



Statement on the press release of the European Professional Beekeepers Association and the German Professional and Commercial Beekeepers Association

Dear Sir or Madam

FoodQS GmbH is an internationally active, accredited service laboratory with more than 25 years of experience in the field of honey analysis. Testing honey samples for the unauthorized addition of foreign sugars using the latest technologies is part of our daily routine, with over 10,000 samples per year from all over the world. Our high level of investment in research and development, participation in national and international committees and attendance at specialist conferences ensure that we are always up to date with the latest developments in the field of adulteration analysis.

We recently learned of the presentation published by the European Beekeeping Association on September 28, 2024 entitled: '80% OF FAKE HONEY IN GERMANY - European Professional Beekeepers Association - EPBA action "Clean up the honey market" ¹, which has since been reproduced many times via various channels (social media, national and international press releases, private and public media, websites, etc.).

In the following, we would like to make a statement on this in order to provide our perspective on the claims made in the video. As the topic is extremely complex, we will first summarize the main conclusions of the statement in brief bullet points. The appendix features the in-depth version, going into aspects in detail, which are backed up with the respective sources.

- **30 honeys from German supermarkets are not representative of the entire German honey market. Therefore, sensational statements such as "80% OF FAKE HONEY IN GERMANY" are false!**
- **The honey database used by the Estonian laboratory does not provide a comprehensive and reliable overview of honeys in international trade and blends of these.**
- **The DNA method used lacks decisive information regarding method validation, accreditation, evaluation and the underlying database.**
- **No information is available on whether and how well the method is suitable for detecting adulteration, as is usual for other established methods (e.g. spiking tests with syrup).**
- **It is questionable to what extent the criteria DNA profile, DNA quantity or DNA quality allow clear conclusions to be drawn about adulteration. There is a lack of solid scientific evidence.**
- **Statements that adulteration can be detected solely on the basis of the taste of the honey sample are false and we consider them to be dubious.**

In summary, we rate the presentation as extremely critical and harmful to consumers and all companies/institutions concerned. Finally, we would also like to emphasize that the unscientific approach shown here discredits the long, intensive and elaborate work of accredited service laboratories for honey analysis.

The FoodQS team



Detailed statement:

- The sampling shown in the video (30 honeys from German supermarkets) is not representative of the entire German honey market, regardless of the analytics used afterwards. Therefore, sensational statements derived from the results such as “80% OF FAKE HONEY IN GERMANY” are false, dubious and unscientific.
- The DNA-based method used by the laboratory in Estonia (Honey Metagenomic DNA Analysis) lacks crucial information regarding method validation, accreditation, evaluation and the underlying database, especially with regard to the detection of adulteration. Without this information, the results of the laboratory are not comprehensible.
- A LinkedIn post published by the laboratory manager and managing director of the laboratory from Estonia on October 8, 2024 (LinkedIn page: Clean Up The Honey Market) shows that the laboratory's publication (Paluoja et al. 2024)², which was recently published as a preprint (evaluation and quality check of the scientific work by independent experts has not yet taken place), serves as the basis for the DNA test offered. Unfortunately, the adulteration analysis is not discussed in the preprint for reasons of confidentiality (“The manuscript describes the honey DNA composition aspect of MDA analysis, leaving authenticity analysis out of scope due to confidential reasons.”).
- The post also explains that honeys differ mainly in their botanical composition and that there are only minor differences in other organisms (bacteria, fungi, animals, viruses), even across countries. How this information is incorporated into the evaluation and whether it should help with DNA adulteration analysis is not clear from the post and is not supported by data.
- Assuming that the honey database provided in the manuscript (or a slightly extended version) was the basis of the test, there are strong doubts about the validity of the method with regard to detection of honey adulteration (even if the manuscript does not directly address the evaluation in this regard).
- The database listed in the manuscript contains 266 honey samples from Estonia, as well as 103 honey samples of other geographical origin. Samples from important main exporting countries for honey are strongly underrepresented.
- The published database does not provide a comprehensive and reliable overview of honeys in international trade. A comparison of this database with 30 honey samples from German supermarkets is therefore all the more critical. It would not be surprising that 80 % of the samples show deviations. However, these are due to the unsuitable composition of the database and not to foreign sugar.
- This suspicion is confirmed by an interview³ with the laboratory manager published in September 2024, in which he states: “As an independent laboratory, we must now wisely harness this potential- there is a need to create a reliable database covering all of Europe and major honey-exporting countries, while increasing the share of high-level laboratory services in Estonia.”
- Furthermore, the company's website states (as of October 8, 2024) that the test is currently only available for Estonia and that work is underway on other regions. From this we conclude that the method has so far largely worked or been tested with honey samples from Estonia (“The test is



currently available in Estonia. We are also actively working to make the test available in other regions.")⁷.

- The laboratory's homepage (as of 08.10.2024) only states that the analysis of honey adulteration is carried out in two steps, namely by 1. looking at the amount and quality of DNA ("The amount and quality of honey DNA is evaluated. Authentic and unprocessed honey contains high concentrations of undegraded DNA.") and 2. the examination of the DNA profile with regard to existing species (species composition as well as quantity ratio of the different species) with subsequent comparison against an internal database. From our own experiments and a comprehensive literature search ^{e.g. 4,5,6} we know that a well reproducible extraction of DNA from honey is not trivial. The amount of DNA extracted depends on the extraction method and the type of honey. In addition, there are matrix-related interference factors (e.g. various PCR inhibitors such as polyphenols) that can make analysis more difficult.
- This would also be a possible explanation for the honey samples mentioned in the video, in which only bacterial and animal DNA could be detected. If DNA extraction works, such honeys would either have to consist of 100% syrup or be filtered so that no more pollen is contained. We strongly doubt that such honeys can be found in a German supermarket and assume that in these cases the pollen DNA has been insufficiently extracted. As already mentioned, we have observed this phenomenon ourselves several times in our own preliminary tests.
- We believe that detecting adulteration based on the DNA composition of a honey is very ambitious for honeys and blends of honeys that are sold globally. We consider setting up the relevant databases to be a mammoth task that can hardly be accomplished. Furthermore, given the aforementioned complexity, it is questionable to what extent the quantity or quality of DNA allows clear conclusions to be drawn about adulteration. There is currently a lack of solid scientific evidence for this. The same applies to the presence or absence of DNA from other organisms.
- The video mentions that the 30 honey samples tested were analyzed in an accredited service laboratory using several methods to detect adulteration (IRMS, NMR, oligosaccharide screening), but no adulteration could be detected. We would like to clarify that FoodQS GmbH did not test the samples in question. It is extremely unlikely that 25 mixed honey samples would be detected as adulterated using only one single method (there is usually at least some overlap).
- Statements that adulteration can be detected solely on the basis of the taste of the honey sample are false and we consider them dubious. Sensory defects can only provide indications of foreign sugar, which must be confirmed using other methods. Being able to distinguish such sensory defects from the natural global variance in the flavor profiles of honeys requires years of experience and access to honey varieties available worldwide.



Sources:

1. <https://ebaeurope.eu/80-of-fake-honey-in-germany-european-professional-beekeepers-association-epba-action-clean-up-the-honey-market/>
2. <https://www.biorxiv.org/content/10.1101/2024.07.31.605955v1.abstract>
3. <https://tradewithestonia.com/the-worlds-first-dna-tested-honey-shipment-is-heading-from-estonia-to-japan/>
4. <https://www.sciencedirect.com/science/article/pii/S0956713524004894>
5. <https://www.sciencedirect.com/science/article/abs/pii/S0956713518303748>
6. <https://www.sciencedirect.com/science/article/abs/pii/S0308814616310998>
7. <https://mda-test.com/en/results/>