

Questions and answers on food fraud and authenticity testing

FAQ to the BfR of 22 February 2016

The analytical examination of the authenticity of foods and feeds is a fundamental aspect of consumer health protection. For this reason, the Federal Institute for Risk Assessment (BfR) is involved in the development, validation and assessment of analytical strategies and methods for testing authenticity – the determination of the composition and origin of foods and feeds.

In the following paragraphs, the BfR has compiled questions and answers on the topic of food fraud and authentication. You will find more detailed information on the subject at the BfR website http://www.bfr.bund.de/de/produktidentitaet_und_rueckverfolgbarkeit-62072.html.

What is food fraud?

European legislation does not currently contain any uniform legal definition of the term “food fraud”. Generally speaking, food fraud is understood to be the deliberate marketing of foods with the intention of making a financial gain by deceiving consumers. This is achieved on the one hand by means of unauthorised adulterants which alter the composition of the food, and on the other by consciously false declarations, i.e. the deliberate use of erroneous or omission of correct information on the label.

What are the most common types of food fraud?

There are fundamentally different forms of food fraud which often go hand-in-hand with one another:

1. Addition of a food-external – exogenous – substance to feign better quality or bulk up the food
2. Addition of a food-internal – endogenous – substance to bulk it up or feign better quality
3. Blending of foods of various geographical and/or botanical/zoological origins without the appropriate labelling
4. Use of unlabelled or banned manufacturing processes
5. False declaration. False details or claims are regularly made on the label as a result of food fraud.

An initial estimation of the most common types of food fraud can be taken from the first activity report of the European Commission’s newly founded Food Fraud Network. 60 cases were evaluated in 2014 and the following types of food fraud identified in the European Union (as percentages of reported cases):

- False labelling, e.g. with regard to the best-before date: 25 %
- Falsed certification, e.g. feigning of a higher quality: 22 %
- Substitute ingredients, e.g. use of horse meat instead of beef: 17 %
- Banned ingredients: 10 %
- Banned processing methods and/or processes: 8 %
- Illegal products unfit for human consumption: 7 %
- Adulterated products/brands: 5 %
- Other: 5 %

(Source: http://ec.europa.eu/food/safety/docs/official-controls_food-fraud_network-activity-report_2014.pdf)

Which food groups are particularly affected by fraud?

No systematic evaluations of the extent of food fraud have been made to date, but indications of the most frequently affected foods globally are to be found in the U.S. Pharmacopeial Convention's food fraud database (<http://www.usp.org/food-ingredients/food-fraud-database>). This approach focuses on the number of "reported" adulterations, however, and not on the volume of adulterated products, where a difference should be made between trade volume and market value. Olive oil, milk, honey, saffron, orange juice, coffee, apple juice and wine are among the foods most frequently reported on. In Germany, there is currently a lack of meaningful, nationwide data on fraud in certain food sectors.

What health risks does food fraud involve?

There are more and more cases of adulteration which could pose a health risk to consumers. Occurrences of this kind in the past were caused by the addition of poor quality or even banned substances. Well-known cases of this were the adding of antifreeze to wine and Sudan red dyes to spices. Against the background of globalised trade, the BfR sees a possible risk to health, especially where the addition of foreign substances to food is concerned.

Not every case of food fraud has effects on health. Accordingly, the latest non-declared use of horse meat in beef products did not have any consequences with regard to health, but products with falsely declared ingredients or of unknown geographical origin can involve an increased risk, especially in a crisis. Only when it is possible to trace back all production, processing and distribution phases – including marking and labelling – without any gaps certain goods can be identified and returned quickly and effectively in a crisis (e.g. BSE). This means that the analytical authentication and guaranteed traceability are fundamental aspects of consumer health protection.

What is authentication?

Authentication is understood to be the analytical investigation of the genuineness of foods and feeds with regard to their composition and origin (e.g. type, region, production). The authenticity of a product is ascertained by means of various chemical-analytical and document-based strategies and methods, by which it is verified whether a food or feed actually complies with the information given on the product by the manufacturer.

Which analytical methods are there for testing the authenticity of foods and feeds?

Chemical-analytical investigation of foods and feeds has its origins in the uncovering of adulterations. Many different methods are used today to test authenticity, ranging from classical wet-chemical procedures and modern instrumental techniques to molecular biological methods. Adulterated products are often detected via so-called marker compounds which are characteristic for the detection of a blend or admixture. Examples of this are:

- the detection of horse meat in beef products using PCR analysis
- the detection of the addition of technical glycerine to wine (glycerine is a natural ingredient of wine. The addition of technical glycerine can be determined via the accompanying substances 3-methyl propanol and cyclic diglycerides which are not otherwise found in wine).

One difficulty in the detection of adulterations is the fact that only the substances that are being investigated are usually found, i.e. foods are tested for the presence or absence of various adulterations that are already known. Unknown adulterants can be overlooked. An example of this is the addition of melamine to dairy products to feign a higher protein content, as happened in China in 2009. The protein content in dairy products is usually determined

using the Kjeldahl method, with which the total nitrogen content in the sample is determined. It cannot be distinguished using this method whether the nitrogen originates from the milk proteins or from organic, N-containing chemicals such as melamine.

With this in mind, newer approaches also include so-called non-targeted methods which make it fundamentally possible to recognise unknown adulterations, especially unexpected additives. With non-targeted analysis methods, a characteristic fingerprint of a food or feed is taken before checking by a reference library whether it is the claimed food or feed, or not. The possibility of identifying many different deviations from the expected product, e.g. in the form of adulterations, is worthy of special emphasis in the view of the BfR, as health and safety relevant adulterations can also be detected in this way. It is hoped that it will also be possible in future to use this method to answer analytically demanding questions, such as the geographic origin of products.

How can I protect myself against food fraud?

The adulteration of foods and feeds is a complex problem which is also very difficult to determine through analysis. Consumers themselves have hardly any possibilities of recognising food fraud. In Germany, the official food and feed surveillance established on a regional level involve extensive tests to investigate authenticity. On a national government level, the national contact point for food fraud has been set up an European network, so called Food Fraud Network, at the Federal Office of Food Safety and Consumer Protection (BVL) to combat food fraud. In cases of cross-border food fraud, for instance, an exchange of information with other European member states is ensured through this contact point via an electronic system for administrative assistance and cooperation managed by the European Commission. Over and above this, the BfR is involved in the development, validation and assessment of new analytical strategies and methods for the testing of identity and authenticity which have the aim of improving consumer health protection.

This text version is a translation of the original German text which is the only legally binding version.