



Bundesamt für
Verbraucherschutz und
Lebensmittelsicherheit



Abstract Report on the National Monitoring 2018

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Abstract Report on the National Monitoring 2018

This Abstract Report presents a short overview about the findings of the analyses of foods, cosmetic products and commodities carried out in 2018. A full version of the Report on the National Monitoring 2018 is available in German from <http://www.bvl.bund.de/monitoring2018>. 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 2018 (market basket monitoring):

1.1 Food of Animal Origin

- Beef, meat
- Blue mussels (*Mytilus* sp.)
- Wild boar, meat, liver
- Butter
- Camembert, Brie cheese, Gorgonzola/Roquefort
- Egg, chicken
- Minced beef
- Pacific pollack (*Theragra chalcogramma*)
- Prawns (*Aristeomorpha* sp.), shrimp (*Penaeidae* sp.)
- Sour cream
- Tuna fish
- Turkey, meat
- Yoghurt made from ewe's milk

1.2 Food of Plant Origin

- Apricot
- Algae (dried)
- Banana, baby-bananas, plantain
- Bell pepper
- Broccoli
- Coffee; roasted, ground
- Cowberry
- Cucumber
- Dates (dried)
- Grapefruit
- Grapes red/white
- Kale
- Herbal tea (chamomile, stinging nettle, rooibos, sweet balm, mate tea, vervain)
- Linseed
- Maize (flour, grits)
- Oat grain
- Olive oil, cold-pressed
- Orange juice
- Paprika powder
- Parsley
- Pea
- Poppy seed
- Processed cereal-based foods for infants and young children
- Pumpkin seed oil
- Radish
- Rocket lettuce
- Spelt grains
- Sweetcorn
- Tofu
- Water melon
- Wheat grain, whole wheat flour
- White mushroom (*Agarius bisporus*), oyster mushroom (*Pleurotus ostreatus*), king oyster mushroom (*Pleurotus eryngii*)

1.3 Cosmetic Products

- Baby powder
- Make-up products
- Children's toothpaste/toothgel
- Nail polish

1.4 Commodities

- Footwear
- Food packaging made of paper/cardboard or textiles and the packaged dried food
- Toys and joke articles
- Plastic articles intended for consumption of food
- Jewellery and piercings/earrings

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).

Among the cosmetics, baby powder, make-up products, and toothpaste or gel for children were examined for elements. Nail polish, including base coat and top coat were examined for nitrosamines.

As regards the consumer items, footwear made of leather or material combinations was examined for primary aromatic amines after reductive cleavage of azo dyes. Mineral oil portions were analysed in food packaging made of paper, carton, cardboard or textiles, and in the dry food contained in this packaging. The toys and joke articles were analysed for preservative agents. Costume jewellery and piercings/earrings were analysed for release of elements. Plastic articles used for consuming food were examined for migration of melamine and formaldehyde from melamine raisin, urea formaldehyde raisin, or phenol formaldehyde raisin.

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

- zearalenone in soya
- pyrrolizidine alkaloids in tea and herbal infusions
- residues of plant protection products in partially fermented grape must
- elements in dried algae (seaweed)

As far as comparison with results of 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 2018. 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 2018 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 9.540 samples of products of domestic and foreign origin were analysed in the framework of market basket and project monitoring in 2018, including 8.238 samples of foodstuffs, 626 samples of cosmetic products, and 676 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 quantified in 11.8% of Pacific pollock samples, in 20.7% of butter samples, 17.1% of minced beef and 14.7% of chicken egg samples. Levels were always lower than the maximum residue levels (MRLs) fixed in Regulation (EC) No. 396/2005 and the German national regulations on maximum residue levels (*RHmV*). As in the years before, residues found in foodstuffs of animal origin were almost exclusively such of ubiquitous persistent organo-chlorine compounds. The only exception were residues of chlorpyrifos in Pacific pollock. The residues did not mean a health risk to consumers.

2.1.2 Food of Plant Origin

Cowberry and sweetcorn had by far the fewest findings of quantifiable residues. Rocket lettuce, table grapes, and grapefruit had the highest percentages of samples with quantifiable residues. Three of the 20 foodstuffs examined – namely, orange juice, sweetcorn, and cowberry – had no findings higher than the fixed maximum residue level (MRL). Most findings exceeding an MRL were made in kale (11.5%), herbal teas (9.1%), and parsley leaves (6.3%). 2.3% of vegetal food samples originating from Germany showed residues of active substances which were actually not authorised for use in the respective crop in Germany in 2018. In 2017, the percentage of such findings was only 1.9%. The overall risk assessment of the findings resulted in the statement that, based on the current state of knowledge, an acute impairment of the health of children might be possible with one chlorpyrifos residue found in broccoli, one formetanate residue found in sweet peppers, one ethephon residue found in table grapes, one cypermethrin residue in cultured champignons, and one chlorothalonil residue in apricots. Four residue findings – dimethoate/omethoate, tebuconazole and thiocloprid in one kale sample each, and methomyl in one sample of aubergines – were assessed as “acute health impairment possible for children and adults, based on the current state of knowledge”.

In addition to the above, partially fermented grape musts were analysed for residues of plant protection products in the framework of a particular monitoring project. One fifth of the samples analysed did not contain any residues in quantifiable amounts, but nearly half of all samples were found with multiple, quantifiable residues. After all, all plant protection product residues found in the major portion of the partially fermented grape musts analysed, were in the permitted range.

2.2 Quaternary Ammonium Compounds (QAC)

Five findings of both BAC and DDAC (that is, 0.4% of samples) exceeded the permitted maximum residue level of 0.1 mg/kg. In order to improve the data basis needed by the end of 2019 for a well-founded risk assessment and revision of preliminary maximum residue levels set in Regulation (EU) No. 1119/2014, BAC and DDAC will continue to be subject to intensified controls in the EU, and thus also subject to monitoring programmes.

2.3 Chlorate

The foodstuffs orange juice, peas, and broccoli were again conspicuous with relatively high percentages in samples with quantifiable chlorate levels. Overall, the maximum levels measured did not signal any health risk to consumers. In order to complete the data basis for a well-founded risk assessment, which in turn will be the basis for defining specific maximum residue levels, monitoring programmes over years to come will continue to place a focus on residues of chlorate in a variety of foodstuffs.

2.4 Perchlorate

The foodstuffs of vegetal origin sampled under the 2018 programme were found with low levels of perchlorate. Reference values were exceeded in single cases only. The EU is discussing at expert level establishing maximum permissible levels for various food groups. Data collected in monitoring programmes may serve as an important basis for decisions in further discussions on risk management at the European level.

2.5 Dioxins and Polychlorinated Biphenyls (PCB)

Turkey meat, tuna, as well as pumpkin oil and dried algae – which were all sampled for the first time in the framework of the monitoring programmes – showed low levels of dioxins and dioxin-like and non-dioxin-like PCBs. The levels found were far below the permitted maximum levels in these foodstuffs. Boar meat samples showed high levels of dioxin and dioxin-like PCBs in the median of the sum parameter. The sum parameter levels did not essentially deviate from the levels measured in boar meat samples in 2013. Non-dioxin-like PCB had declined compared to earlier monitoring testing of boar meat. Whether this is a developing trend will have to be shown by future monitoring. One boar meat sample originating from Germany exceeded the maximum level for PCB 153 established in Germany's national Contaminants Regulation. Regarding consumption of wild game offal, we refer to the relevant consumer information leaflet of the Federal Ministry of the Environment, Nature Conservation, and Nuclear Safety (BMU), which says that offal of wild game should be consumed only occasionally.

2.6 Perfluorinated and polyfluorinated Alkyl Substances (PFAS)

Samples of turkey meat, mussels, tuna, and dried algae, which were for the first time subject to the monitoring programme, displayed low levels of per- or polyfluorinated alkyl substances (PFAS). Salad cucumbers did not contain quantifiably levels of PFAS. Boar meat had higher average levels of the single substances perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). The highest level of contamination with PFOS was found in liver of boar.

2.7 Polycyclic Aromatic Hydrocarbons (PAH)

PAH-4 were quantifiable in total in more than one third of the linseed samples and half of the samples of dried algae. The findings showed that PAH in these foodstuffs contribute their part to consumers' alimentary exposure to PAH. There was a conspicuous maximum finding of the sum of the major PAH-4 substances in linseed of 23.2 µg/kg. It should be considered whether PAH levels in linseed can be reduced through better manufacturing techniques in accordance with the ALARA ("as low as reasonably achievable") principle.

2.8 Mycotoxins

2.8.1 Aflatoxins B1, B2, G1, G2

Aflatoxin levels in cream yoghurt, camembert, wheat, poppy seed, linseed, and dates were very low or low. In maize flour and grits, aflatoxin levels were insignificantly higher than in 2012, while the sum of B1, B2, G1, and G2 exceeded the legal maximum level in one sample. Paprika powder had clearly higher aflatoxin levels than all other foodstuffs tested. The maximum level of the single parameter aflatoxin B1 was exceeded in one sample originating from Turkey. In the medium term, we do not expect a decline in aflatoxin levels in paprika powder, and recommend to continue risk-based checks in the framework of official food control.

2.8.2 Ochratoxin A (OTA)

Boar meat had on average very low levels of ochratoxin A. OTA levels in wheat and spelt grain samples were low. Concentrations in two of the spelt grain samples exceeded the established

maximum level. Average OTA levels were also low in poppy and linseed. Both oilseeds had strikingly high maximum values, though. OTA levels found in dried dates, ground roast coffee, and cereal-based infant food ranged from very low to low. Paprika powder showed the highest OTA levels among all foodstuffs tested. These findings should be reason to monitor the situation in the framework of risk-oriented control programmes in future.

2.8.3 T-2-Toxin and HT-2-Toxin

Wheat (grains and whole meal) and spelt displayed low levels of T-2 and HT-2 toxins, while oat grains, which were also analysed for these toxins, had higher and quantifiable T-2 and HT-2 toxin levels. But none of the concentrations measured in the three cereal products analysed exceeded the indicative levels listed in EU Commission Recommendation No. 2013/165/EU. *Fusarium* toxin levels in wheat display a marked year-by-year variance. This is in the first place attributable to weather conditions, and can thus be influenced in the framework of cultivating conditions.

2.8.4 Deoxynivalenol (DON)

Only low levels of the mycotoxin deoxynivalenol were found in cereal-based infant food. None exceeded the established maximum level. Nevertheless, such products should also be subject to monitoring in future because of that sensitive consumer group's (infants and very small children) particular need for protection.

2.8.5 Fumonisin

Fumonisin B1 and B2 were quantifiable in three quarters of the maize flour samples. Apart from that, one sample of unknown origin exceeded the maximum level valid for maize flour intended for direct human consumption. In view of these findings, we recommend that the situation be further watched in the framework of official food control.

2.8.6 Zearalenone

Testing of cereal-based infant food for zearalenone was part of the monitoring programme for the first time in 2018. The concentrations found were at a very low level. The highest value measured was far below the established maximum level for cereal-based infant food, which is 20 µg/kg. Still, as with DON, testing should go on in future because of the particular need for protection required by infants and young children, as a very sensitive consumer group.

Soy beans and various soy products were tested for zearalenone in one of the special monitoring projects. Zearalenone was detected in 17 out of 143 (11.9%) samples examined, but only in four samples to a quantifiable amount. Both the concentrations found and the number of contaminated samples were comparable to the findings in cereal flours (rye and wheat flour) in a monitoring project in 2005. It is recommended to repeat such testing in the near future, as consumption of soy and soy products is increasing, in line with a rising trend towards vegetarian and vegan food.

2.9 Vegetal toxins

Another monitoring project dealt with presence of pyrrolizidine alkaloids (PA) in tea and herbal infusions. A total of 167 samples drawn from seven teas and herbal infusions were examined in the framework of that project. About 30% of all samples had quantifiable total levels of pyrrolizidine alkaloid substances. The average total PA level of all 167 samples was 32.5 µg/kg. Compared to findings in earlier monitoring projects, total PA contents in the samples analysed under the present project were clearly lower. Regarding the various kinds of tea examined, rooibos had both the highest rate of contaminated samples (13 out of 15) and the highest average concentration of total PA, with 134 µg/kg.

Five of the samples analysed (one black tea, one peppermint, and three rooibos) would have exceeded the maximum levels which are currently discussed in the EU.

2.10 Elements

The tests showed that levels of the elements analysed were low, in the majority. Only one sample of apricots exceeded the maximum level for lead established by Regulation (EC) No. 1881/2006. Compared to findings of previous years' monitoring programmes, the concentrations of lead, cadmium, arsenic, nickel, and mercury analysed in the foodstuffs tested were roughly similar or lower.

Higher levels of cadmium, aluminium, and nickel were found only in single cases and certain substance-matrix combinations (among others, in linseed). Paprika powder was conspicuous with regard to high levels of lead, copper, and chromium, and in particular with high aluminium levels. It should be considered whether improved processing techniques could help to reduce the element content in paprika powder.

In addition to the analyses performed in the framework of the market basket monitoring, a total of 165 samples of dried sea algae were analysed for elements in a separate monitoring project. The algae samples analysed carried high levels of cadmium, lead, aluminium, arsenic, and nickel. The measurements also revealed that dried algae contain high concentrations in uranium. Tests for iodine produced the side-finding that 8% of the algae samples with a iodine content of more than 20 mg/kg were not labelled with a warning note or recommendation for maximum consumption, although such products are rated as potentially health-risky by the Federal Institute for Risk Assessment (BfR). EU experts are currently discussing the question whether the portion algae contribute to consumers' total exposure to arsenic, cadmium, lead, and iodine, requires establishing relevant maximum levels or introducing any measures. The data collected in the framework of this monitoring project can serve as an important basis for decision-making regarding further risk management discussions at the European level.

2.11 Nitrate

Nitrate levels in rocket lettuce have declined, in comparison to earlier monitoring test findings. Yet, rocket lettuce still carried high levels of nitrate, and measures suitable to reduce nitrate levels in this food should continue to be applied. The median values of nitrate levels in broccoli and kale, on the other side, were low. Kale, however, had high values of 2,200 mg/kg in the 90th percentile and 6,000 mg/kg as the maximum. However, consumers should by no means refrain from consuming vegetables, but take care to widely vary their choice in vegetables, as the BfR recommends in a FAQ fact sheet about nitrate and nitrite in foodstuffs.

3 Cosmetic Products

3.1 Elements in baby powder, make-up products, and children's toothpaste/tooth gel

Using the lower bound method, at least 90% of the samples of each product group were found with element contents below the orientation values of technically unavoidable concentrations of arsenic, antimony, cadmium, and mercury, as published in the *Journal of Consumer Protection and Food Safety* in 2016. It showed, however, that one cannot exclude that levels in single samples exceed these orientation values, in particular as regards lead. Namely, make-up powder and eyeshadow had several findings higher than the respective orientation levels. As these elements are banned in cosmetics, manufacturers should continue to strive to reduce heavy metal contents through very careful choice of raw materials and good manufacturing practice. Also, heavy metal contents in cosmetics should be regularly subject to monitoring. The 90th percentile level in nickel varies quite strikingly among the product groups analysed. In order to derive technically unavoidable concentrations of nickel in cosmetic products, and maybe also product-overriding values for orientation, we have to wait for more monitoring findings in yet more product groups in the years to come. Use of certain compounds of chromium, copper, and cobalt as colourants in cosmetic products is allowed. High levels found in eyeshadow should be primarily attributable to the use of such colourants. The analytic

methods used in this monitoring programme do not allow to differentiate between forbidden and permitted compounds. That is why it is not possible to derive technically unavoidable concentrations of chromium, copper, and cobalt from the measurements of this analysis, at least as regards eyeshadow and comparable make-up products.

3.2 Nitrosamines in nail polish/base coat/top coat

Compared with the analytic findings in hair dyes in 2014 and mascara ink in 2015, nail polish contained markedly higher, quantifiable levels of the nitrosamine *N*-nitrosodiethanolamine (NDELA). Even though one can assume that the risk to human health is very low, provided fingernails and toenails are intact and the polish is properly applied (not covering the cuticle), nitrosamine levels in any cosmetic product are subject to the principle of minimisation. Based on the present data, the following levels – as orientation values – can be considered as technically unavoidable in nail polish: NDELA – 60 µg/kg; *N*-nitrosodimethylamine (NDMA) – 165 µg/kg; *N*-nitrosomorphol (NMOR) – 60 µg/kg, and *N*-nitrosodiethylamine (NDEA) – 10 µg/kg. This data basis should, however, be validated by further investigations in upcoming monitoring programmes.

4 Commodities/Daily Use Articles

4.1 Primary aromatic amines after reductive cleavage of azo dyes in leather and combined-materials shoes

All samples were found to comply with the requirements of No. 43 of Annex XVII to Regulation (EC) No. 1907/2006. Both the levels of single regulated aromatic amines and their sum levels were lower than the quantification limit of 30 mg/kg, which is defined by the REACH Regulation in conjunction with the testing method specified in Annex 10. 1,4-phenylenediamine, which is not regulated, but strongly skin-sensitising, was detected in 7.3% of the samples, and to a certain part with very high concentrations. Aniline, too, which is poisonous and can be absorbed through the skin and by inhalation, was detected in 18.2% of the samples, and partly with high concentrations. Lining and upper leather of shoes were not found with high concentrations of these amines, apart from single cases.

4.2 Mineral oil components in food packaging materials from paper/cardboard/carton and textile fibres, and migration therefrom to dry foodstuffs packed therein, and mineral oil components in items used for cooking/frying/baking/roasting and made from paper/carton/cardboard (for instance, muffin baking cups)

Because of a possibly carcinogenic potential, the Federal Institute of Risk Assessment (BfR) and the European Food Safety authority (EFSA) both hold the opinion that uptake of mineral oil aromatic hydrocarbons (MOAH) should be minimised. As regards food contact items, exposure could be minimised by using, for instance, fresh fibre cartons, mineral oil-free printing inks, or by integrating functional barriers in the packaging design. The measurements showed that the large majority of samples (93.2%) complied with the guidance levels recommended by the BfR and the detection limit defined in the draft of the 22nd Regulation amending the *Regulation on Food Contact Items* (short in German “*Mineralölverordnung*”). Overall, nine out of 132 samples of packed foodstuffs (6.8%) exceeded the – so far not binding – limit value for migration of mineral oil components from food contact items made from paper, carton, cardboard, or recycling paper. MOSH/MOAH distribution patterns showed that the mineral oil entry in these nine foodstuff samples mainly stemmed from packaging materials. The percentage of non-compliance with the guidance limit values has minimally increased compared to the findings in the year before (6.1% non-compliant samples).

4.3 Preservatives in colours for painting and drawing, and modelling materials

Assessment guidance values for one or more isothiazolinones, as defined by the industrial standard DIN EN 71-9:2005+A1:2007, which were used to evaluate accessible liquids in toys, modelling pastes, plasticine and similar materials intended for children aged over 36 months, were exceeded in two samples (3.8%, not considering finger paints). The limit values defined in Annex C of Directive 2009/48/EC for watery toys intended for children aged under 36 months or intended for children taking the toys into their mouths were exceeded as regards one or more isothiazolinones in ten out of 52 samples (19.2%, not considering finger paints). These limit values do not hold for all of the toys examined. But as playing with these toys is connected with intensive skin contact, one can assume an enhanced allergy risk for children. Isothiazolinones are not allowed in the manufacture of finger paints, yet these were present at quantifiable, though low levels in 11 out of 21 samples. Moreover, 3 of the 21 finger paint samples did not comply with the maximum level for 2-phenoxyethanol, a faint contact allergen. Two samples contained quantifiable amounts of phenol, which is not allowed as a preservative in finger paints.

4.4 Element release from jewellery and piercings from metal, and from any materials

Assessment of the absolute findings non-compliant with nickel limit values showed a rate of 7.0% in piercings/earrings and 10.0% in jewellery. These findings show that the problem of nickel release should continue to get enhanced attention in the framework of official control. New data were also raised for chromium and cobalt, which are relevant as allergens, and aluminium, which is also currently in the centre of discussions. As regards release of chromium and cobalt, the very low median values showed that the majority of jewellery samples had low release levels. However, there were single cases of very high release rates. The high median value of aluminium release will continue to be monitored in future.

4.5 Migration of melamine and formaldehyde from melamine resin, urea formaldehyde resin, and phenol formaldehyde resin plastic items intended for consuming foodstuffs, and manufactured using “natural” materials such as bamboo and maize

Of the samples analysed, 10.7% exceeded the specific migration level (SML) for formaldehyde, and 25% exceeded the SML for melamine in the 3rd migrate. In the 5th migrate, there was an increase in migration of melamine, while levels of formaldehyde were similar to those in the third migrate. This leads to the conclusion that migration levels of these substances do not decline with repeated use of kitchen items, but may rather increase, namely as regards melamine.