to be carried out.

- Measures/Programs that ensure sustainable prices for EU honey within the honey supply chain should be promoted, *e.g.* a "good practices guideline"[21].

- Consumer confidence must be regained to support the marketing of honey from the EU.

- Beekeepers should be encouraged to form cooperatives that market European honey.

- The EU apicultural program must be increased (mainly at the national/regional level) and adjusted, including a performance review and reducing bureaucratic burdens. Many MSs are not in a position to fully utilise the money agreed at the EU level. Meanwhile, some authorities even refrain from utilising the

[20] Such a Guidance would be a white paper created and agreed by all actors of the supply chain with good practices to which all these actors would adhere and which implementation would be shown transparently.

[21] https://www.mousquetaires.com/communique/la-gamme-citoyenne-dintermarche-les-eleveurs-vous-disent-merci-sinstalle-au-rayon-miel/

funds completely due to the high bureaucratic effort involved.

- Import prices must reflect the actual production costs. There is evidence that this is often not the case. This is also partly linked to honey adulteration, making low prices possible. Anti-dumping duties could be imposed because the production methods and the honey export prices from some countries, notably China, show unfair competition. It is doubtful whether these countries' imported goods are honey. However, the structure of the European honey sector makes it very difficult to carry out an anti-dumping process. It should also be pointed out that, in light of the US experience, this approach should be adopted with caution, given the existence of triangular trade and the possibility of honey being transferred via other exporting countries.

- There is a need to align food, agriculture, and trade policies and study the possibility of putting in place mirror measures or clauses, *i.e.*, not importing products produced in ways that are (suspected to be) incompatible with European standards.

- The import of honey from companies or whole countries has to be banned if they do not respect the definition of honey as given in the EU Honey Directive or the Codex Alimentarius. Also, traders in non-EU countries who purchase potentially adulterated honey to export it to the EU should be excluded from the list of authorised exporters. If the product cannot be banned, it must be traded under, for example, the HS Code 1702. This is the moment to impose this nomenclature on non-EU economic partners who do not respect the integrity of a "natural sweet substance produced by honeybees", the so-called honey.

- Create transparent mechanisms to regulate the market at the EU level, including market indexes that allow investors to follow the market and help supply chain actors adapt.

- The EU Member States must generate and make available to the honey supply chain actors the statistical data related to honey consumption, analysis and trade within a short timeframe.

References

Agriculture and Rural Development ISAMM-CM. (n.d.). *National apiculture programmes for 2020-22, Annex 3*. Retrieved 15 September 2024, from https://agriculture.ec.europa.eu/farming/animal-products/honey/national-apiculture-programmes_en

Cavallo, A., & Kryvtsov, O. (2024). *Price Discounts and Cheapflation During the Post-Pandemic Inflation Surge* (Working Paper 32626). National Bureau of Economic Research. https://doi.org/10.3386/w32626

European Commission, H. and F. S. D.-G. (2023). *From the hives. Sampling, investigations and results.* (p. 22). Publications Office of the European Union.

European Parliament. (2019). Resolution of 1 March 2018 on prospects and challenges for the EU apiculture sector (2017/2115(INI)). *IO C 129*, 25–37.

Eurostat. (n.d.). *International trade—Easy Comext. - Cproduct code: 0616. Name of the database used for commercial exchanges: DS-059331—EU trade since 1999 by CTCI*. Retrieved 14 November 2024, from https://ec.europa.eu/eurostat/comext/newxtweb/setupdimselection.do

Eurostat. (2024). *Agricultural labour input statistics: Absolute figures (1 000 annual work units)*. https://ec.europa.eu/eurostat/databrowser/product/page/aact_ali01

FAOSTAT. (n.d.). Retrieved 28 August 2024, from https://www.fao.org/faostat/en/#data/QCL

FAOSTAT. (2024). *Production quantities and Value of Natural Honey from 2002 to 2022.* [CSV].

Federal Register, Daily Journal of the United States Government. (2022, June 10). *Raw Honey From Argentina, Brazil, India, and the Socialist Republic of Vietnam: Antidumping Duty Orders*. Federal Register. https://www.federalregister.gov/documents/2022/06/10/2022-12498/raw-honey-from-argentina-brazil-india-and-the-socialist-republic-of-vietnam-antidumping-duty-orders

Gray, A., Adjlane, N., Arab, A., Ballis, A., Brusbardis, V., Charrière, J.-D., Chlebo, R., Coffey, M. F., Cornelissen, B., Amaro da Costa, C., Dahle, B., Danihlík, J., Dražić, M. M., Evans, G., Fedoriak, M., Forsythe, I., Gajda, A., de Graaf, D. C., Gregorc, A., … Brodschneider, R. (2020). Honey bee colony winter loss rates for 35 countries participating in the COLOSS survey for winter 2018–2019, and the effects of a new queen on the risk of colony winter loss. *Journal of Apicultural Research*, *59*(5), 744–751. https://doi.org/10.1080/00218839.2020.1797272

Gray, A., Brodschneider, R., Adjlane, N., Ballis, A., Brusbardis, V., Charrière, J.-D., Chlebo, R., F. Coffey, M., Cornelissen, B., & Amaro da Costa, C. (2019). Loss rates of honey bee colonies during winter 2017/18 in 36 countries participating in the COLOSS survey, including effects of forage sources. *Journal of Apicultural Research*, 1–7.

Honey Authenticity Project. (2024). Honey Authenticity Project. http://honeyap.org/

IPBES. (2019). *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Zenodo. https://doi.org/10.5281/zenodo.6417333

Leonhardt, S. D., Gallai, N., Garibaldi, L. A., Kuhlmann, M., & Klein, A.-M. (2013). Economic gain, stability of pollination and bee diversity decrease from southern to northern Europe. *Basic and Applied Ecology*, *14*(6), 461–471. https://doi.org/10.1016/j.baae.2013.06.003

Mutinelli, F., Montarsi, F., Federico, G., Granato, A., Ponti, A. M., Grandinetti, G., Ferrè, N., Franco, S., Duquesne, V., Rivière, M.-P., & others. (2014). Detection of Aethina tumida Murray (Coleoptera: Nitidulidae.) in Italy: outbreaks and early reaction measures. *Journal of Apicultural Research*, *53*(5), 569–575.

Reilly, J. R., Artz, D. R., Biddinger, D., Bobiwash, K., Boyle, N. K., Brittain, C., Brokaw, J., Campbell, J. W., Daniels, J., Elle, E., Ellis, J. D., Fleischer, S. J., Gibbs, J., Gillespie, R. L., Gundersen, K. B., Gut, L., Hoffman, G., Joshi, N., Lundin, O., … Winfree, R. (2020). Crop production in the USA is frequently limited by a lack of pollinators. *Proceedings of the Royal Society B: Biological Sciences*, *287*(1931), 20200922. https://doi.org/10.1098/rspb.2020.0922

Requier, F., Fournier, A., Pointeau, S., Rome, Q., & Courchamp, F. (2022). Economic costs of the invasive asian hornet on honey bees. *Available at SSRN 4280914*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4280914

Requier, F., Fournier, A., Pointeau, S., Rome, Q., & Courchamp, F. (2023). Economic costs of the invasive Yellow-legged hornet on honey bees. *Science of the Total Environment*, *898*, 165576.

Schindler, J. (2022, February 9). *Survey Says: Honey Consumption on the Rise*. National Honey Board. https://honey.com/newsroom/press-release/survey-says-honey-consumption-on-the-rise

Statistisches Bundesamt. (2024). *Verbraucherpreisindex und Inflationsrate*. Statistisches Bundesamt. https://www.destatis.de/DE/Themen/Wirtschaft/Preise/Verbraucherpreisindex/_inhalt.html

Ždiniaková, T., Loerchner, C., De, R. O., Dimitrova, T., Kaklamanos, G., Breidbach, A., Respaldiza, H. M. A., Vaz, S. I. M., Paiano, V., Ulberth, F., & Maquet, A. (2023, March 23). *EU Coordinated action to deter certain fraudulent practices in the honey sector*. JRC Publications Repository. https://doi.org/10.2760/184511

Annexe 1. Demographics of the EU beekeeping sector and other relevant data per country.

Table S1. Demographics of the EU beekeeping sector up to the end of 2023.

Country	No. Beekeepers	No. Hives (in thousands)	No. Hives/ Beekeeper	Production (1000 t)[(a)]	Honey consumption (t)[(b)]	Imports of honey from Extra-EU in 2023 (t)[(c)]	Cost of production (€/kg)[(d)]
AT	34,430.00	494.00	14.35	4.50	9,466.43	2,288.94	4.05
BE	9,593.00	70.00	7.30	2.70	12,727.37	31,395.49	10.00
BG	10,224.00	817.00	79.91	11.90	4,135.69	1,690.69	1.31
CY	698.00	56.00	80.23	0.30	1,048.80	191.28	3.62
CZ	65,042.00	669.00	10.29	6.10	9,081.44	1,838.43	1.95
DE	149,105.00	1,000.00	6.71	34.10	8,0294.8	40,998.38	6.90
DK	7,000.00	110.00	15.71	2.40	4,237.06	1,909.80	2.14

EE	2,826.00	52.00	18.40	1.63	1,698.16	0.03	2.60
EL	36,494.00	2,317.00	63.49	21.50	24,418.02	3,586.82	5.40
ES	36,494.00	2,804.00	76.83	27.40	30,971.84	15,665.43	2.73
FI	62,744.00	82.00	1.31	3.30	5,223.02	0.04	8.65
FR	62,744.00	1,792.00	28.56	31.40	58,220.77	7,697.05	5.27
HR	9,262.00	450.00	48.59	8.30	10,342.82	1,026.27	2.97
HU	20,945.00	1,171.00	55.91	25.00	12,122.04	1,697.00	3.34
IE	4,329.00	27.00	6.24	0.30	8,277.75	4,606.92	7.00
IT	81,693.00	1,592.00	19.49	24.50	43,130.89	5,797.13	3.88
LT	9,074.00	170.00	18.73	5.66	5,412.01	863.94	1.30
LU	451.00	7.00	15.52	0.18	414.34	0.14	7.20
LV	3,075.00	103.00	33.50	2.30	2,180.55	40.75	2.43
MT	263.00	6.00	22.81	0.00	213.56	3.10	7.25

NL	8,772.00	100.00	11.40	0.70	12,250.28	6,501.24	8.00
PL	91,005.00	2,350.00	25.82	24.00	37,021.71	23,315.20	3.15
PT	11,479.00	678.00	59.06	11.47	13,042.35	7,686.88	5.15
RO	32,277.00	2,396.00	74.23	29.76	24,174.03	3,557.18	2.58
SE	missing	179.00	missing	3.40	7,801.52	345.09	missing
SI	11,359.00	208.00	18.31	2.41	3,352.16	61.51	7.63
SK	22,907.00	342.00	14.93	3.50	3,458.81	942.02	3.50
EU	**784,285.00**	**20,045.00**	**25.56**	**289.06**	**424,718.22**	**163,706.71**	**3.98**

Note. Data about the numbers of hives and beekeepers were provided by the European Commission at CDG Honey on 08/10/2024. [(a)]Data Source: FAOSTAT; [(b)]Calculation of consumption based on Production+Imports-Exports (Source: FAOSTAT). The authors are well aware of the limitation of this approach; [(c)]Source: Eurostat Comext; [(d)]Source: Beekeeping programmes included in the National Strategic Plans of the CAP (Agriculture and Rural Development ISAMM-CM, n.d.).