Bundesamt für
Verbraucherschutz und
Lebensmittelsicherheit

Abstract Report on the National Monitoring 2013

Joint report by the Federal Government and Federal States

Table of content

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This Abstract Report presents a short overview about the findings of the analyses of foods, cosmetic products and commodities carried out in 2013. A full version of the Report on the National Monitoring 2013 is available in German from www.bvl.bund.de/monitoring2013. 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/EN/01_Food/05_LM_Monitoring_en/LM_Monitoring_EN_node.html

In line with the General Administrative Provisions (AVV) for the 2011-2015[1] Monitoring Scheme, the following foodstuffs, commodities and cosmetic products from the population's representative market basket were examined in 2013 (market basket monitoring):

1.1 Food of animal origin

- Milk (3.5 % fat, ultra heat-treated)
- Cream (sour, 10 % fat)
- Goat (meat)
- Pork (meat, liver, kidneys)
- Wild boar (meat)
- Blue mussels (*Mytilus* sp.*)*
- Prawns (giant prawns; gamba; king prawns)
- Plaice
- Honey

1.2 Food of plant origin

- Barley grains
- Rye grains
- Beans (dried)
- Poppy seeds
- Linseed
- Sunflower oil

[1] *"Allgemeine Verwaltungsvorschrift zur Durchführung des Monitorings von Lebensmitteln, kosmetischen Mitteln und Bedarfsgegenständen für die Jahre 2011 bis 2015 (AVV Monitoring 2011-2015)", BAnz no. 198 of 29.12.2010, p. 4364ff*

- Pistachios
- Walnuts
- Apple juice
- Pear juice
- Wine (red, white)
- Apple
- Peach
- Plum
- Strawberry
- Raspberry
- Pineapple
- Grapefruit
- Algae (dried)
- Basil
- Lettuce (head)
- White cabbage
- Broccoli
- Brussels sprouts
- Leeks
- Onion
- Tomato
- Courgette
- Tofu

1.3 Cosmetic products

- Tattooing/Tattoo inks

1.4 Commodities

- Clothes and footwear made of plastic
- Accessories made of plastic, e. g. bracelets
- Other commodities with body contact, e. g. sports equipment, buoyancy aids
- Commodities that can have contact with saliva, e. g. teats of baby feeding bottles or dummies, drinking spouts, balloons, teething rings, joke items
- Toys for children aged under 36 months
- Finger paints, toy colour muds

Depending on which undesirable substances were expected, the foods were analysed for residues of plant protection products and pesticides as well as for contaminants (e.g., dioxins and polychlorinated biphenyls, perfluorinated alkyl substances (PFAS), mycotoxins, elements and nitrate).

Cosmetic products (tattooing/tattoo inks) were tested for element contents, and colour tattoo inks were additionally analysed for aromatic amines.

Commodities were examined for contents of plasticisers or nitrosamines and nitrosatable compounds depending on the materials. In finger paints and toy colour muds, both the content of preservatives and the microbiological status were determined.

In addition to *market basket monitoring*, the following special topics were examined with regard to foodstuffs in order to close knowledge gaps for risk assessment and to address current questions. This part of the programme is called *project monitoring*:

- Ergot alkaloids in bread and baking mixtures
- Mercury in wild mushrooms and wild mushroom products
- Dioxins and dl-PCBs in dried leafy spices and herbs

As far as comparison with results from earlier monitoring studies was possible, this was considered in the interpretation of findings. It must be emphasised that all statements and assessments in this report concerning the presence of substances, which are undesirable from a health point of view solely refer to the products, substances and substance groups studied in 2013. An estimation of the entire exposure to certain substances is not possible because only part of the market basket can be examined per year and the substances occur in other products.

Altogether, the findings of the 2013 food monitoring programme again support the recommendation that nutrition should be manifold and balanced in order to minimise the dietary intake of undesirable substances which is, to some degree, unavoidable.

In total, 7,929 samples of products of domestic and foreign origin were analysed in the framework of market basket and project monitoring in 2013, including 6,978 samples of foodstuffs, 559 samples of commodities, and 392 samples of cosmetic products. In detail, the findings were as follows:

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 one sample of pork meat (1.2 %), 11 % of pork liver samples, 23 % of honey samples, 27 % of plaice, and 42 % of the milk samples. Compared to earlier monitoring studies, this was clear decline of findings in pork meat and liver, a small decline in honey, and an increase in milk.

As in many other foodstuffs of animal origin – apart from honey – findings were mainly residues of ubiquitously present, persistent organochlorine compounds. These were once used intensively and still find their way into the food chain via environmental contamination.

Honey carried some residues of various plant protection products. One sample of lime honey exceeded the maximum residue level of azoxystrobin, and one that of mecoprop.

The residues gave no indication of an acute health risk for the consumer.

2.1.2 Food of plant origin

Residues of plant protection products were detected in various amounts in all foodstuffs of plant origin analysed. More than 84 % of apple juice and onion samples did not have quantifiable residues; neither did 60 % of the samples of dried beans, broccoli and white cabbage. The highest percentages of samples with quantifiable residues (>80 %) were in pineapple, apples, basil, strawberries, grapefruit, lettuce, peaches/nectarines and tomatoes. The same products plus raspberries were also those with the most frequent findings of multiple residues. The highest number of residues found in one sample was 19 substance residues in a sample of apples, followed by 15 substances in a sample of peach and 14 substances in a sample of basil.

Three per cent of samples of domestic vegetal foods showed residues of substances not allowed for use in the respective crops in Germany in 2013. Most conspicuous here were strawberries and leek.

Apple juice, pear juice, strawberries, leek, rye grains, Brussels sprouts, wine and white cabbage did not exceed any legal Maximum Residue Levels (MRL). On the other hand, basil and pineapple had the highest proportions of samples with residues above MRLs, with 6.8 % (basil) and 3.5 % (pineapple), respectively. In the eleven other vegetal foods analysed, this proportion ranged between 0.5 and 1.8 % of samples.

The percentage of samples exceeding MRLs was significantly lower in products from Germany (0.6 %) and Europe (0.9 %), compared to products from Third Countries (4.4 %). In addition, the percentage of samples without any quantifiable residues in domestic products was twice as high as that in samples from foreign products.

None of the residues found, including those above legally fixed maximum levels, harboured an acute health risk to consumers.

2.2 Dioxins and polychlorinated biphenyls (PCB)

The medians of upper bound levels of dioxins and dioxin-like PCB measured in wild boar meat in the framework of this monitoring programme were found roughly as high as in routine official food control testing. As regards the geographic distribution, a representative statement is not possible, because of the small number of samples (n=41) in the 2013 monitoring programme. None of the samples exceeded the maximum permitted level of dioxins and dioxin-like PCBs in wild boar meat fixed in the National Regulation on Contaminants.

Mean contents of dioxins and dl PCBs in refined sunflower oil indicate a very low level of contamination.

Plaice muscle showed only low levels in the 2013 monitoring. This indicates that the underlying contamination of catching areas is also low. The data did not allow a breakdown on catching areas.

All samples analysed of plaice muscle and refined sunflower oil complied with the maximum levels for dioxins (WHO-PCDD/F-TEQ), the sum of dioxins and dl PCB (WHO-PCDD/F-PCB-TEQ) and the sum of indicator PCB (ndl PCB).

The special monitoring of dried herbs and spices showed that dried herbs are to very different degrees contaminated with dioxin and PCB. The monitoring data did not allow establishing a general link between the origin of the herb samples and their contamination. A health risk to consumers is very unlikely because of the small amounts of consumption.

2.3 Perfluorinated alkyl substances (PFAS)

PFAS are ubiquitous in negligible levels in the environment. This may result in unavoidable so-called background contamination of foodstuffs. Analytic results of this monitoring programme showed that milk and pork liver – both were examined for PFAS for the first time – carried only low levels of PFAS. Legal maximum levels of these substances in foodstuffs have not been set as of yet.

Out of the 15 individual substances analysed, only perfluorooctanoic acid (PFOA) perfluoropentanoic acid (PFPeA) and perfluoroheptanoic acid (PFHpA) were measured to negligible levels in milk, and perfluorooctane sulfonate (PFOS) and PFOA in pork liver.

As regards foods of vegetal origin, only perfluorohexanoic acid (PFHxA) was quantified in three, and perfluorohexane sulfonate (PFHxS) in one apple sample. In the other vegetal foodstuffs analysed for PFAS, such substances were not detectable.

2.4 Mycotoxins

2.4.1 Aflatoxins B1, B2, G1 and G2

Barley grains, dried beans, poppy seed, and linseed, which were examined for mycotoxins for the first time under this monitoring, showed a very low aflatoxin contamination level.

Pistachio kernels sampled on retail level showed median levels of both the individual aflatoxins and the sum of aflatoxins at the same low level as in the previous year. Only one pistachio sample originating from the US did not comply with the legal maximum level for aflatoxins (both individual and sum parameter).

The number of walnut samples tested for aflatoxins in 2013 was not representative. Quantifiable levels were not found.

2.4.2 Ochratoxin A (OTA)

The highest OTA levels in food in the 2013 monitoring were measured in pistachios, with 0.6 µg/kg.

Linseed showed higher OTA contents than in earlier studies, while levels in poppy seed were lower, compared to findings in 2005.

The contamination of barley grains with OTA clearly declined in the mean compared to 2001, when barley grains were last analysed for OTA.

Walnut, dried beans and apple juice – the latter two were tested for OTA for the first time – were found with very low levels.

Very low levels were also found in samples of pork liver and kidney, and in muscle of wild boar.

2.4.3 T-2 toxin, HT-2 toxin

The presence of T-2 and HT-2 toxins was relatively frequent with quantifiable levels in barley grains. The average content in the sum of T-2/HT-2 toxins was roughly at the same high level as last year's findings in oats grains. Two samples of barley grains from Germany exceeded the guidance maximum level in cereals intended for direct consumption, which is 50 µg/kg.

2.4.4 Ergot alkaloids

One monitoring project looked into the presence of ergot alkaloids in baking mixtures and bread. The proportion of samples of rye-containing baking mixtures/flours and of breads baked from these flours with quantifiable levels of ergot alkaloids was around 40 % and 30 %, respectively. The levels of ergot alkaloids measured in these samples did not correlate with the rye contents in the samples analysed. In order to identify the origin of ergot alkaloids in a bread, and define the content of ergot alkaloids in the individual raw materials compared to the whole bread, it would be necessary to sample all relevant raw materials, the total recipe, and the finished bread as one sample with subsamples.

The most frequently occurring ergot alkaloid in baking mixtures/flours was ergotamine, while, in addition to ergotamine, ergometrin and its less active isomer ergotmetrinin were the most frequent ergot alkaloid in bread.

Ergot alkaloid patterns found in baking mixtures/flours and in bread were roughly similar, but levels in breads were about 50 % lower.

The findings of this monitoring project were clearly influenced by some single samples with higher levels of contamination. The maximum total content of alkaloids was 830 µg/kg in baking mixtures/flours and 265 µg/kg in bread. The 90th percentiles of total alkaloid contents, however, were 131 µg/kg in baking mixture/flours and 49 µg/kg in bread.

The present data was not suitable to determine how ergot alkaloids are degraded during the food production process. Further studies should be made in order to answer this question.

2.5 Elements

2.5.1 Lead

The foodstuffs of animal origin analysed in 2013 generally contained low levels of lead. Blue mussels showed a higher degree of contamination than the other foods of animal origin, which is attributable to their role of a "biological filter", by which they accumulate certain amounts of contaminants, such as lead or other toxic elements. Therefore, higher lead levels were to be expected in this food. Still, none of the blue mussel samples analysed exceeded the maximum level for lead fixed by Regulation (EC) No. 1881/2006.

As regards the vegetal foodstuffs, lead levels decreased compared to previous years in barley and rye grains, dried beans, poppy seed, linseed, walnuts and tofu. They continued to be low. In pear juice,

grapefruit, basil and Brussels sprouts, too, lead levels were low. These foodstuffs were examined for lead for the first time in the framework of the monitoring.

Relatively high levels of lead were measured in the 40 samples of dried algae tested for the first time in the framework of this monitoring programme. One has to acknowledge that algae are particularly accumulating heavy metals from water, which can result in increased contamination. Lead contents in dried algae should be further monitored in future programmes.

2.5.2 Cadmium

The foodstuff samples of animal origin analysed in 2013 (milk, sour cream, goat meat, prawns, and plaice) were only contaminated to a small degree with cadmium. One plaice sample exceeded the legal maximum level, but this was a single case in this kind of fish. Blue mussels showed a higher degree of contamination than the other foods of animal origin, which is attributable to their role of a “biological filter”, by which they accumulate certain amounts of contaminants, such as cadmium or other heavy metals. Still, none of the blue mussel samples analysed exceeded the maximum level for cadmium fixed by Regulation (EC) No. 1881/2006.
As regards the vegetal foodstuffs, cadmium levels in barley and rye grains and in walnuts continued to be at about the same low level as in previous years. Although the maximum level for cadmium as fixed in Regulation (EC) No. 1881/2006 was exceeded in two samples of rye grains, the mean levels of cadmium in this food were not conspicuous. So, the non-compliant samples are probably attributable to a punctual increased contamination.

Pear juice, grapefruit, basil and Brussels sprouts, had only low levels of cadmium. These foodstuffs were examined for cadmium for the first time in the framework of the monitoring.

The highest cadmium level was found in dried algae. Forty samples of dried algae were tested for the first time for cadmium in the framework of this monitoring programme in 2013. Algae accumulate heavy metals from water to a particular degree, which explains the increased contamination found in this food.

Increased concentrations of cadmium were also found in poppy seed and linseed. Oil seeds in general count among the foods with potentially high cadmium levels, because the plants take it selectively up from the soil and accumulate it in the seed. Permanent reduction of cadmium levels can only be achieved by growing oil seed crops on soils with particularly low contamination levels. It is an encouraging fact that medium cadmium levels in linseed were significantly lower in 2013 than in previous studies in 1999 and 2005. The cadmium levels in algae and oilseeds such as poppy and linseed should be further monitored in the future.

2.5.3 Mercury

Milk, sour cream, goat meat, and giant prawns had low levels of mercury. Blue mussels and plaice showed comparatively higher mercury levels. These findings were to be expected because mercury is characteristically accumulated in these foods of aquatic origin. Still, neither blue mussels nor plaice had a finding exceeding the maximum level for mercury in these foods fixed in Regulation (EC) No. 1881/2006.

As regards the vegetal foodstuffs tested for mercury, levels found were also low. It was not measurable in tofu. Therefore, in contrast to the situation in 2002, there were no noteworthy finding of mercury in these foods.

Samples of barley and rye grain, dried beans, and linseed tested for mercury showed also low levels. Two samples of rye grains exceeded the mercury maximum levels fixed in Regulation (EC) No. 396/2006. However, this was not a general finding, but was attributed to a punctual increase in mercury levels.

Samples of wild mushrooms, in particular edible boletus (cep) and products therefrom, tested in the framework of a special project had increased levels of mercury, considering current legal maximum levels. If wild mushrooms are consumed in great amounts or daily, health risks cannot be excluded.

2.5.4 Copper

In the foodstuffs of animal origin analysed, the median values of copper levels ranged from 0.09 mg/kg (in milk) to 1.38 mg/kg (in blue mussels). In the foods of vegetal origin, the medians ranged from 0.28 mg/kg (pear juice) and 15.9 mg/kg (poppy seed). Maximum levels pursuant to Regulation (EC) No. 396/2005 were exceeded in only one sample each of goat meat, barley grains, and poppy.

2.5.5 Aluminium

For most of the foodstuffs analysed for aluminium during the 2013 monitoring programme, there are no results available from previous monitoring studies to serve as a comparison.

The median values of aluminium levels found in foodstuffs of animal origin were between 0.25 mg/kg (milk) and 1.57 mg/kg ([giant] prawns), which is low. Compared to that, blue mussels showed relatively high aluminium contents, with a median level of 21 mg/kg and a maximum concentration found of 157 mg/kg. This was attributed to the fact that mussels accumulate substances from the surrounding water.

In the foods of vegetal origin tested, median levels were between 0.2 mg/kg (grapefruit) and 7.7 mg/kg (dried beans). Linseed, poppy seed and dried beans in general had higher concentrations owing to accumulation of aluminium from the soil. In some foods, residues from use of plant protection products could not be excluded as a possible source of contamination.

Also conspicuous were high levels of aluminium in dried algae, and here in particular the maximum concentration found, 3,414 mg/kg. These very high levels might be explained by the fact that algae accumulate substances from the water surroundings to a particular extent, and the accumulated content is further concentrated during the drying process. Considering the consumption habits in Germany, however, a risk to human health is not to be expected. These findings should be reason to continue the monitoring of these levels in future programmes.

2.5.6 Arsenic

Contamination with arsenic was negligible for foodstuffs of animal origin analysed in 2013: milk, sour cream, and goat meat. Concentrations were clearly higher in marine samples of blue mussels and prawns (kings prawns), and in particular in plaice. Sea fruit and fish accumulate various substances (such as elements) from their natural water surroundings, which explains the increased arsenic contents of these foods. However, arsenic is usually present in sea fruit and fish in the form of less toxic organic compounds.

The foodstuffs of vegetal origin tested in 2013 showed mainly low levels of arsenic. Yet, dried algae showed very high levels. Dried algae were tested for arsenic for the first time in the framework of the monitoring programme. Algae accumulate arsenic in particular in the form of organic compounds, which explains the high levels in that product.

2.5.7 Nickel

For most of the foodstuffs analysed for nickel in 2013, there are no results available from previous monitoring studies to serve as a comparison. The middle contents (median values) for most foodstuffs of plant and animal origin analysed were on a low level. Only dried beans, linseed and walnuts had relatively increased nickel contents.

2.5.8 Iodine

Iodine contents analysed in milk and sour cream in the 2013 monitoring showed that levels in milk had increased compared to levels documented in literature in the past few years. Owing to the adding of iodine to animal feed, milk and milk products have now become significant sources of iodine. The current iodine content in milk contributes to an improved iodine supply to the population in Germany and does not pose a health risk.

2.6 Nitrate

Brussels sprouts, which were analysed for nitrate for the first time in the monitoring programme in 2013, did not contain any quantifiable nitrate levels.

Although nitrate levels have slightly decreased compared to previous years, and only one non-compliant concentration (above the established maximum level) was found, head lettuce still had relatively high nitrate levels. It continues to be a potential source of exposure. We maintain our recommendation to take suitable measures to effectively reduce nitrate levels in head lettuce.

3. Cosmetic products (tattooing/tattoo inks)

3.1 Elements

In the 2013 monitoring, the proportion of tattoo ink samples with measurable contents of the elements antimonium, arsenic, lead, cadmium and mercury was higher than found in the 2007 National Control Plan (“Bundesweiter Überwachungsplan”, BÜp). This is alarming because sampling for the National Control Plan is oriented on potential risks, while sampling for the monitoring programme is representative.

Arsenic contents in general are higher than results have shown in the 2007 BÜp. The European Council’s recommended maximum levels of arsenic and the other elements subject to this study in tattoo inks, and the respective recommendations put forward in the framework of this monitoring programme, were largely complied with, though.

Quite high levels of barium were found in a number of colour tattoo inks. Though use of barium-containing dyes is permitted in tattoo inks under certain conditions, it may result in a considerable barium load in some cases.

Nickel contents were below 10 mg/kg, apart from few exceptions. Nickel contents should be as low as possible, given the fact that allergies are individual intolerances with sometimes considerable consequences on the health of persons affected.

3.2 Primary aromatic amines

The low levels of primary aromatic amines found in colour tattoo inks in the 2013 monitoring programme complied with the legal regulations, apart from few exceptions.

4. Commodities

4.1 Plasticisers

The material of toys and baby articles, in particular such that young children may take in their mouths, consisted to about one third of the soft plastic PVC. The rest was made of other materials where plasticisers are not to be expected. DBP was detectable in 10 % of toy samples representing jumping jacks and dolls.

Of the 254 samples of product groups others than toys, nearly 46 % consisted of PVC. Not all plasticisers looked for were found in all samples. Monitoring findings showed neither a tendency towards more use of plasticisers – which is still not subject to legal restrictions – nor a tendency towards not using phthalates, which are toxic to reproduction.

4.2 Nitrosamines and nitrosatable substances

While the large majority of samples of baby bottle teats and soothers of natural or synthetic rubber complied with the maximum levels of nitrosamines and nitrosatable substances allowed in these products, three product samples still exceeded this level. This is unacceptable, because it means that babies as an extraordinarily sensitive consumer group are exposed to those potent carcinogenic substances, and thus possibly to an increased health risk.

19 % of balloon samples exceeded the permitted maximum level. The recommendation to avoid the risk to consumers is to use a pump to blow up the balloons.

4.3 Preservatives

In finger paints, only Kathon exceeded the permitted maximum level. Apart from that, some single samples were found to contain chloromethylisothiazolinone, which is not allowed as a component in finger paints. Both substances being strong contact allergens, finger paints containing these substances may pose an increased allergy risk to children.

4.4 Microbial status of finger paints and toy colour muds

Monitoring tests of the microbial status of finger paints and toy colour muds produced a moderate number of quantifiable microbial levels, which indicate insufficient hygienic conditions or microbiologically contaminated raw materials. There were no potentially pathogenic contaminants, however, and hence, no acute health risk to be expected for children.