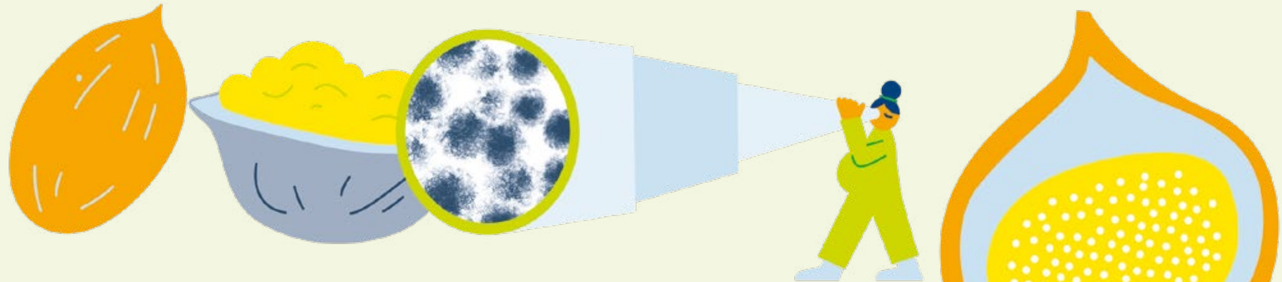


Tracking down mould toxins

Harmful mould toxins are mainly found in plant-based foods. However, the latest data shows that they may also be lurking in cheese and meat.

Illustrations: Susann Stefanizen

Whether stored incorrectly or simply forgotten – many people have certainly experienced an unpleasant surprise due to mouldy food. Mould is hard to miss but mould toxins are real masters of camouflage. The toxins, known in science as mycotoxins, are formed as secondary metabolites in various genera of mould. They can be harmful to health if ingested with food. One example of these toxic substances are aflatoxins, which are produced by moulds of the genera *Aspergillus flavus* and *Aspergillus parasiticus*. Their main representative – aflatoxin B1 – is one of the strongest toxic and carcinogenic substances found in nature. In Germany and other Central European countries, the risk of acute damage to health, such as liver failure, from ingesting large quantities of aflatoxins from food is very low. Therefore, the effects of long-term ingestion are more relevant when assessing the health risks. These include liver and kidney cancer. Thus, ingestion of these substances should be as low as possible. Aflatoxins are mostly found in regions with a warm and humid climate. However, it is already apparent that they are also increasingly prevalent in grains in Europe due to climate change.

ODOURLESS, TASTELESS, INVISIBLE

In contrast to moulds, mycotoxins are not visible to the naked eye. They are also odourless and tasteless. They sometimes form while plants are growing in the field or during transport and storage. The toxic substances are mainly found in plant-based foods, such as grains (e.g. maize, wheat) and products made from them, as well as in dried fruit, nuts and dried spices. Some mycotoxins, including aflatoxins, can pass into products derived from livestock, such as milk, via contaminated feed.

Since mycotoxins are toxic substances that are not man-made but of natural origin, their occurrence cannot be completely avoided. For this reason, the European Commission has set maximum levels for various mycotoxins, such as aflatoxins, in individual foods and in some feeds. Food companies have to ensure that the legal maximum levels are not exceeded in their products. In addition to their own monitoring, products are randomly checked by German federal states' ("Laender") relevant monitoring authorities. EU-wide maximum levels for mycotoxins are currently

TIPS

For avoiding mould altogether:

Avoid hoarding: buy food as fresh as possible, store in a clean, dry and cool place and consume in good time.

Remove bread crumbs from surfaces and chopping boards.

Clean bread bins and similar items once a week and wipe down with diluted vinegar.

What should you do with food that is already mouldy?

Do not eat mouldy food – throw it away immediately, as mould is "contagious".

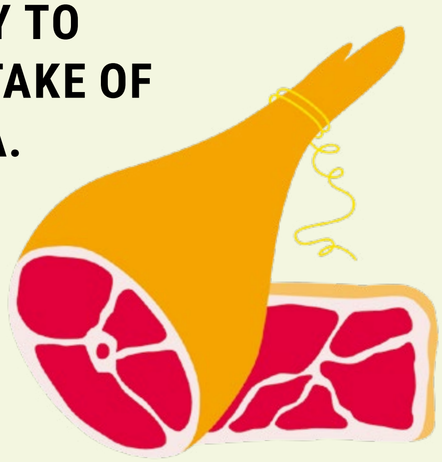
Food should also be thrown away completely if there are spots of mould, such as on loaves of bread.

Mould-ripened cheeses, such as Roquefort and Camembert, are harmless; these kinds of cheese should always be stored in separate packaging to distinguish it from "real" mould.

More information

BfR leaflet
"Protection against mould toxins in food" *(pdf) (in German)*

THE CONSUMPTION OF PRESERVED MEAT, SUCH AS CURED HAM, CAN CONTRIBUTE SIGNIFICANTLY TO THE TOTAL INTAKE OF OCHRATOXIN A.



only exceeded in individual cases. With regard to aflatoxins, pistachios, dried fruit and dried spices produced outside the European Union in particular may contain levels above the maximum limit.

MATURED CHEESE AND HAM ALSO AFFECTED

Ochratoxin A is a mould toxin that is much more prevalent in Europe. If ingested over a long period of time, it can lead to kidney damage in humans. Carcinogenic effects on the kidneys have also been observed in animal experiments. Ochratoxin A has also mainly been detected in plant-based foods, including grains, coffee, cocoa, wine, liquorice and dried fruits, such as dates and figs. In 2020, the European Food Safety Authority (EFSA) published a new report on this issue. The result: in addition to plant-based foods, ochratoxin A was also detected in a small number of matured hard cheese samples – mostly on or near the rind of "Parmigiano Reggiano" and "Grana Padano" – and in cured ham. Both cases concern traditionally manufactured products with a long maturing period.

Scientists at the German Federal Institute for Risk Assessment (BfR) have developed an analytical method for determining the toxic substance ochratoxin A in cheese. This was made available to the official control laboratories as a tool for a national monitoring programme for ochratoxin A in hard cheese and blue cheese. Carried out in 2023, the evaluation of the results is currently still pending. Initial preliminary investigations carried out by the BfR on ochratoxin A in matured hard cheese on the German market show that some samples contain the mould toxin. The differences between grated cheese, cheese in the form of flakes or in a block were particularly striking: the grated samples showed higher concentrations of ochratoxin A than the other two product forms. This is probably because manufacturers are allowed to process up to 18 % of the rind in the grated product form.

Further studies carried out by the BfR on ochratoxin A concentrations in dried and cured ham confirm the EFSA's statement that the consumption of preserved meat, for example, cured ham varieties like Serrano and Parma ham, can contribute significantly to the total intake of ochratoxin A. "The findings show that mycotoxins can also occur in foods of animal origin without transfer from feed. This is an aspect that has barely been considered so far," says chemist Dr Stefan Weigel, who investigates plant toxins and mycotoxins at the BfR. "Long maturing periods and special presentation forms could be a significant influencing factor here."

NEW TRACES OF UNKNOWN MOULD TOXINS

It is assumed that in addition to the hundreds of known mycotoxins, a large number of previously undiscovered mould toxins are present in the environment. Weigel and his team at the BfR have developed methods that also detect previously unknown mycotoxin compounds so that as many mycotoxins as possible can be measured at the same time in one sample. Other mould toxins and previously unknown transformation products of mould toxins can also be determined in addition to the mycotoxins for which there are presently routine tests. "In the next step, it's important to find out how the previously unknown substances affect human health," says Weigel. —

More information

BfR information
"Mycotoxins"

ALSO IMPORTANT TO KNOW:

Mycotoxins are resistant to heat and cold. They cannot be destroyed by cooking, baking, frying or freezing.

Children, pregnant women and people with a weakened immune system are particularly sensitive to the possible harmful effects of mycotoxins.