Bundesamt für
Verbraucherschutz und
Lebensmittelsicherheit

Abstract Report on the National Monitoring 2017

Joint report by the Federal Government and Federal States

Table of content

Abstract Report on the National Monitoring 2017

This Abstract Report presents a short overview about the findings of the analyses of foods, cosmetic products and commodities carried out in 2017. A full version of the Report on the National Monitoring 2017 is available in German from http://www.bvl.bund.de/monitoring2017. Abstract Reports on the National Monitoring from previous years can be downloaded from www.bvl.bund.de/monitoring_abstracts.

1 Summary

The Monitoring Scheme is a system of repeated representative measurements and evaluations of levels of substances that are undesirable from a health point of view, such as residues of plant protection products and pesticides, heavy metals, mycotoxins and other contaminants in and on foodstuffs, commodities and cosmetic products. Further details about the monitoring programme are available from http://www.bvl.bund.de/monitoring_EN.

In line with the General Administrative Provision (AVV) for the 2016–2020 Monitoring Programme, the following foodstuffs, commodities and cosmetic products from the population's representative market basket were examined in 2017 (market basket monitoring):

1.1 Food of Animal Origin

- Trout
- Goose (meat)
- Chicken (meat and liver)
- Herring
- Hen's eggs
- Salmon
- Lamb/sheep (meat)
- Infant formulae and follow-on formulae
- Sour milk cheeses
- Pangasius fish (*Pangasius spp*)
- Tuna in its own juice
- Catfish (*Silurus glanis*)

1.2 Food of Plant Origin

- Pear
- Cauliflower
- Green beans
- Beans (white, brown, black, red)
- Blackberry
- Buckwheat grains
- Endives, Cos lettuce, oak leaf lettuce, lollo rosso/bianco
- Peanuts
- Lamb's lettuce
- Cucumbers
- Currants
- Cocoa powder
- Potatoes
- Cherry

- Cherry juice/nectar
- Kiwi fruit
- Pumpkin
- Pumpkin seeds
- Spring onions
- Tangerine/clementine/satsuma
- Carrots
- Oranges
- Black Pepper
- Pine nuts
- Rice (husked and milled)
- Rice (wholegrain)
- Rye grains
- Chocolate
- Sesame
- Beer (bottom-fermented)
- Lemons
- Onions

1.3 Cosmetic Products

- Skin care, lip care, and make-up products with UV protection
- Tattoo inks and permanent make-up products

1.4 Commodities

- Textiles made of natural fibre
- Food packaging material made of paper, cardboard or textiles
- Air fresheners (liquids, essential oils)
- Food contact material made of paper or cardboard
- Toys and other daily use products with body contact

Depending on what undesirable substances were expected, the foods were analysed for residues of plant protection products and pesticides as well as for contaminants (for instance, dioxins and polychlorinated biphenyls (PCB), per- and polyfluorinated alkyl substances (PFAS), polycyclic aromatic hydrocarbons (PAH), elements, mycotoxins, and nitrate).

Regarding cosmetics, skin care and make-up products with UV protection were examined for their content of organic UV filters. Tattoo inks and permanent make-up products were examined for the microbiological status.

As regards the consumer items, textiles of natural fibres were examined for primary aromatic amines after reductive cleavage of the azodyes. Products made of paper, carton, cardboard and intended for food contact, and textile packaging products, as well as dry foodstuffs packed therein, were analysed for mineral oil. Furthermore, the monitoring included allergenic fragrances in liquids and essential oils used as room fragrances. Paper and carton products intended for food contact were examined for element release into watery and acidic extracts. Daily use products with body contact and toys were examined for levels and migration of PAH.

In addition to the market basket monitoring, the following specific subjects were treated in another part of the monitoring programme which is called project monitoring:

- Glycoalkaloids (α-solanine and α-chaconine) in potatoes
- Glyphosate residues in cow milk
- Pyrrolizidine alkaloids in spices
- Residues of plant protection products in spices
- Total chromium and chromium VI in mineral water
- Pesticide residues in beer

As far as comparison with results from earlier monitoring studies was possible, this was considered in the interpretation of findings. Yet, all statements and assessments in this report concerning the presence of substances that are undesirable from a health point of view, solely refer to the products, substances and substance groups considered in 2017. At the same time, it is not possible to estimate the entire exposure to certain substances because only part of the market basket can be examined per year, while the substances considered also occur in other products.
Altogether, the findings of the 2017 Monitoring Programme again support the recommendation of a varied and balanced diet, as this is the most practicable way to minimise the dietary intake of undesirable substances which is, to a certain degree, unavoidable.

In total, 9,570 samples of products of domestic and foreign origin were analysed in the framework of market basket and project monitoring in 2017, including 8,047 samples of foodstuffs, 592 samples of cosmetic products, and 931 samples of consumer items (such intended for food contact or body contact). The findings are presented in the following chapters.

2 Foodstuffs

2.1 Residues of Plant Protection Products and Pesticides

2.1.1 Food of Animal Origin

Residues of plant protection products and pesticides were found in 57 % of the samples of freshwater fish, 63 % of samples of ovine meat, 33 % of chicken meat samples and in 11 % of the goose meat samples. In all foodstuffs of animal origin tested, the findings were nearly exclusively residues of ubiquitous, persistent organo-chlorine compounds and are thus not attributable to direct use of such products, which corresponds with the findings of previous years.
The regulatory maximum residue level (MRL) was exceeded in one sample of Pangasius fish, attributable to chlorpyrifos. The residue findings did not indicate any health risk to consumers.

Apart from that, a total of 93 cow milk samples of varying type were analysed for glyphosate residues in one of the specialised monitoring projects. The milk variants were: 85 samples of whole milk and raw milk, 6 samples of partially skimmed milk and 2 samples fully skimmed milk. For glyphosate, the milk fat portion is not relevant, because glyphosate is easily soluble in water and therefore primarily found in the fat-free whey portion of the milk. None of the 93 samples analysed were found to contain residues of glyphosate. 22 of the samples were at the same time analysed for the metabolite AMPA. Here too, no measurable residues were found (detection limit 0.01 mg/kg in all analyses).
Some laboratories tested their samples for more substances, in addition to the actual target of the monitoring project, and had findings of DDT/DDE, hexachlorobenzene, and lindane. These persistent organic substances have no longer been applied for years now, but are still ubiquitous in the environment and, because of their high fat-solubility, are accumulating in particular in foodstuffs of animal origin, where they may build up to measurable residues. The levels found in cow milk were inconspicuous, though.

2.1.2 Food of Plant Origin

Cauliflower, buckwheat grains, and pumpkin had the least findings of quantifiable residues, while cherries, currants, and oranges were those with the most quantifiable residue findings.
Seven of the 22 foodstuffs of plant origins had no findings exceeding the maximum residue level (MRL). Percentages of findings not in compliance with the respective MRLs were highest in pepper (9.6 % non-compliant), dried beans (8.9 %), blackberries and currants (4.9 % each). Overall, quantifiable non-compliant residue findings occurred in 15 of the 22 foodstuffs examined.
Residues of substances actually not authorised in the respective crop in Germany in 2017 were detected in 1.9 % of the vegetal food samples originating from Germany (in 2016: 1.2 %).

The risk assessment of the findings concluded that certain residues of dimethoate/omethoate (one sample of cherries), nicotine (one sample of leaf lettuce), and fenthion (one sample of oranges) had the potential of an acute health impairment for children, proceeding from the current state of knowledge.
Residue findings of propoxur (in 4 samples of beans) could have the potential of an acute health impairment both for children and grown-ups, at the current state of knowledge.

Residues of plant protection products in spices were examined in the framework of a special monitoring project. The data obtained showed that MRLs – sometimes of multiple plant protection products – were frequently exceeded, particularly in cumin, paprika, and dried chillies.
Given the findings of non-compliant and multiple residues, spices should continue to be monitored for residues of plant protection products.
Residue findings in ginger were lower than in the other foodstuffs analysed, which may partly be explained by a natural potential in ginger to deter pests. Still, there is a problem with multiple residues and a small data basis, and further tests should be made.
Although there were frequent findings of non-compliant residues of some plant protection products in spices, a health risk to consumers could be ruled out because of the low consumption amounts.

Another monitoring project analysed pesticide residues in beer. The results show that beer has no, or only very low levels of residues. Nearly two thirds of the samples analysed did not contain quantifiable residue amounts. The other samples contained, in the majority, low levels of residues of active substances which are allowed in barley and hop cropping, or which are attributable to hygienic measures. Glyphosate residues were quantifiable in 13.8 % of the samples. While Germany has restricted the use of glyphosate in brewing barley, other countries have not.
As regards health risks to consumers, all findings are rated as harmless. For the active substances mandipropamid, boscalid, and fosethyl/phosphonic acid, there is no need for a toxicological “acute reference dose” (ARfD) because of their low acute toxicity. Among the other substances detected, chlorate has both the highest residue concentration found (0.12 mg/kg) and the lowest ARfD (0.036 mg/kg body weight). In order to reach that dose, beer consumption would have to be 300 g beer per kg body weight, which would amount to 15 litres of beer per day for a person of 50 kg body weight. The residue concentrations of plant protection products or hygienic biocides found in beer therefore do not pose a risk to consumers, at the current state of knowledge.

2.2 Quaternary Ammonium Compounds (QAC)

Apart from some single findings, all measurements were lower than the maximum residue level of 0.1 mg/kg. In order to improve the data basis necessary for a well-founded risk assessment and review of preliminary maximum residue levels pursuant to Regulation (EU) No. 1119/2014 by the end of 2019, benzalkonium chloride (BAC) and didecyldimethylammonium chloride

(DDAC) will remain the object of increased control activities within the EU and thus, also of further monitoring.

2.3 Chlorate

As in the previous years, the number of findings of quantifiable chlorate levels was relatively high in fresh leaf vegetables, namely lamb's and leaf lettuce. Still the findings, including the maximum finding of 0.52 mg/kg in leaf lettuce, did not indicate any health risk to consumers. In order to perfect the data basis for a well-founded risk assessment that will allow to establish specific maximum residue levels, the Monitoring Programme will continue to test a large number of foodstuffs for chlorate residues.

2.4 Perchlorate

The vegetal foodstuffs subject to this Programme had very low chlorate concentrations. The 90th percentile values and most of the maximum levels measured were clearly below the valid EU reference values, and thus very low. None of the findings exceeded the reference levels.

2.5 Dioxins and Polychlorinated Biphenyls (PCB)

Hen's eggs contained very low levels of dioxins and PCBs, with levels in eggs from free-range or organic keeping containing slightly higher levels than barn eggs. Findings non-compliant with the maximum level (ML) were more frequent in organic and free-range eggs than in barn eggs.
Chicken liver also contained low levels of dioxins and PCB. One single sample exceeded the maximum level set for the sum of non-dioxin-like PCB.
Dioxin and PCB levels in baby and infant food (powder) were far below the respective maximum level. So, from a preventive-health-protection point of view, and with particular regard to babies as the most susceptible consumer group, the maximum levels set by Commission Regulation (EC) No. 1881/2006 for foodstuffs intended for infants and small children could be reduced.

2.6 Perfluorinated and polyfluorinated Alkyl Substances (PFAS)

In hen's egg and salmon samples, there were no quantifiable findings of single substances of the PFAS spectrum tested.
In the tuna samples tested (preserves, tuna in own juice), a low concentration of the main substance perfluorooctane sulfonic acid (PFOS) was quantified in just one single sample.
Trout contained also only low levels of the main substances PFOS and perfluorooctanoic acid (PFOA). The other single substances of the PFAS spectrum tested were below the detection limit.
The results in the tested fish products such as trout and salmon show that PFAS levels have declined, compared to previous years' programme findings.

2.7 Polycyclic Aromatic Hydrocarbons (PAH)

Ground black pepper was found with enhanced PAH levels. A relatively large portion of 6.2 % of the samples did not comply with the maximum level of 50 µg/kg lipid for the sum of the four major PAH, which has been valid since 1 January 2016 pursuant to Commission Regulation (EC) No. 1881/2006.
PAH levels in chocolate with a quality label (minimum 80 % cocoa portion) were markedly lower. All samples of this food complied with the set maximum limit.

2.8 Mycotoxins

2.8.1 Aflatoxins B1, B2, G1, G2

Pumpkin seeds (unroasted, shelled) analysed under the 2017 Monitoring Programme had no quantifiable aflatoxin findings.
In sesame, the average concentrations both of aflatoxin B1 and of the sum of the aflatoxins B1, B2, G1 and G2 were at a low level, and all samples complied with the fixed maximum level. The monitoring findings were thus at a corresponding level with the findings of the 2011 programme.
Roasted peanuts showed aflatoxin concentrations below the valid maximum level within the 90th percentile of measurements. But 2 samples did not comply with the legal maximum level for aflatoxin B1, and 3 samples did not comply with the maximum level as regards the sum of aflatoxins B1, B2, G1 und G2. One sample originating from Egypt contained aflatoxin B1 at a concentration of 14.7 µg/kg and total aflatoxins B1, B2, G1 and G2 at 17.0 µg/kg, which is significantly higher than the established maximum level of 2.0 µg/kg for aflatoxin B1 and 4.0 µg/kg for total aflatoxins B1, B2, G1 and G2.
In black pepper, one sample originating from Spain did not comply with the maximum level for aflatoxin B1 (5.0 µg/kg). Compared to the last programme testing of aflatoxins in pepper in 2011, the aflatoxin concentrations found were higher this time, both with regard to single and sum parameters.

2.8.2 Ergot alkaloids

Buckwheat grains contained clearly lower concentrations in ergot alkaloids than rye products that had been tested for these mycotoxins in previous years' programmes.
The present monitoring test results in buckwheat indicate that apart from the known cereal species, ergot alkaloids may be found also in other food products of vegetal origin.

2.8.3 Ochratoxin A (OTA)

OTA levels in bottom-fermented beer, sesame, and cocoa powder were low and about in the same range as in previous years' monitoring programmes.
Whole-grain rice also showed low levels of OTA. There were no non-compliant levels. Compared with the monitoring test results of 2014, OTA levels were somewhat higher.
In buckwheat, the statistical index values were lower than in 2011 by nearly factor 5. Again, there were no non-compliant samples.
Pumpkin seeds (unroasted, shelled) showed enhanced OTA levels in 2 samples.
In roasted peanuts, the portion of samples with quantifiable OTA concentrations decreased from 49 % in 2011 to 23.5 % in 2017.
Black pepper showed relatively low concentrations of OTA. The maximum concentration found, however, indicates that there are single samples with higher levels of contamination, which corresponds to the test results of 2011.

2.8.4 Deoxynivalenol (DON)

Concentrations of the mycotoxin deoxynivalenol detected in wholegrain rice were only low. None exceeded the legal maximum level.

2.9 Vegetal toxins

One of the monitoring projects dealt with glycoalkaloid levels (α-solanine and α-chaconine) in potatoes. About 91 % of the potato samples had glycoalkaloid concentrations lower than the 100 mg/kg which are recommended as maximum level by the Federal Institute of Risk Assessment (BfR). With one exception, the other samples exceeded this level only by little, with concentrations between 102 mg/kg and 129 mg/kg. So in total, 179 of the 180 potato samples analysed had glycoalkaloid levels lower, or only slightly higher than the BfR-recommended limit of 100 mg/kg. Symptoms of poisoning after consumption of these potatoes are considered as rather unlikely. One sample, however, was found with a fairly higher

glycoalkaloid concentration of 225 mg/kg. This is about in the range as in a case of poisoning reported by the BfR on another occasion. The test results show that most potatoes have glycoalkaloid contents that are harmless from a health point of view. In some single cases, however, glycoalkaloid levels might be as high as to result in poisonings. As glycoalkaloid levels in potatoes may still build up while stored at the consumer's, consumers should adhere to the usual recommendations regarding storage and preparation of potatoes.

Another monitoring project examined pyrrolizidine alkaloids (PAs) in spices. A total of 101 spice samples from 8 spices were analysed under this project.
Overall, the PA levels detected in this project were widely strewn. PA were not quantifiable in 52.2 % of the 101 spice samples. High average concentrations of PA occurred in particular in the leaf spices oregano, lovage, borage, and parsley. The single substances senecionine-*N*-oxide and europine-*N*-oxide were most frequently found in those spices stemming from plants of the families *Asteraceae* (genus *Senecio*) and *Boraginaceae* (genus *Heliotropum*).

2.10 Elements

The tests showed that levels of the elements analysed were low, in the majority. The percentages of samples non-compliant with the maximum levels set for lead and cadmium in Regulation (EC) No. 1881/2006 were low, apart from few exceptions. Compared with the programme results of 2011 and 2012, concentrations of lead, cadmium, arsenic, nickel, and mercury have declined or remained at a similar, low level in the foodstuffs tested.
Enhanced concentrations of cadmium, aluminium, and nickel occurred only in some single cases and certain matrices (namely, in pine nuts and oil seeds). Black pepper was conspicuous with regard to enhanced levels of nickel and lead, and enhanced aluminium levels, in particular. The findings suggest that it should be considered whether improved processing techniques might help to reduce element levels in ground pepper. Pepper had also very high maximum values of contamination with aluminium, nickel, chromium, and thallium.

Total chromium and chromium(VI) was analysed in mineral waters in the framework of one monitoring project. With a maximum content of 4.2 µg/l all samples complied with the chromium legal maximum level of 50 µg/l set by the (national) Ordinance on mineral and table waters.
95 % of the tested mineral waters also complied with the preventive maximum level for chromium(VI) in drinking water of 0.3 µg/l recommended by the Federal Environmental Agency (UBA). The maximum chromium(VI) concentration detected was 1.55 µg/l, which shows that natural mineral waters may also have levels significantly higher than the recommended maximum.

2.11 Nitrate

Nitrate levels in lamb's lettuce have declined, compared to earlier programme findings, but were still relatively high. Measures suitable to reduce nitrate levels in this food should therefore be kept up. In contrast to that, green beans and carrots above all had very low nitrate levels. So, consumers should choose a varied diet in vegetable foodstuffs, but in no way restrict their vegetable diet, according to a FAQ list published by the Federal Institute of Risk Assessment on nitrate and nitrite in foodstuffs.

3 Cosmetic Products

3.1 UV filters in skin care and decorative make-up products

The samples were distributed as follows: 81.9 % from products with low and medium UV protection (sun protection factor SPF < 30), 16.4 % products with high protection factor (SPF 30–50), and 1.7 % products with very high protection (SPF > 50).
In contrast to the sun screen products examined under the 2016 monitoring programme, the cosmetics subject to the 2017 programme might be used throughout the year, regardless of actual sun radiation intensity, as they are primarily intended for skin care and decorative make-up. A total of 17 samples out of 483 (3.5 %) contained the organic UV filters ethylhexyl salicylate and butyl methoxydibenzoyl methane at concentrations numerically higher than the maximum concentrations fixed in Regulation (EC) No. 1223/2009. The data obtained in the testing showed sum UV filter contents of up to 29 %. The data may serve as a basis for further risk assessment.

3.2 Microorganisms in tattoo inks and permanent make-up

Tattoo and permanent make-up inks should be sterile, pursuant to the European Council's ResAP (2008) Resolution. In the monitoring tests, total microorganism counts in all permanent make-up samples and in 95.4 % of the tattoo ink samples were below the detection level of 10 cfu/g.
The microorganism counts detected in 4.6 % of the tattoo ink samples can be seen as indicating insufficient hygienic conditions in the manufacturing processes of these inks.
Critical findings were two total counts of 130,000 cfu/g and 610,000 cfu/g, and findings of potentially pathogenic microorganisms in tattoo inks.

4 Commodities/Daily Use Articles

4.1 Primary aromatic amines in natural fibre textiles after reductive cleavage of the azodyes

The individual, regulated aromatic amines and even the sum of them did not exceed the maximum level of 30 mg/kg fixed in the REACH Regulation (EC) No. 1907/2006 in any sample. But 2 of the 165 samples tested (1.2 %) were found with a high concentration of 1,4-phenylenediamine, which is not regulated, but to a high degree skin-sensitizing.

4.2 Mineral oil in products from paper, cardboard, carton, and textile fibres intended for food contact, and migration of mineral oil to dry foodstuffs packed therein

Both the Federal Institute for Risk Assessment (BfR) and the European Food Safety Authority (EFSA) recommend that the intake of mineral oil aromatic hydrocarbons (MOAH) should be minimised because of a possible carcinogenic potential. With regard to food contact products, such minimisation may be achieved, for instance, by using fresh-fibre cartons, mineral oil-free printing inks, or by including functional barriers in package material and design. The monitoring test results show that the large majority of samples (93.9 %) comply with the levels recommended by the BfR or the detection limit defined in the draft of the 22nd Ordinance amending the Ordinance on consumer items (that is, the "Mineral Oil Ordinance"). Overall, 11 of 179 packed foodstuffs (6.1 %) exceeded the – so far not binding – limits for release of mineral oil from food contact products of paper, carton, cardboard, or recycling paper. The MOSH/MOAH distribution patterns indicated that the migrant mineral oil portion in these 11 foodstuffs is probably not only attributable to the packaging material, but also – and in some cases only – to previous contamination.
The 2018 Monitoring Programme will include more studies with regard to MOSH/MOAH.

4.3 Allergenic fragrances in liquids and essential oils used as room fragrances

Sometimes very high concentrations of allergenic fragrances of up to 87 g/100 g were measured in 97.9 % of the room fragrances tested. Having in mind that there are already legal regulations about allergenic fragrances in cosmetics as well as in washing agents and detergents, it is desirable, from a consumer protection point of view, to regulate all 26 allergenic fragrant substances also with regard to room fragrance sprays.

4.4 Element release from paper/carton products with food contact to aqueous and acidic extracts

None of the samples tested exceeded the maximum levels recommended by the Federal Institute for Risk Assessment (BfR).
When considering the present test results, please note that the measurements are based on analysis of cold and hot water extracts according to German Industrial Standards DIN EN 645 and DIN EN 647.
Element release levels established by European Council Resolution CM/Res (2013)/9 with regard to metal and alloy products intended for food contact are in the majority toxicologically derived guidance values. These levels were exceeded in 102 (49.8 %) of the samples of paper or carton food contact products tested. Although the levels are only guidance values for metal and alloy food-contact products, the partly high release levels of, for instance, arsenic, aluminium, and cobalt found in the samples tested must be discussed from a critical point of view.
The data obtained may contribute to establishing guidance values for food-contact materials from paper and carton with regard to the analysis in cold and hot water extracts according to the standards DIN EN 645 and DIN EN 647.

4.5 Determining levels and migration of polycyclic aromatic hydrocarbons (PAH) in consumer items with body contact and toys

Out of 188 analysed consumer items with body contact and toys the limit values for the 8 PAH regulated in Annex XVII of Regulation (EC) No. 1907/2006 (REACH Regulation) were exceeded in 7 samples (3.7 %) up to more than 400-fold. These samples, which had very high levels of PAH, also produced higher levels of single, regulated PAH in the migrate solution. The data obtained, together with an assessment opinion by the Federal Institute for Risk Assessment (BfR), were reported in due time to the European Commission and the European Chemicals Agency ECHA, and may be a valuable contribution to revising the PAH Restriction Entry 50 in Annex XVII to the REACH Regulation. In order to finally clarify whether the currently valid limit values are suitable to fully preclude risks to human health, further investigations into PAH migration from various relevant products are needed.