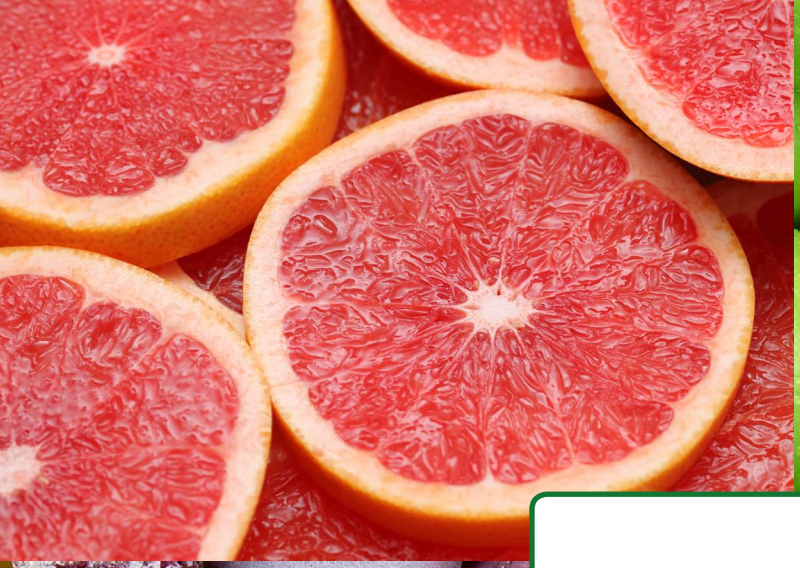
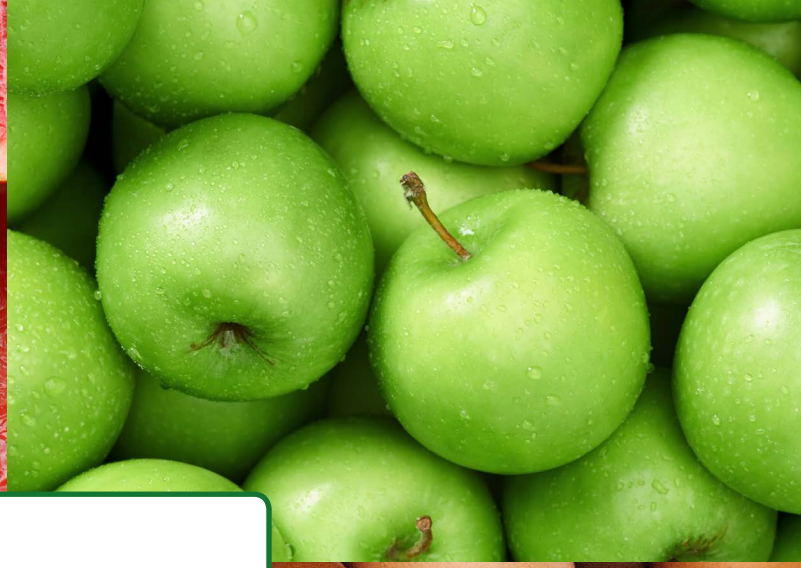



The Expert Committee on Pesticide Residues in Food (PRiF)

Annual Report 2018

PRiF
Pesticide Residues in Food


The Expert Committee on Pesticide Residues in Food oversees a programme that checks food and drink in the UK for traces of pesticide residues.

- We are appointed by the Department for Environment, Food and Rural Affairs (Defra) to advise Defra, the Northern Ireland Executive, the Scottish Government, the Welsh Government, the Health and Safety Executive and the Food Standards Agency on a monitoring programme that checks food and drink in the UK for traces of pesticide residues.
- One of the purposes of the programme is to check whether residues found in food and drink are above the maximum residue levels (MRLs) set by law.
- When we find residues, we assess whether the levels found are likely to impact on human health.
- We assess whether residues might be of concern to particular groups of consumers such as babies, toddlers and the elderly.
- Where more than one pesticide is found with similar modes of action, we assess if the impact of the sum of the residues is of concern.
- When problems are found, we take action including focused testing – and if necessary we advise the regulatory authority so that enforcement action can be taken.
- We act as a check on the regulatory regime.

The Expert Committee on Pesticide Residues in Food **does not**:

- advise whether pesticides should be approved for use or withdrawn from the market
- set government policy on pesticides
- take account of or assess the impact of pesticides on the environment
- promote the use of pesticides

This is the eighth annual report from the Expert Committee on Pesticide Residues in Food. It summarises the results from monitoring samples collected throughout 2018 and our conclusions about those results. It also describes the work that is being carried out in 2019.

Details of all the samples we have collected and tested are available at: https://data.gov.uk/dataset/pesticide-residues-in-food

If you have any comments about this report, please send them to prif@hse.gov.uk

Contents

1. Chairman's introduction

Dear Reader,

This is the eighth annual report from the Expert Committee on Pesticide Residues in Food (PRiF). The committee is made up entirely of independent members with a wide range of expertise.

Throughout 2018, PRiF have published quarterly reports on the results of the monitoring programme. We have also reported monthly on beans with pods, grapes, okra, and potatoes as part of our rolling programme. All of these results have been published on GOV.UK. In addition, we publish the results and sample details in an accessible, useable format on https://data.gov.uk/.

In 2018, we tested 3,385 samples of food and drink from the UK supply chain for pesticide residues. We tested for up to 373 pesticides in some of the commodities. The results showed us that 55.1% of the samples tested by the laboratory did not have any residues of the pesticides we tested for. The results also show that around 3.2% of the samples contained a residue above the MRL set by law.

We have reported results for chlorate separately from other residues as we are confident that the residues we are detecting come from use of chlorine-based disinfectants used to maintain microbiological safety (control microorganisms that cause food poisoning), not from use of pesticides used on plants. You will find a detailed explanation of this issue in this report. We responded directly to the European Commission consultation that in our opinion chlorate residues may prove impossible to reduce when the main source of chlorate is likely to be from treated drinking water or the use of legitimate biocides. We are working closely with our colleagues from the Advisory Committee on Microbiological Safety of Food on this topic.

Part of the monitoring programme is targeted at foods where we expect to find residues. Our programme uses the latest technology for analysis, which is constantly improving, and means that each year we can look for more pesticides at lower levels. For these reasons we expect to see a rise in the number of samples with residues detected, including some over the MRL. The Health and Safety Executive assesses the risk to consumer health for every sample that contains a residue at any level. From the results of these assessments we can see that even where food contains a residue above the MRL, there is very rarely any risk to the health of people who have eaten the food.

For information about the monitoring programme, please look at our page on GOV.UK:

www.gov.uk/government/collections/pesticide-residues-in-food-results-of-monitoring-programme

Please contact us if you have any comments: prif@hse.gov.uk

Yours sincerely

Dr Paul Brantom

Chairman
The Expert Committee on Pesticide Residues in Food

2. Executive summary

- 3,385 samples of 40 different types of food were collected in 2018.
- 45% of these samples contained a residue other than chlorate.
- We tested for up to 371 pesticides in fruit and vegetables, 106 in animal products, 369 in starchy foods and grains, 373 in infant food and 369 in other groceries.
- All of the samples in which a residue was detected were checked by the Health and Safety Executive (HSE) for risk to the consumers by means of a risk assessment screening mechanism. We published results of 29 detailed risk assessments where we wanted to consider in more detail whether there was a concern for human health.
- We referred five samples to the Food Standards Agency (FSA) as we had concerns about the potential risk to human health of people eating these foods. Where appropriate, the FSA notified the Rapid Alert System for Food and Feed (RASFF) about these samples.
- We referred 21 samples of UK produce to HSE's enforcement team as they contained residues of pesticides not approved for use in the UK on those crops. Where HSE could not identify an obvious reason for the residues, they investigated how these residues could have arisen.
- Residues of chlorate were not treated as breaches of the law. The position on the regulation of chlorate residues, and chlorine-based biocides, is still developing. We have presented results for chlorate separately to other results in Section 13.

3. About us

The pesticide residues surveillance programme monitors pesticide residues in food and drink in the UK supply chain. The term 'pesticide residue' means the chemical trace of a pesticide which may be found in or on our food. The agriculture and food industries use pesticides to help protect their crops from pests, including insects, weeds or fungal infections. The agriculture and food industries must comply with specific regulations.

We give advice on:

- setting up monitoring programmes for pesticide residues in UK food
- how to collect and process samples
- methods of analysing samples
- how to assess the results

We publish the monitoring results regularly on GOV.UK in an understandable way, and we aim to do this as quickly as possible without compromise of integrity.

The Expert Committee on Pesticide Residues in Food was formed in 2011, to carry on the work of the Pesticide Residues Committee (PRC) which ceased to operate in 2010.

Our members have been appointed by ministers from Defra, the Scottish Government, the National Assembly for Wales, and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland.

We give advice on the monitoring programme to:

- ministers
- the Chief Executive of the FSA
- the Health and Safety Executive's Chemicals Regulation Division (CRD)

We meet four times a year and representatives from government departments attend our meetings as officials. HSE provides our administration. We open one of our business meetings to the public each year.

The bigger picture

People are concerned about health, the environment and how food is produced. Pesticides used in the incorrect way or in the wrong amounts can harm people, wildlife and the environment, so they must be handled with care. Pesticides can only be used in UK agriculture if they are used in line with the law and guidance controlling their use.

As regulating pesticides is a complicated area, there are a number of different organisations involved. On behalf of Defra and the other UK agricultural departments, the Health and Safety Executive authorises and controls pesticides for use in the UK, as well as monitoring pesticide residues in the UK food supply no matter where the food was produced. The Food Standards Agency has overall responsibility for food safety.

Most residues come from pesticides being used on crops. To work effectively, pesticides must be used in the correct amounts and at the right time. The amount of residue in a food is dependent on:

- how much pesticide was used
- when it was applied in relation to harvest date
- how it is metabolised by plants and animals
- how it breaks down in the environment

In addition to this, residues can sometimes be due to contamination (small amounts of pesticide that remain in the environment after legitimate use). Due to significant technical improvements in laboratory analysis, we now have the capability to detect very low levels of residues and so it is possible that, as methods become more sensitive, we may find more residues.

Our work and open reporting system has encouraged producers and retailers to be responsible about their use of pesticides and how they supply food to people. We are transparent about our work and publish the results, including brand names, where samples were obtained and where possible who produced them.

The Expert Committee on Pesticides (ECP)

The Expert Committee on Pesticides (ECP) is responsible in the UK for giving advice on using and handling pesticides and for considering incidents related to the effect pesticides have on wildlife and pets. The ECP assesses pesticides before they can be used and sold in the UK. It advises the government if a pesticide should be approved, what crops it may be used on, how it may be used and how much can be used on a crop. It takes account of any new information about an approved pesticide to see if it should be used at a reduced rate, under different conditions or withdrawn from sale. We let the ECP know if we see something in our results that falls inside their remit.

Maximum Residue Levels (MRLs)

Maximum Reside Levels (MRLs) are set in law at the highest level of pesticide that the relevant regulatory body would expect to find in that crop when it has been treated in line with good agricultural practice (GAP). When MRLs are set, effects of the residue on human health are also considered. The MRLs are set at a level where consumption of food containing that residue should not cause harm to consumers.

If a food has a higher level of residue than the MRL, it does not automatically mean that the food is not safe to eat. A residue above the MRL may show that the farmer has not used the pesticide properly. Some pesticides may be permitted for use in the country of export but not be permitted for use in the EU, and so the MRL may be set at the lowest level that official laboratories can normally detect. This is known as the limit of determination (LOD). An LOD MRL is indicated by an asterisk after the level (i.e. 0.01* mg/kg).

The Food Standards Agency (FSA) update

The main objective of the Food Standards Agency (FSA) is to protect public health from risks that may be associated with the consumption of food (including risks caused by the way in which it is produced or supplied) and otherwise to protect the interest of consumers in relation to food. The FSA attends PRiF meetings as an assessor and works closely with us, and with HSE, on pesticide residues issues.

The FSA has enforcement responsibility at the border for pesticides in food coming into the UK from outside the EU. This is normally carried out on behalf of the FSA by Port Health Authorities. In 2018, the UK border controls found eight incoming consignments of commodities from non-EU countries that contained non-compliant levels of residue associated with a possible risk to health. Of these, four were confirmed to be of potential concern. Four of the consignments were from India although these concerned different commodities and/or residues, two were from the Dominican Republic and the remainder from other third countries. There was no evidence of a recurrent problem. All of the consignments were either rejected at the port or seized for destruction and none entered the food chain.

4. The monitoring programme

We are interested in whether pesticides meet legal trading levels and if there is any risk to people's health.

Collecting and testing samples

The size of the sample and the number of individual units of a food within each sample is set down in regulation. For example, for apples the sample must be made up of at least 10 apples and weigh at least 1 kilogram.

We send samples to the following laboratories to be tested:

- Agri-Food and Bioscience Institute (AFBI) – Belfast
- Fera Science Ltd – York
- Science and Advice for Scottish Agriculture (SASA) – Edinburgh

Residues tested for

We test for pesticides that are expected to be found in those products as well as other pesticides in a wider analytical suite.

Over the last 15 years the number of pesticides we test for has risen. The increase is consistent with the current capability of most laboratories which test food for pesticide residues.

The choice of pesticides tested for in a survey depends on:

- which pesticides have been found before
- what we know is being used to grow specific foods, (that is, which pesticides are approved for certain crops)
- what we know about pesticides used in the UK and other countries
- what we know about pesticides being found in tests in other countries
- the risk residues of that pesticide may present
- the maximum residues levels set in law

Why we chose certain foods

There is a wide range of foods available in the UK throughout the year. To make the most of resources and make sure we test a wide range of food, the programme changes from year to year.

When we choose the foods to test in a year, we take account of many factors. Some foods are so common in our diets that even if PRiF normally finds few or no residues, it is right to carry on checking them. Although there have been no recent health concerns we continue to monitor staples like milk and bread because of their role in our diet.

We group the foods into five categories:

- fruit and vegetables
- animal products
- starchy food and grains
- miscellaneous groceries
- infant food

Other foods are less commonly consumed but are important in the diet of some groups of people; speciality fruit and vegetables are a good example. So, we check these to protect those who consume these foods most frequently or in the greatest amount. Some foods that are not staples in our diets are still included most years because we regularly find residues in them that are not compliant with the MRLs.

We also keep an eye out for new trends in diets, like the increased sale of pots of prepared fruit in recent years. We bear in mind different shopping habits in our sampling, like buying from street markets, greengrocers or supermarkets.

We also take account of monitoring data from other countries as well as information from the Rapid Alert System for Food and Feed (RASFF). EU member states use the RASFF to share notifications of foods which could be a risk to human health.

Each year we contribute to Europe-wide surveys of main food groups collected to an agreed timetable. In 2018, aubergine, banana, beef, broccoli, eggs, grapefruit, grapes, melon, mushrooms (cultivated), olive oil, peppers and wheat formed part of this larger survey. These results are then shared with the European Food Safety Authority (EFSA), who compile and publish a single annual report.

Each year we publish our proposed list of foods to be sampled. In 2017, we developed in conjunction with HSE a monitoring matrix ranking tool which helps determine the priority of the relative surveys. We hope this will enable a more objective approach: https://www.gov.uk/government/groups/expert-committee-on-pesticide-residues-in-food-prif#minutes-and-papers

We publish detailed results from the programme every three months. In 2017, we changed the way our reports were published, to make them easier to navigate and to be more user friendly to readers. We carried on with this format in 2018.

The reports are published in two parts. The first is the Quarterly Summary report which details the findings, risk assessments that were carried out and any comments from the committee. This part of the report is published on GOV.UK: https://www.gov.uk/government/collections/pesticide-residues-in-food-results-of-monitoring-programme#quarterly-reports

The other part of the report provides all the sample details, such as brand name information, what was detected in each sample, and what residues were sought and not found in each survey. This part of the report is published in an accessible format at: https://data.gov.uk/dataset/pesticide-residues-in-food

Report	When samples collected	When report published
Quarter 1 2018	January – March 2018	September 2018
Quarter 2 2018	Up to June 2018	December 2018
Quarter 3 2018	Up to September 2018	March 2019
Quarter 4 2018	Up to December 2018	June 2019

Food and drink being monitored in 2019

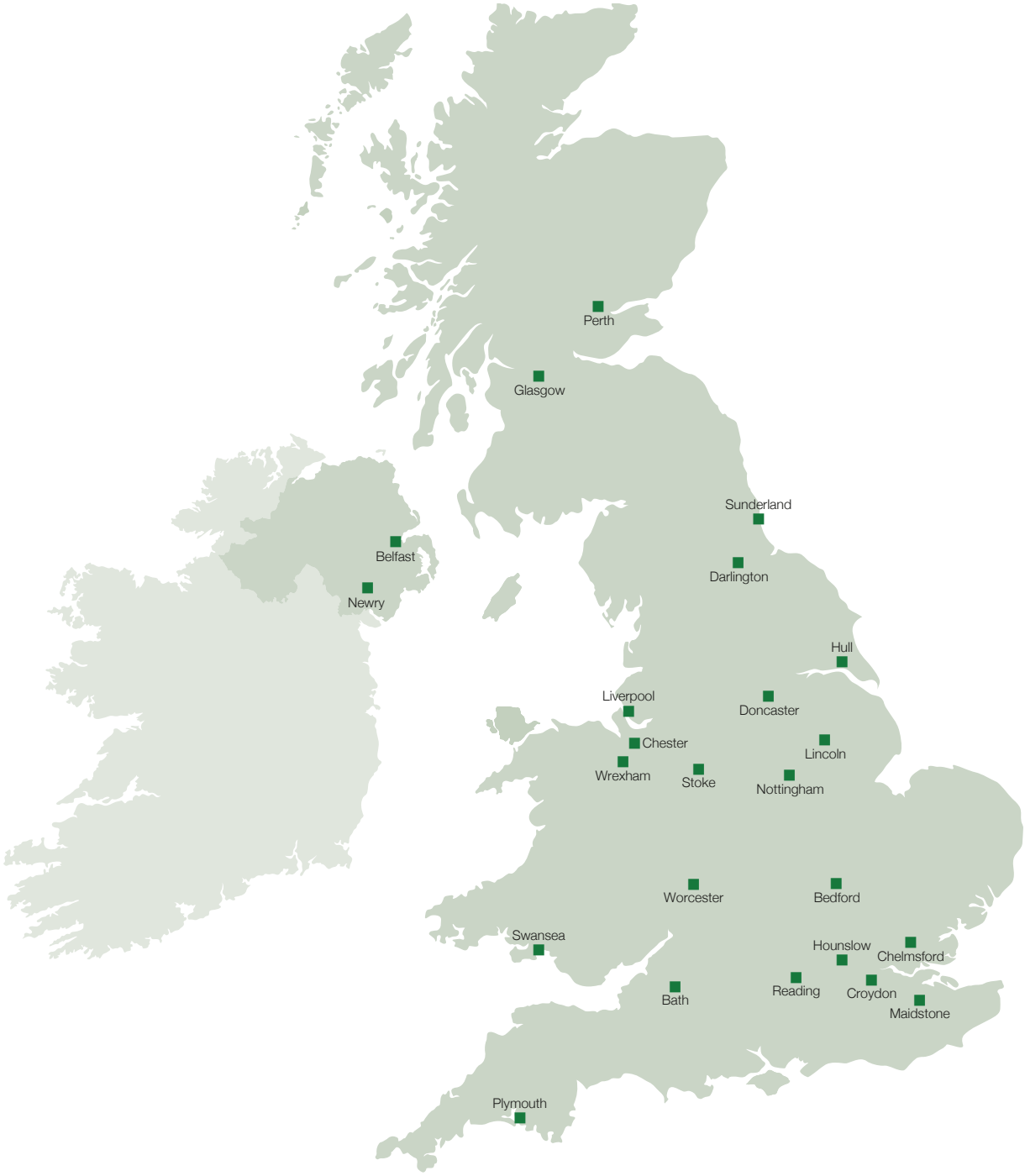
The 2019 programme started in January 2019.

Apples	Cooked meat	Oats	Pre-prepared salad leaves
Barley grain	Curry leaves	Okra	Rice
Beans with pods	Fish (sea)	Pasta	Shellfish
Bread	Grapes	Peaches and nectarines	Spices (turmeric)
Butter	Honey	Peppers	Spinach
Cabbage	Infant food (savoury)	Plums	Strawberries
Cheese (processed)	Lemons	Pork	Tomato
Chilli peppers	Lettuce	Potato	Wine
Chocolate	Milk	Potato (processed)	

HSE is planning the programme for 2020. A proposed list of commodities for 2020 will be published for comments as a paper of a future PRiF meeting.

5. Where the samples were collected in 2018

Each year, samples are collected from different places throughout the UK. Two towns or cities are chosen from each government region. In 2018, we bought over 2,732 samples from retail outlets in 24 towns or cities in the UK. Government inspectors collected around 653 samples from places such as wholesalers, ports, supermarket distribution depots and processor factories. This allows samples to be collected from non-retail sources making the surveys more representative of the food chain.



6. Foods tested in 2018

As some foods are available at different times throughout the year from different parts of the world, we may collect samples of these foods over three, six, nine or twelve months. We sometimes report results of tests every six months rather than every three months. We do this when there are only a small number of samples in a survey or when we do not expect there to be many residues of interest in the results because analysing larger batches of samples is more economical.

We publish detailed results from the programme every three months. Reports for 2018 are available at: https://data.gov.uk/dataset/pesticide-residues-in-food

Details of the foods reported on in each quarter (Q1, Q2, Q3, Q4) are shown below:

Q1 report (January to March 2018, published September 2018)	**Q2** report (up to June 2018, published December 2018)	**Q3** report (up to September 2018, published March 2019)	**Q4** report (up to December 2018, published June 2019)
Apples	Animal fats	Apples	Animal fats
Aubergine	Apples	Aubergine	Apples
Banana	Aubergine	Banana	Aubergine
Beans with pods	Banana	Beans with pods	Banana
Beef	Beans with pods	Beef	Beans with pods
Broccoli	Beef	Berries and small fruits	Beef
Eggs	Berries and small fruits	Bread	Beer
Fish (white)	Broccoli	Broccoli	Bread
Frozen vegetables	Cheese (soft)	Cheese (soft)	Broccoli
Game	Chinese cabbage	Chinese cabbage	Cheese (soft)
Grapefruit	Cream	Eggs	Eggs
Grapes	Curry leaves	Fish (white)	Fish (white)
Lettuce	Eggs	Frozen fruit and smoothie mixes	Frozen fruit and smoothie mixes
Melon	Fish (white)	Game	Game
Milk	Game	Ginger	Ginger
Mushroom (cultivated)	Grapefruit	Grapefruit	Grapefruit
Okra	Grapes	Grapes	Grapes
Pears	Lettuce	Infant food (cereal based)	Lettuce
Peppers	Melon	Lentils	Melon
Pineapple	Milk	Melon	Milk
Potato	Mushroom (cultivated)	Milk	Mushroom (cultivated)
	Mushroom (speciality)	Mushroom (cultivated)	Okra
	Okra	Okra	Olive oil
	Pears	Pears	Pears
	Peas without pods	Peppers	Peas without pods
	Peppers	Pineapple	Peppers
	Pineapple	Potato	Pineapple
	Potato	Soft citrus	Potato
	Soft citrus	Vine leaves	Soft citrus
	Speciality vegetables		Speciality vegetables
			Wheat

7. Results from the 2018 programme excluding chlorate

Results for chlorate are presented separately in Section 13

In 2018, we tested 3,385 samples. We tested each sample for many different pesticides. In total we tested around 966,044 food and pesticide combinations.

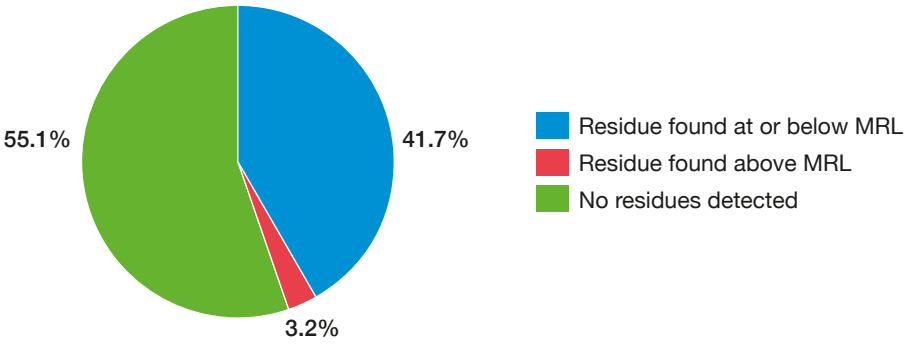
Of the pesticides we looked for we found that:

- 55.1% of samples contained none of the pesticides we looked for
- 41.7% of samples contained a residue at or below the MRL
- 3.2% of samples contained a residue over the MRL

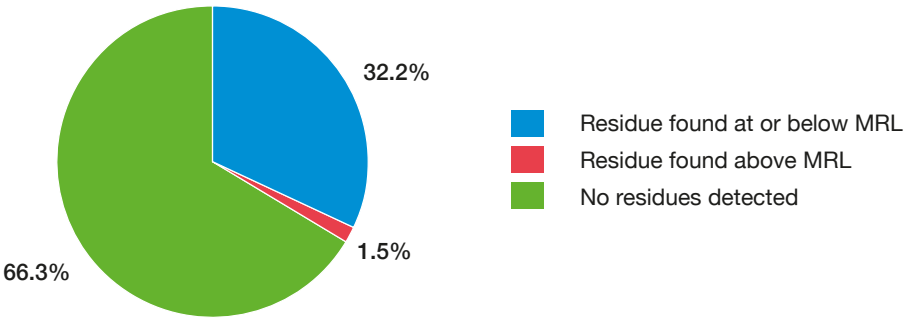
The monitoring programme looks at those foods in which we expect to find residues. Because of this, we cannot say that the results represent the UK food supply as a whole.

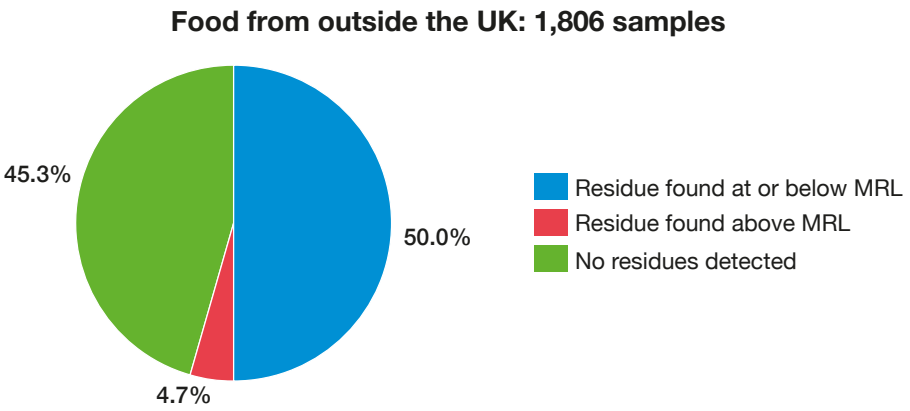
Some of the samples labelled as being from the UK may not have been produced in the country. The country of origin can be where the raw ingredient was produced, where the food was made, where it was packed from large shipments into smaller packs for retail sale – or it could be the home of the brand owners. For example, tinned tomatoes can be labelled as being from the UK, but the tomatoes in the tin could have been grown in Italy or China and then canned in the UK.

Overall results for 2018: 3,385 samples



Food from UK: 1,579 samples





Credit: Blue Skies

8. Fruit and vegetable results

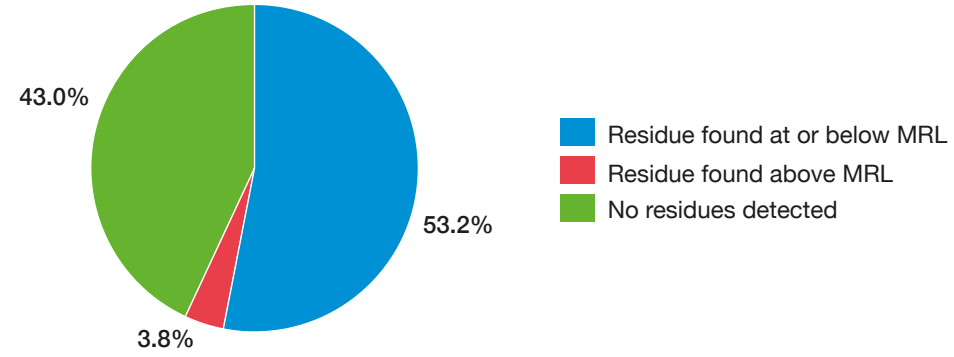
Results for chlorate are presented separately in Section 13

We tested 1,962 samples of fresh or frozen fruit and vegetables for up to 371 pesticides and carried out tests on around 684,187 food and pesticide combinations.

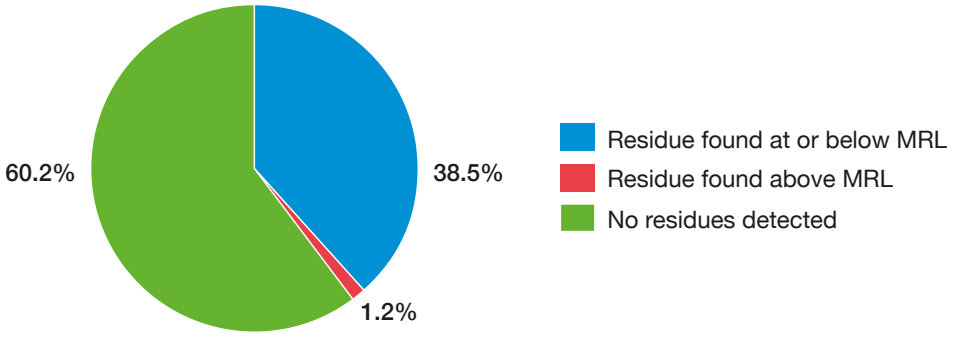
We found residues in 1,118 of those samples (57%). Of those samples, 74 (3.8% of the total) contained a residue above the MRL.

We tested 576 samples labelled as UK fruit and vegetables. We found residues in 229 (39.7%) of those samples, and 7 samples (1.2%) contained a residue above the MRL.

Overall results in fruit and vegetables: 1,962 samples



Fruit and vegetables from UK: 576 samples



Some of the frozen samples labelled as being from the UK may not have been grown in the country. The country of origin on the label can be where the original ingredient was produced, where the food was frozen, where it was packed from bulk for retail sale – or it could be the home of the brand owners. For example, frozen melon can be labelled as being from the UK, but the melon in the pack would have been grown elsewhere.

Main findings and actions

- We didn't find any residues above the MRL in apples, aubergines, bananas, lettuce and pineapples.
- Continuing a trend seen in previous years, all 21 samples of beans with pods that had residues over the MRL were samples of speciality beans. These are varieties not commonly grown in Europe so many of the pesticides have MRLs set at the Limit of Determination (LOD).
- Similarly, all the samples of ginger with residues over the MRL were grown outside Europe and the relevant MRLs were set at the LOD.
- Out of the 18 okra samples with MRL exceedances, 5 were samples of frozen okra. We collect frozen okra in the survey as it is usually from different sources than fresh okra.
- We found DDT in one sample of speciality vegetables (taro) from Bangladesh where we can't confirm that the residue came from historic use (see page 20 for more information on DDT residues).

Results by food type

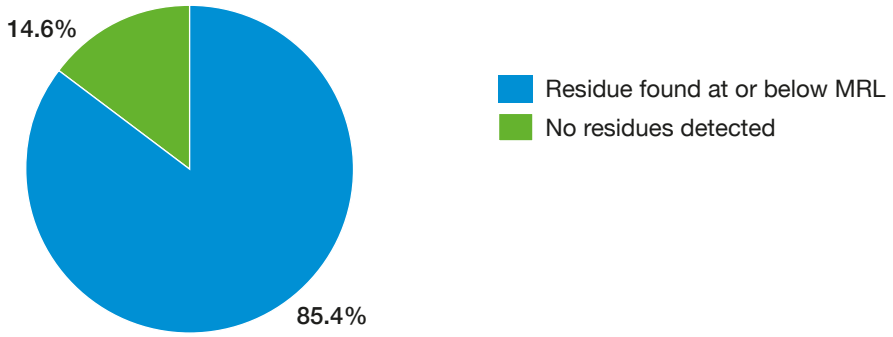
Food	Number of samples tested	Number of samples containing residues at or below MRL	Number of samples containing residues above the MRL	Number of samples containing more than one pesticide
Apples	96	59	0	42
Aubergine	96	56	0	26
Banana	71	41	0	35
Beans with pods	96	40	21	43
Berries and small fruits	96	60	6	40
Broccoli	96	27	1	9
Chinese cabbage	48	25	1	11
Frozen fruit and smoothie mixes	72	0	2	0
Frozen vegetables	24	0	0	0
Ginger	25	6	10	7
Grapefruit	96	95	1	95
Grapes	120	111	2	93
Lettuce	72	32	0	21
Melon	120	82	1	36
Mushrooms (cultivated)	71	12	1	5
Mushrooms (speciality)	24	6	2	1
Okra	90	24	18	22
Pears	95	68	1	63
Peas without pods	72	14	0	2
Peppers	96	54	3	35
Pineapple	96	53	0	20
Potato	157	76	1	18
Soft citrus	72	70	2	69
Speciality vegetables	61	33	1	14

9. Starchy food and grains results

We tested 288 samples for up to 369 pesticides. We carried out tests on around 106,056 food and pesticide combinations.

We found residues in 240 (85.4.%) of these samples. None of those samples contained a residue above the MRL.

Overall results in starchy foods and grains: 288 samples



Bread samples labelled as being from the UK may not necessarily have been made from wheat or rye grown in the country. The country of origin may be only where the bread was baked; the flour could be made from rye or wheat grown elsewhere.

Main findings

- We didn't detect any residues above the MRL.
- Glyphosate was sought in all 288 samples of bread and wheat. 25 samples contained glyphosate, all within the MRL.

Results by food type

Food	Number of samples tested	Number of samples containing residues at or below MRL	Number of samples containing residues above the MRL	Number of samples containing more than one pesticide
Bread	216	187	0	40
Wheat	72	59	0	14

Applying processing factors to find MRLs for bread (and other processed foods)

MRLs apply to all traded foods, including foods used as ingredients. The law specifies the level to apply to foods as they are traded. For almost all foods that means their raw, unprocessed form. But MRLs also apply to prepared and processed foods in which case the effect of processing needs to be taken into account.

To check that prepared and processed foods were made with ingredients that complied with MRLs, we use appropriate processing factors, based on scientific studies of the effect of preparation and processing. Different forms of processing remove, concentrate or dilute residues and the effect may also vary depending on the food and pesticide concerned.

The use of processing factors enables checks that the original ingredient was compliant with MRLs. Food manufacturers should have information on how they check their ingredients and also on their recipes and preparation techniques – for instance, how much water is added or removed, or how much of an ingredient is used to make a food.

10. Animal products results

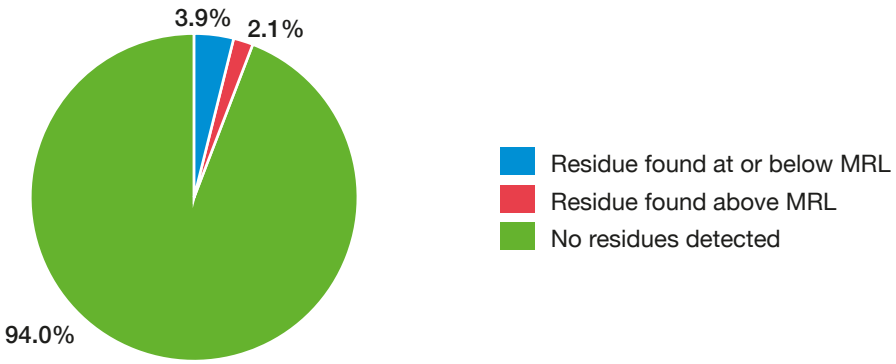
Results for chlorate are presented separately in Section 13

We tested 858 samples for up to 105 pesticides. We carried out tests on around 74,448 food and pesticide combinations.

We found residues in 63 (7.4%) of these samples. 16 of those samples (1.9%) contained a residue above the MRL.

18 of the 108 fish samples tested (17%) contained residues. There are no MRLs for fish, so the chart below excludes fish.

Overall results in animal products other than fish: 750 samples



Main findings

- We didn't find any of the residues we looked for in eggs. (Our routine testing of egg samples includes fipronil, which in the past has been found in other countries in Europe but not in the UK.)
- We didn't find any residues above the MRL in milk.
- Most of the residues in animal fats, fish, game and beef were of BAC or DDAC. We expect that these residues were from the use of disinfectants to clean surfaces and tools for storage and processing. See Section 13.
- We detected DDT in 2 samples of feta cheese, 3 samples of fish and 1 sample of beef. All these residues were in a form showing the residue was from historic use. See page 20.

Results by food type

Food	Number of samples tested	Number of samples containing residues at or below MRL	Number of samples containing residues above the MRL	Number of samples containing more than one pesticide
Animal fats	48	0	1	0
Beef	90	11	6	2
Cheese (soft)	96	3	1	0
Cream	36	2	0	0
Eggs	107	0	0	0
Fish (white)	108	18 residues detected*		2
Game	72	7	8	2
Milk	301	6	0	0

* There are no MRLs for fish.

DDT

This year we found DDT in samples of taro (1 sample), beef (1), soft cheese (2) and white fish (3). The levels we found were under the MRL, would not be expected to have an effect on health, and overall are consistent with the continued decline of this pesticide in the environment.

The use of DDT is banned in the UK and banned or heavily restricted in many countries worldwide. It isn't allowed for use on food crops any more, but it is still used in some countries outside the EU as a public health insecticide. Residues of DDT take a long time to break down in the environment and can accumulate in fatty tissue which is a major reason that it has been banned in the EU and many other countries.

Due to the bans and restrictions on use, the levels in food have decreased substantially since the 1960s and 1970s. Even so, because it takes a long time to break down we do expect, and do see, occasional DDT residues in our monitoring results. Overall, the incidence and the size of residues have fallen steadily over time, which is what we would expect. In recent years none of our findings were unusual, unexpected or of concern.

The residues we find nowadays are at levels that would not be expected to have any effect on health, either in the short term or in the long term, when checked against today's understanding of the effect of DDT on health. As a committee, we take care to ensure we look thoroughly at this, and the Food Standards Agency is also actively involved in our considerations.

For residues found in meat, fish and cheese in 2018, we can tell from the chemical form detected by the laboratories whether the residues are from historic use (which is what we usually find). We explain this every time we publish DDT results to try to make it as clear as we can that the results show food producers are not using DDT today. However, there are occasional media stories about DDT and various links and associations, which do not make this distinction.

Unusually the residue we found in taro was of parent DDT. Parent DDT is of a form of DDT that had not yet broken down in the environment. Based only on the chemical form, we can't confirm this is from historic use, and we can't investigate in detail because the taro was grown in Bangladesh.

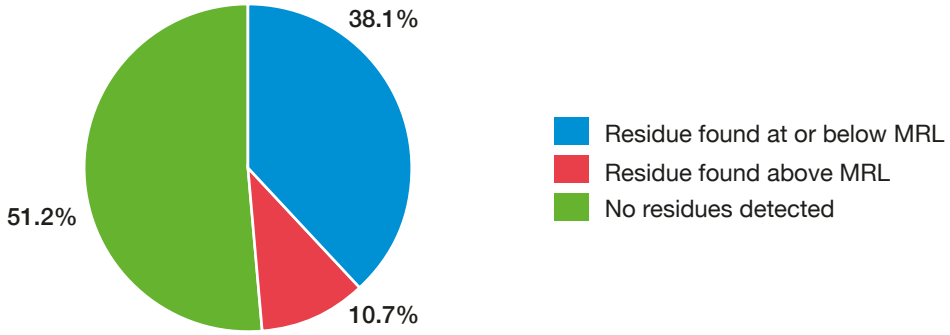
11. Miscellaneous groceries results

Results for chlorate are presented separately in Section 13

The miscellaneous groceries that we tested this year were beer, curry leaves, lentils, olive oil and vine leaves.

We tested 168 samples for up to 366 pesticides. We carried out tests on around 101,353 food and pesticide combinations. We found residues in 62 (34.2%) of the samples. 18 of those samples (10.7% of foods to which we applied MRLs) contained a residue above the MRL. 10 of the 72 samples of beer tested contained residues. We have not calculated MRLs for beer. The chart below excludes beer samples.

Overall results in miscellaneous groceries other than beer: 168 samples



Main findings

- As we expected, vine leaves (mostly canned or preserved, but a few dried samples) and (dried) curry leaves had a relatively higher rate of both residues over the MRL and multiple residues. We think this may be because these foods are combined from many different sources before they are processed, but also because they are not produced with a view to complying with EU MRL standards. None of the residues found were expected to have an effect on health – see Section 15.
- We detected residues in 14% of beer samples, as expected as they were of pesticides used on cereals. We tested all 72 samples for glyphosate and did not find any residues.
- We tested all 48 samples of lentils for glyphosate. We found residues in 29 samples of which one residue was over the MRL. The findings were in line with our expectations, as glyphosate is widely used on lentils.

Results by food type

Food	Number of samples tested	Number of samples containing residues at or below MRL	Number of samples containing residues above the MRL†	Number of samples containing more than one pesticide
Beer	72	10 residues detected		0
Curry leaves	24	10	5	5
Lentils	48	31	3	14
Olive oil	72	21	0	1
Vine leaves	24	2	10	10

† We lacked sufficient evidence to calculate MRLs for beer.

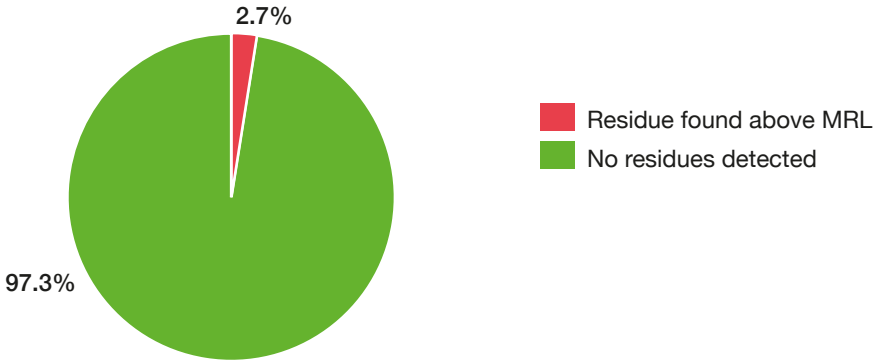
12. Infant food results

Results for chlorate are presented separately in Section 13

Infant food, and infant formula (baby milk) have their own MRLs which are set separately. Health departments are responsible for this legislation. However, these foods have been included in the UK's mainland monitoring programme alongside other foods for many years, and more recently EU member states have been required to test a type of infant food every year.

We tested 37 samples of cereal-based food for infants for up to 373 pesticides. We carried out tests on around 13,801 food and pesticide combinations.

Overall results in infant food: 37 samples



Main findings

- We found a residue of chlormequat in 1 sample of an organic oat-based cereal for toddlers, which was above the baby food MRL. This residue would not be a risk to any baby or toddler (or other person of any age) who ate it.
- The residue was most likely from the oat ingredient. The brand owner and the manufacturer had extensive records demonstrating their own quality control measures to ensure their ingredients complied with both organic and baby food legislation. They could not identify a cause for our finding, so planned to add additional checks to prevent a recurrence.
- All samples were tested for glyphosate, and no residues were found above the reporting limit.

13. Chlorate and other biocides in food

Summary: We are not advising that food companies change their existing practices as a result of our findings.

They should be aware about the ongoing discussion in this area. Biocides are important tools for maintaining microbiological food safety and any changes in practice to comply with current pesticide MRLs need to be carefully considered to ensure food safety is not compromised.

Why we are reporting 2018 chlorate results separately

We have been testing a limited number of foods for chlorate since 2016. This year we have decided to present our results for this substance separately, as we think doing otherwise will distort the overall picture.

The pesticide sodium chlorate is a residual broad action weed killer that is not authorised for use in the EU. However, we are confident that the residues we are detecting come from use of chlorine-based disinfectants used to maintain microbiological safety (to control microorganisms that cause food poisoning), either at food processing premises, or at public water works (chlorination), not from use of pesticides used on plants. We are grateful for the information supplied by food producers and suppliers on this topic and, in particular, in response to our findings.

Because these residues are unavoidable, and important for the maintaining of microbiological control vital for food safety, we are not treating these results as breaches of the LOD MRL. This reflects an agreement within the EU that, while the default MRL for chlorate remains in place, enforcement should be left to the discretion of member states. The UK approach, in line with that normally taken for environmental or process contaminants, is to require that levels in food are as low as reasonably achievable to ensure the protection of human health.

We are only part of the work going on across government and beyond to consider what to do about chlorate residues in food and water.

Our results for chlorate

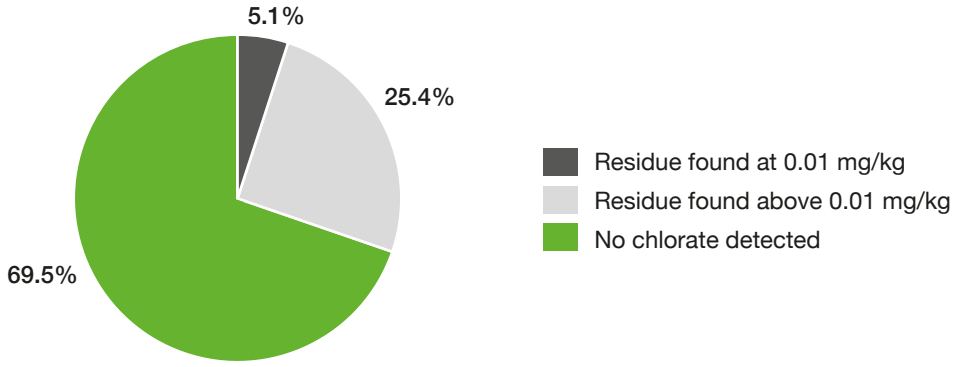
We tested 492 samples from 7 of our surveys for chlorate as well as our usual range of pesticides.

Testing for chlorate requires a separate test (chlorate is a single-residue method)[1] to the cost-effective tests we use to detect hundreds of pesticides in one test (multi-residue methods). Because we need to keep costs under control, we targeted our testing to foods where we expected to find chlorate residues. Instead of looking for non-compliance, our aim was to collect information on the incidence and source of chlorate residues.

We found chlorate residues in 150 samples (30.5%); of those, 125 (25.4% of the total sampled) contained a residue above 0.01 mg/kg. This is as low as our test could detect and measure, and also the legal MRL that we chose not to apply.

1 The test also detects and measures perchlorate, which is a chemically similar substance but not a pesticide residue. Perchlorate is regulated as a food contaminant, so we gave our results to the Foods Standards Agency.

Chlorate results for all foods tested: 492 samples



Main findings

- We frequently found residues of chlorate in frozen fruits and vegetables, including frozen samples of melon and peas without pods. Evidence from food suppliers and growers established these were associated most often with residues in potable (drinking quality) water supplies.
- Other than in frozen melon, we didn't get enough information to make conclusions about residues of chlorate in melon.
- Most of the residues we found in beer were of chlorate. Disinfection is a routine process in brewing, essential to successful beer production as well as hygiene. Another potential source is the potable water treated with chlorine-based biocides for hygiene reasons.
- Cheese and cream tend to be made from milk sourced locally to the dairy. So we couldn't separate out residues originally in milk or from potable water used in the dairy.

Results by food type

Food	Number of samples tested	Number of samples containing residues at 0.01 mg/kg	Number of samples containing residues above 0.01 mg/kg
Beer	72	3	19
Cheese (soft)	24	2	23
Cream	37	1	15
Frozen fruits and smoothie mixes	72	4	23
Frozen vegetables	24	0	24
Melon	120	3	5
Peas without pods	72	12	162

HSE and EU – Establishment of MRLs

The Health and Safety Executive is leading UK work in the EU to establish more meaningful statutory levels for chlorate in food to reassure consumers and allow the continued use of disinfectants that are themselves important for safeguarding human health.

Since sodium chlorate is no longer authorised for use as a pesticide, chlorate is currently subject to an MRL of 0.01 mg/kg in all foods to which MRLs apply. This level was, in line with normal practice for pesticides that are not currently used, set at the default limit of detection rather than on the basis of an assessment of health risks. Our findings are adding to the evidence that current legal limits are not sufficient to allow for the essential use of disinfectants to protect food and water hygiene.

For some years now, EU member states and the European Commission had agreed only to enforce the default legal limit, and in particular not to block trade in affected products while more enquiries took place. During 2018, the European Commission prepared proposals for MRLs based on monitoring data submitted to the European Food Safety Authority (EFSA), using the same approach as would be used to derive MRLs from the results of residues trials. They asked for stakeholder views on those proposals in February 2019.

During earlier negotiations, the UK and other member states had pointed out that this approach may still not be sufficient to permit essential food and water hygiene uses to continue in line with good practice while a wider review takes place. We responded directly to the European Commission that in our opinion chlorate residues may prove impossible to reduce when the main source of chlorate is likely to be from treated drinking water or the use of legitimate biocides.

Our colleagues from the Advisory Committee on Microbiological Safety of Food made similar comments, stressing our joint concern that the effect on overall food safety – including microbiological safety – should be taken into account. The pesticides MRLs regime is not a useful tool to apply these limits. Comments from across the EU were similarly sceptical.

Our understanding is that the European Commission considers it is bound under EU law to proceed with making proposals under pesticide legislation. However, they will look again to alter the proposal based on further monitoring data in particular from food industry sectors, and carefully explore whether additional special provisions to minimise the impact on food producers where residues are incurred during food processing are legally possible.

Reviews of chlorate safety for consumers

Since 2018, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has been considering chlorate as part of its ongoing work looking at the chemicals in the diet of infants and young children (up to 5 years). The European Food Safety Authority's 2015 opinion on chlorate[2] establishes appropriate health-based guidance values for chlorate exposure to protect against acute and chronic risks to health.

Food Standards Agency – best practice for the food industry

The Food Standards Agency is working with the food industry to develop and promote best practice in the use of sanitisers. This is important because the presence of low-level residues of chlorate in food results from measures taken by the food and water industries to protect food safety by reducing microbiological contamination of food and drink (including drinking water, which is a significant source of chlorate in food). Chlorate itself is not used as a disinfectant, but chlorine-based sanitisers can contain small amounts of chlorate.

2 EFSA Journal 2015;13(6):4135 [103 pp.] and https://ec.europa.eu/food/plant/standing_committees/sc_phytopharmaceuticals_en

Defra – drinking water

Defra is working on the EU review of its Drinking Water Directive and discussion about the future of monitoring water for chlorate and the level to be achieved. In national legislation throughout the UK, it is already a requirement to keep disinfection by-products as low as possible. This is usually achieved through management of disinfectant dosing and storage.

The big picture - the Advisory Committee on Microbiological Safety of Food

We are working with the Advisory Committee on the Microbiological Safety of Food to understand how changes to pesticide MRLs affect biocide use, microbiological food safety, and the overall risk to consumers taking into account both chemical and microbiological safety. From the point of view of pesticide residues, this will include considering the wide ranging substances that are covered by pesticide residues rules and also used as biocides around food or water.

14. Organic samples

In 2018, out of the 3,385 samples that we tested, 351 were labelled as organic. Although we do not specifically target organic foods in all our surveys, they are tested as part of the monitoring programme as they are available for people to buy and are covered by the same MRLs as other food.

Residues in organic samples

Organic farmers and growers are allowed to use a limited number of approved pesticides where other methods of control are inadequate to prevent damaged by pests, diseases and weeds.

Seventeen of the organic samples that we tested contained a pesticide residue. One sample of infant food contained a residue above the infant food MRL: there is more information on this sample in Section 12. All the results were passed to the section within Defra that deals with organic farming. Our role and expertise doesn't include the rules on producing organic food, so we can't comment on these findings in relation to those rules.

The following organic samples contained residues. None of the residues detected would be expected to have an effect on health.

Food	Country of origin	Pesticide residue found	Amount of residue found (mg/kg)	MRL (mg/kg)
Banana	Dominican Republic	imidacloprid	0.02	0.05*
Banana	Dominican Republic	spinosad (sum)	0.02	2.00
Banana	Dominican Republic	azoxystrobin	0.04	2.00
		thiabendazole	0.05	6.00
Banana	Mexico	fenpropidin	0.07	0.20
Banana	Mexico	boscalid	0.05	0.60
		fenpropidin	0.02	0.2
Beans with pods	Egypt	propargite	0.08	0.01*
Beef	UK	BAC†	0.09	0.1
Broccoli	UK	tri-allate	0.02	0.1
Cheese (soft) Feta	Greece	chlorate†	0.03	N/A
Cream	UK	chlorate†	0.06	N/A
Curry leaves	Sri Lanka	profenofos	0.02	0.13
Curry leaves	Sri Lanka	profenofos	0.03	0.13
Curry leaves	Sri Lanka	profenofos	0.04	0.13
Curry leaves	Sri Lanka	profenofos	0.02	0.13
Frozen vegetables	UK	chlorate†	0.02	N/A
Infant Food‡, Cereal based	Switzerland	chlormequat‡	0.02	0.01
Olive oil	Palestine	bifenthrin	0.01	0.1

* Maximum Residue Levels set at the LOD (LOD MRL): These MRLs are set at a default level, i.e. at the limit of determination (LOD) as specified in EC Regulation 396/2005.

† See Section 13 for more information on chlorate and biocide residues in food.

‡ Baby food has separate MRLs to other foods. See Section 12.

15. Suspected unapproved uses in the UK

We are able to check the samples labelled as UK produce to see if they contain residues of pesticides which are not approved for use on those crops in the UK.

Sometimes we do find residues of pesticides which have not been approved for use on particular UK grown crops. There are different reasons this may occur, such as:

- the crop has been grown from imported seed or seedling which was treated legally in another country, and the residue is still detectable in the adult plant
- a food was grown or produced overseas, but the country of origin on the packaging is that of the brand owner or where it was packed (processed foods may be grown in one country but processed in another)
- if the residues are very low, this may have been caused by poor agricultural practice, such as failing to take appropriate steps to control spray drift or equipment not being correctly cleaned between uses
- illegal use
- accidents and unexpected consequences

If we find a residue of a pesticide that has not been approved for use in the UK on that crop, we inform the HSE's enforcement team about our results so they can consider investigating.

We referred the following samples to HSE enforcement in 2018:

Food	Pesticide residue found	Amount of residue found (mg/kg)	MRL (mg/kg)
Apple			
Apple	myclobutanil	0.05	0.6
Apple	myclobutanil	0.05	0.6
Berries and small fruit			
Blueberries	captan (sum)	0.06	30
Blueberries	phosmet	0.02	10
Blueberries	captan (sum)	0.03	30
Broccoli			
Broccoli	fluazifop-p (sum)	0.03	0.01*
Broccoli	tri-allate	0.01	0.1
Broccoli	tri-allate	0.02	0.1
Chinese leaves			
Choi sum	acetamiprid	0.08	1.5
Pak choi	acetamiprid	0.02	1.5
Pak choi	fluopyram	0.02	0.7
Lettuce			
Lettuce	inorganic bromide	35	50

Food	Pesticide residue found	Amount of residue found (mg/kg)	MRL (mg/kg)
Mushrooms including speciality			
Oyster mushrooms	chlormequat	4.6	0.9
Oyster mushrooms	chlormequat	4.5	0.9
Portobello mushrooms	chlormequat	0.02	0.9
Shiitake mushrooms	chlormequat	0.1	0.9
Shiitake mushrooms	chlormequat	0.1	0.9
Mushroom	mepiquat	0.04	0.09
Peas without pods			
Petits pois in water	pyrimethanil	0.02	0.2
Speciality vegetables			
Celeriac	chlorpropham	0.02	0.05*
Celeriac	chlorpropham	0.01	0.05*
Celeriac	linuron	0.01	0.5

* Maximum Residue Levels set at LOD (LOD MRL): These MRLs are set at a default level, i.e. at the limit of determination (LOD) as specified in EC Regulation 396/2005.

HSE's investigation into most of these cases found that no illegal use had taken place and the residue was present for another reason. In some cases the investigation is still ongoing and the results will be published in one of our quarterly reports once the investigation has been completed.

16. Assessing the risk to people's health

Since 2008, every result which contained a residue has been checked to see if the residues found could have an effect on human health. We call these checks 'risk assessment screens'.

Risk assessment screening

In nearly all cases the risk assessment screening showed that people would eat:

- less than the acute reference dose (ARfD), which is the amount of pesticide that a person can eat in one day without affecting their health
- less than the acceptable daily intake (ADI), which is the amount of the pesticide that it is safe to eat every day for a lifetime

The risk assessment screening considers the amount eaten by 10 different groups of people based on consumption data supplied by FSA. These groups are infants, toddlers, young people (4 different groups), adults, vegetarians, elderly people living in their own homes, and elderly people living in residential accommodation.

The ARfD and ADI values that we use in risk assessment screens are generally set by international bodies such as the European Food Safety Authority, and the Joint Food and Agriculture Organisation / World Health Organisation Meeting on Pesticide Residues.

HSE assesses the health risk of any residues in food. The assessment is made by assuming someone has eaten near the maximum that we find in consumption patterns, identified from UK government food surveys. HSE takes the 97.5th consumption percentile as representing a high level of consumption. That means for every 100 people, 97 will have eaten less than HSE assumes.

Other assumptions in HSE's assessments tend to overestimate rather than underestimate the risk. For example, for most fruits, a first assessment assumes people have eaten the peel. This is not just for apples and pears which are often consumed including the peel, but also for fruit which is more often eaten after being peeled. Risk assessments may then be refined using registration data about the distribution of residues in that food.

We take account of the more extreme consumption patterns of foods, so we ensure that HSE's risk assessments address the safety of consumers in general.

Detailed risk assessments

We publish risk assessments:

- for all situations where consumption patterns could lead to people eating more than the acute reference dose or acceptable daily intake of specific pesticides
- where a sample contains a residue of more than one organophosphate or carbamate pesticide (or both) or residues of certain fungicides from the same chemical group (e.g. captan and folpet; triazoles; organophosphates)
    - each of these pesticide groups can have similar effects on people, so we check what could happen if these effects are added together

We considered 29 detailed risk assessments during 2018. In each case we considered specific advice on the possible health risks. In most cases we found that risk to people's health was unlikely. Where the risk assessment showed that there may be a risk to health, we informed the Food Standards Agency.

The full text of all the detailed risk assessments is in our quarterly reports which can be downloaded from GOV.UK: https://www.gov.uk/government/publications/pesticide-residues-in-food-quarterly-monitoring-results-for-2018

17. Follow-up action

If we find a residue above the relevant MRL it could just be in one sample. However, if we find that several samples contain residues of that particular pesticide above the MRL in one survey or in further surveys of the same food, it suggests that:

- the pesticide's approval is not in line with the MRL (pesticides approved in the UK are rarely out of line with the MRLs, but there may be problems with imported foods)
- the MRL is set at the limit of determination (the lowest amount that can normally be detected and measured by official laboratories), which is a default level that does not take account of the uses not covered by the MRL setting system, in particular in countries outside Europe
- some people who grow or store food are not using pesticides properly

Main actions

- All samples with residues over the MRL were reported to the retailers, suppliers or growers involved. We asked them to explain why the residues were over the MRL. Where they asked us to, we published these explanations in our quarterly reports.
- All UK samples with a residue of a pesticide not approved for use in the UK on that crop were reported to HSE enforcement for further investigation.
- For all non-UK produce with a residue over the MRL, we wrote to the relevant authorities in the countries the produce was exported from.
- When we found a residue that was over the MRL that could be a risk to health, we informed the FSA. They informed the Rapid Alert System for Food and Feed (RASFF). Our quarterly reports include details of RASFF notifications issued as follow up to the monitoring results.
- Any residues detected in organic samples were reported to the team in Defra that deals with organic produce, as well as being copied to the relevant organic control body.
- We can target further monitoring of a food where we have found residues of interest. Examples of this are the continued monitoring of beans with pods and okra.
- Alongside the quarterly reporting we run a programme called 'rolling reporting'. This is 4 commodities which are sampled and reported on every month throughout the year. In 2018, the commodities in the programme were beans with pods, grapes, okra and potatoes.
- HSE is able to prosecute growers or suppliers they find breaking the law. If we suspect that pesticides are being used illegally in the UK, HSE may carry out further investigation.

Examples of follow-up action

- HSE has continued to send all non-compliant results of okra and beans with pods to the FSA, to be included in the dataset used when deciding what foods and sources should be included on heightened border controls.
- HSE has liaised with brand owners to provide additional details and technical information to assist with following up results especially where the source of residues was unclear.

18. Legal controls on pesticide residues

Maximum Residue Levels

It is illegal to sell, supply, distribute or import food with residues above the MRLs. MRLs are set for individual pesticides in specific foods based on the highest level of a residue expected to be in a food when the pesticide is used in line with good agricultural practice. MRLs are set at levels which may occur when the pesticide is used properly, taking into account worker and environmental safety as well as the level needed to work as a pesticide. MRLs are also set below the level considered to be safe for people eating the food.

For any pesticide without a specific MRL, a default value of 0.01 mg/kg is set. Our laboratories' reporting levels (the lowest levels our tests are set to measure) when testing samples are set in line with the default MRL (0.01 mg/kg).

Pesticide residue testing

MRL legislation requires an annual pesticide residue testing programme which is representative of the country's food supply market. The programme must take samples close enough to the point where produce enters the food supply market to enable follow-up activity to take place if the food does not comply with the law.

The UK also shares its results with a European-wide monitoring programme. Results are compiled and published by the European Food Safety Authority.

As well as the laws on levels of pesticide residues allowed in food, there are laws on the authorisation, selling, supplying, using, storing, importing and advertising of pesticides. More information is available on the HSE website.

19. Members of the Expert Committee on Pesticide Residues in Food

Dr Paul Brantom
Chairman

Dr Paul Brantom is a registered toxicologist and has worked in toxicology of food-related chemicals for more than 40 years. He was previously Head of Toxicology at BIBRA International and Manager of the University of Surrey Centre for Toxicology.

He is currently semi-retired but continues to work as an independent consultant in toxicology risk assessment, mainly for international and national organisations. Following previous research experience, he retains particular interest in toxicological risk assessment including non-animal testing methods and carcinogenicity.

Dr Brantom is a past member of UK Advisory Committees on Novel Foods and Processes, Veterinary Products, Veterinary Residues, and Animal Feeding Stuffs. He is also a past member of the FEEDAP panel of the European Food Safety Authority and continues to work on a number of their working groups.

Dr Jonathan Blackman

Dr Jonathan Blackman is a graduate of Wye College, University of London and studied for a DPhil at the University of Sussex.

He has worked as an agronomist and technical manager in the horticultural industry for 20 years, and prior to that worked as a Soil Scientist and Research Scientist for ADAS. He holds the BASIS Diploma in Agronomy and his work involves advising growers of fruit, hops and ornamental crops and providing technical support to fellow horticultural agronomists working for H L Hutchinson Ltd.

In addition to growers, he has provided consultancy services to packers, industry bodies such as the Agriculture and Horticulture Development Board and the British Hop Association, and sits on several industry committees.

Ann Davison

Ann Davison began her career at Which? and has worked in consumer affairs for most of her career, running consumer organisations and networks such as Foodaware: the Consumers' Food Group. She won the UK Woman of Europe 2000 Award.

Ann has served as a consumer representative on a number of government committees including Defra Expert Panel on Air Quality Standards, the Adult Learning Committee of the Learning and Skills Council and currently the Food Standards Agency's Advisory Committee on Animal Feeding Stuffs.

For nearly six years, she was Defra's consumer adviser and ran its consumer representatives' group. Ann takes a special interest in food, health and standards issues. She co-founded the Fairtrade Foundation and chaired its Certification Committee for 11 years. She currently chairs the PRiF Communications Sub-committee and serves on the National Consumer Federation's Communications Committee, and is an active member of the National Council of Women.

Ian Finlayson

Ian Finlayson is an agricultural supply chain expert. He was involved creating an international Good Agricultural Practice standard during his 16 years as technical manager at Sainsbury's.

Ian was chair of the Fairtrade International Standards Committee, where his passion for social justice and working to relieve poverty found an outlet from 2006 to 2016. His passion for sustainability was served as director of Footprints4Food which provides cost-efficient carbon footprinting of agricultural products and aims to reduce impact on the environment.

He is Managing Director of Practical Solutions International which specialises in helping growers work more effectively with retailers in Europe. This has allowed him to gain extensive experience in Africa working with both small farmers and large companies.

Ian was Technical Director for World Flowers and subsequently Wealmoor in the UK which sell flowers and exotic fruit and vegetables respectively to retailers in the UK. He has most recently been involved in a US AID funded project developing a smartphone app to improve traceability of fresh produce from small holder green bean growers in Kenya through to the supermarket in Europe.

Dr Stuart Freeman

Dr Freeman is a fellow of the Royal College of Pathologists and an independent toxicology consultant with 25 years' experience of the pharmaceutical and consumer products industries. During this time, he worked at Smith Kline and French, AstraZeneca, where he was Head of the Reproductive and Development Toxicology Group, and GlaxoSmithKline Consumer Healthcare, where he was Head of Toxicology for the worldwide business. Dr Freeman has served on numerous industry committees and published and presented extensively in the field of toxicology.

John Points

John Points is a consultant providing advice to food retailers and producers on chemical risk management, analytical testing, and interpretation of results. He also works on laboratory capacity-building projects for developing countries who need to test food for residues before export to the EU.

His previous career has been with Sainsbury's, and LGC - one of the UK's National Reference Laboratories, where he led the teams responsible for food, residues, consumer safety and workplace drugs testing. At Sainsbury's, his role included management of residue monitoring programmes and follow up of results within the own-brand supply chain.

John has previously been a member of the UK Veterinary Residues Committee and has acted as a national expert on European Commission Food and Veterinary Office inspection missions to EU and non-EU countries.

Dr Glenis Wedzicha

Glenis Wedzicha read chemistry at the University of London, where her PhD research was on free radicals in an industrial context. She did postgraduate teaching training at the University of Oxford and her teaching career included teaching physics and chemistry. She also wrote media articles as a freelancer about complex scientific and technical issues that affect society.

Glenis is the Science Co-ordinator of the North Yorkshire East (NYE) Women's Institute (WI). She is an ex-officio member of their Public Affairs and International Committee as well as the membership and training sub-committee for the WI. She leads the scientific strategy of the federation, and her role includes helping members understand the impact of science on their lives and society in general. Glenis has recently been appointed the Resolutions Adviser of the NYE Federation.

She has a particular interest in the communication of food and environmental issues. Glenis is a member of the UK Chemicals Stakeholder Forum, on which she represents the National Federation of WIs.

Analytical Sub-Group

The Expert Committee on Pesticide Residues in Food's Analytical Sub-Group (ASG) reviews the results of analysis by the laboratories before they are sent to HSE, to ensure their reliability.

Most of the members of the group are from laboratories. The group members during 2018 were:

- Helen Kyle – HSE's Chemicals Regulation Division (Chairman)
- Dr Sadat Nawaz – National Reference Laboratory (NRL) Representative
- Helen Barker – Fera Science Ltd
- Mark Kearney – Agri-Food and Biosciences Institute (AFBI)
- Kirsty Reid – Science and Advice for Scottish Agriculture (SASA)
- Laura Melton – Science and Advice for Scottish Agriculture (SASA)

Cost of our surveys

The budget for the UK pesticide residues monitoring programme is made up from a charge on the sales of approved pesticides by manufacturers and suppliers in the UK and the rest from the government. The largest proportion of the budget was spent on testing samples for pesticide residues.

HSE pays PRiF members a fee for each meeting attended. HSE also provides support to the committee and the sub-group.

Communicating the results and work of the PRiF

We want as many people as possible to be aware of the official pesticide residue testing programme and to understand what we do. To do this we:

- publish all the monitoring data on data.gov.uk in an accessible format every quarter
- publish the results of our rolling reporting on data.gov.uk every month
- publish an annual report in plain English
- open one of our quarterly meetings each year to the public
- ensure our Chairman is available for interviews with the media

We have also prepared some extra background and explanatory information:

- frequently asked questions (FAQs) at Section 22 of this report
- a glossary in each quarterly report

If you would like to receive notifications of publications, please email prif@hse.gov.uk to join our mailing list.

2019 Open Event

We will be holding our 2019 open event on Wednesday 16 October in York.

As well as explaining our work, we invite speakers from different areas of food and drink production, marketing and regulation. Our aim for the open event is to give the public an opportunity to get a fuller understanding of the work we do and have a chance to ask any questions.

You will be able to book a ticket for our open event free of charge using Eventbrite.

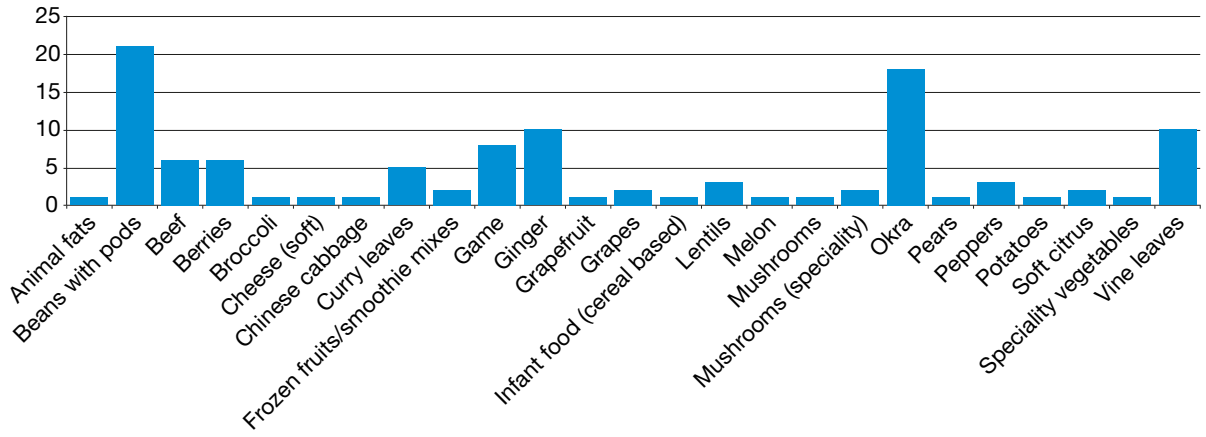
Details of the event and the speakers that will be talking will be added to Eventbrite in the lead up to the day.

20. All residues found above the MRL in 2018

Of the 3,385 samples tested, 109 contained one or more residues above the relevant MRL.

MRLs are trading standards rather than safety levels, therefore these results do not automatically mean the levels of residue detected are a risk to people's health. The samples that contained residues above the MRL were mainly fruit and vegetable samples.

Number of samples with residues over the MRL



Analytical Measurement Uncertainty

No measurement can ever be guaranteed to be exact and this can be caused by many things. Measurement uncertainty is a calculated indicator of our confidence in the accuracy of the amount of pesticide the laboratory detected. It is not expressing a doubt about which pesticides we have found.

It has been agreed for reporting purposes only that measurement uncertainty will be applied to any result that contained a residue over the MRL. In line with the international guidance, we use a default value of 50% for measurement uncertainty. This means that when a sample has a residue over the MRL we subtract 50% of the reported value and check this value against the MRL. All residues still over the MRL after 50% measurement uncertainty has been applied are highlighted as breaching the law in our quarterly reports.

Measurement uncertainty can only be applied by a regulatory authority. In the UK, this is the HSE's Chemicals Regulation Division. It should not be applied by the food industry to determine whether a product is compliant with an MRL.

The table below shows all samples in 2018 where we found at least one residue above the MRL. A number of the MRLs have (*) next to them, which means that the MRL is set at the limit of determination (the lowest level that can normally be detected by official laboratories). This often means that there are no authorised uses on those crops or that the pesticide itself is not authorised for use.

As foods grown in other countries are not all covered by the MRL setting system, residues above these MRLs do not necessarily mean the farmer did not follow Good Agricultural Practice (GAP). The country of origin for processed (including frozen) food is not necessarily the same as the place the original food was produced (see page 13).

More information on all our samples, including results for all residues tested for and full brand name details are available on data.gov.uk

Sample reference number	Food description	Country of origin	Pesticide residue detected	Residue level detected (mg/kg)	MRL (mg/kg)	Breach of the law after allowing for measurement uncertainty
Animal fats						
3098/2018	Goose fat	France	DDAC (sum)	1.5	0.1	Yes
Beans with pods						
0040/2018	Uri beans	Bangladesh	carbendazim (sum)	1.3	0.2	Yes
			fenpropathrin	0.08	0.01*	Yes
0075/2018	Guar beans	India	dimethoate (sum)	0.02	0.01*	No
0080/2018	Yardlong beans	Mexico	folpet (sum)	0.06	0.03*	No
0122/2018	Hyacinth beans	Bangladesh	dimethoate (sum)	0.07	0.01*	Yes
			fenpropathrin	0.03	0.01*	Yes
			quinalphos	0.02	0.01*	No
0274/2018	Uri beans	Bangladesh	abamectin (sum)	0.04	0.03	No
			dimethoate (sum)	0.06	0.01*	Yes
			fenvalerate (sum)	0.2	0.1	Yes
0622/2018	Valor beans	Kenya	profenofos	0.1	0.01*	Yes
0625/2018	Valor beans	Kenya	lambda-cyhalothrin	0.4	0.2	No
			profenofos	0.3	0.01*	Yes
4175/2018	Speciality beans	Egypt	propargite	0.08	0.01*	Yes
0113/2018	Gawar beans	India	dimethoate (sum)	0.02	0.01*	Yes
0139/2018	Yard Long beans	Malaysia	dimethoate (sum)	0.06	0.01*	Yes
0640/2018	Hyacinth beans	Malaysia	carbendazim (sum)	1.7	0.2	Yes
			chlorfenapyr	0.6	0.01*	Yes
			dithiocarbamates	3.9	1	Yes
			fluopicolide	0.3	0.01*	Yes
			lambda-cyhalothrin	0.3	0.2	No
			methomyl (sum)	0.6	0.1	Yes
			propamocarb (sum)	1.5	0.1	Yes
0098/2018	Valor beans	Kenya	acephate	0.1	0.01*	Yes
			methamidophos	0.05	0.01*	Yes
0108/2018	Yard Long beans	Malaysia	chlorfenapyr	0.2	0.01*	Yes
0282/2018	Guar beans	India	monocrotophos	0.02	0.01*	Yes

Sample reference number	Food description	Country of origin	Pesticide residue detected	Residue level detected (mg/kg)	MRL (mg/kg)	Breach of the law after allowing for measurement uncertainty
0287/2018	Uri dolols beans	Malaysia	chlorfenapyr	0.4	0.01*	Yes
			dithiocarbamates	3.3	1	Yes
			fipronil (sum)	0.06	0.005*	Yes
			lambda-cyhalothrin	0.5	0.2	Yes
0438/2018	Yard long beans	Malaysia	dimethoate (sum)	0.05	0.01*	Yes
			fenpropathrin	0.07	0.01*	Yes
			lufenuron	0.07	0.01*	Yes
0632/2018	Guar beans	India	dimethoate (sum)	0.1	0.01*	Yes
0650/2018	Guar beans	India	acephate	0.2	0.01*	Yes
			flusilazole	0.02	0.01*	Yes
			methamidophos	0.05	0.01*	Yes
0487/2018	Guar beans	India	dimethoate (sum)	0.02	0.01*	No
0655/2018	Hyacinth beans	India	phosphamidon	0.04	0.01*	Yes
0660/2018	Guar beans	India	fipronil (sum)	0.01	0.005*	Yes
			monocrotophos	0.2	0.01*	Yes
Beef						
3000/2018	Aberdeen Angus steak mince	UK	BAC (sum)	0.7	0.1	Yes
2283/2018	Steak mince	UK	BAC (sum)	0.2	0.1	No
3433/2018	Top rump joint	UK	DDAC (sum)	0.2	0.1	No
3445/2018	Minced beef	UK	BAC (sum)	0.3	0.1	Yes
2233/2018	Popeseye steak	UK	BAC (sum)	0.2	0.1	Yes
2569/2018	Rump steak	UK	DDAC (sum)	0.3	0.1	Yes
Berries (fresh)						
1851/2018	Fresh blackberries	Mexico	flubendiamide	0.05	0.01*	Yes
			propamocarb (sum)	0.02	0.01*	No
4243/2018	Fresh blackberries	Mexico	permethrin (sum)	0.2	0.05*	Yes
2020/2018	Fresh blueberries	Ukraine	fosetyl (sum)	7.1	2*	Yes
2116/2018	Fresh blueberries	Ukraine	fosetyl (sum)	7.6	2*	Yes
2624/2018	Fresh blueberries	Ukraine	fosetyl (sum)	6.1	2*	Yes
2627/2018	Fresh blueberries	USA	folpet (sum)	0.06	0.03*	No

Sample reference number	Food description	Country of origin	Pesticide residue detected	Residue level detected (mg/kg)	MRL (mg/kg)	Breach of the law after allowing for measurement uncertainty
Cheese						
2961/2018	Mozzarella	Italy	BAC (sum)	1.9	0.1	No
Chinese cabbage						
0186/2018	Pak choi	UK	thiamethoxam	0.03	0.02*	No
Curry leaves						
2428/2018	Curry leaves; organic	Sri Lanka	profenofos	0.2	0.13	Yes
2430/2018	Curry leaves; dried	India	acephate	0.06	0.05	No
			bifenthrin	1.4	0.05	Yes
			ethion	0.2	0.03	Yes
			profenofos	2.3	0.13	Yes
			tebuconazole	1.3	0.13	Yes
			triazophos	1.6	0.03	Yes
3952/2018	Curry leaves; dried	India	acephate	0.06	0.05	No
			bifenthrin	1.4	0.05	Yes
			diphenylamine	0.3	0.13	Yes
			ethion	0.5	0.03	Yes
			profenofos	1.9	0.13	Yes
			tebuconazole	0.4	0.13	Yes
			triazophos	4.0	0.03	Yes
4053/2018	Curry leaves	India	profenofos	0.3	0.05	Yes
4206/2018	Curry leaves	India	profenofos	0.8	0.05	Yes
Fish						
2858/2018	Skinless and boneless cod fillets	North East Atlantic	DDAC (sum)	0.2	0.1	No
Frozen Berries and Smoothie Mixes						
4337/2018	Berry smoothie	UK	BAC (sum)	0.4	0.1	Yes
3669/2018	Breakfast smoothie mix	UK	BAC (sum)	0.2	0.1	No

Sample reference number	Food description	Country of origin	Pesticide residue detected	Residue level detected (mg/kg)	MRL (mg/kg)	Breach of the law after allowing for measurement uncertainty
Game						
2289/2018	Venison	UK	BAC (sum)	0.8	0.1	Yes
2183/2018	Partridge	UK	BAC (sum)	0.3	0.1	Yes
2186/2018	Pheasant	UK	BAC (sum)	1.9	0.1	Yes
2173/2018	Rabbit	China	BAC (sum)	2.2	0.1	Yes
2146/2018	Venison	UK	BAC (sum)	2.4	0.1	Yes
			DDAC (sum)	2.8	0.1	Yes
2179/2018	Venison	UK	BAC (sum)	0.3	0.1	Yes
1226/2018	Partridge	UK	BAC (sum)	0.5	0.1	Yes
1241/2018	Pheasant	UK	BAC (sum)	0.2	0.1	No
			DDAC (sum)	0.3	0.1	Yes
Ginger						
0062/2018	Ginger	China	fosthiazate	0.03	0.02*	No
0112/2018	Ginger	China	clothianidin	0.02	0.01*	No
			fosthiazate	0.04	0.02*	Yes
0184/2018	Ginger	China	thiamethoxam	0.02	0.01*	No
0441/2018	Ginger	China	fosthiazate	0.03	0.02*	No
0557/2018	Ginger	China	clothianidin	0.04	0.01*	Yes
0013/2018	Ginger	China	clothianidin	0.03	0.01*	Yes
0316/2018	Ginger	China	clothianidin	0.4	0.01*	Yes
0419/2018	Ginger	China	clothianidin	0.2	0.01*	Yes
0444/2018	Ginger	China	cyromazine	0.2	0.05*	Yes
0756/2018	Ginger	China	clothianidin	0.07	0.01*	Yes
Grapes						
0286/2018	Crimson seedless grapes	Chile	captan (sum)	0.08	0.03*	Yes
0511/2018	Iniagrape one grapes	Chile	captan (sum)	0.05	0.03*	No
Grapefruit						
1639/2018	White grapefruit; loose	Israel	imazalil	6.2	5	No

Sample reference number	Food description	Country of origin	Pesticide residue detected	Residue level detected (mg/kg)	MRL (mg/kg)	Breach of the law after allowing for measurement uncertainty
Infant food						
2715/2018	Toddler organic oaty pillows	Switzerland	chlormequat	0.02	0.01	No
Lentils						
2666/2018	Brown lentils	UK	procymidone	0.2	0.01*	Yes
2660/2018	Green lentils	India	glyphosate	11.0	10	No
3966/2018	Red lentils	UK	procymidone	0.08	0.01*	Yes
Melons						
2823/2018	Cantaloupe	Honduras	chlorothalonil	1.2	1	No
Mushrooms						
2943/2018	Oyster mushrooms	UK	chlormequat	4.6	0.9	Yes
4224/2018	Oyster mushrooms	UK	chlormequat	4.5	0.9	Yes
1180/2018	Button mushrooms	UK	2-phenylphenol	0.05	0.01*	Yes
Okra (fresh)						
0026/2018	Okra	Honduras	chlorfenapyr	0.03	0.01*	Yes
			oxamyl	0.07	0.01*	Yes
0131/2018	Okra	Honduras	chlorothalonil	0.3	0.01*	Yes
			thiacloprid	0.04	0.01*	Yes
0264/2018	Okra	India	emamectin	0.06	0.02	Yes
0623/2018	Okra	India	diafenthiuron	0.02	0.01*	Yes
0626/2018	Okra	India	flonicamid (sum)	0.2	0.03*	Yes
0628/2018	Okra	India	flonicamid (sum)	0.05	0.03*	No
0193/2018	Okra	India	flonicamid (sum)	0.1	0.03*	Yes
			tebuconazole	0.03	0.02*	No
4004/2018	Okra	Honduras	chlorothalonil	0.4	0.01*	Yes
0641/2018	Okra	Jordan	indoxacarb	0.03	0.02*	No
			thiacloprid	0.04	0.01*	Yes
1737/2018	Okra	India	diuron	0.02	0.01*	Yes
3569/2018	Okra	Jordan	abamectin (sum)	0.04	0.01*	Yes
3294/2018	Okra	Jordan	thiacloprid	0.5	0.01*	Yes
4858/2018	Okra	Jordan	thiacloprid	0.6	0.01*	Yes

Sample reference number	Food description	Country of origin	Pesticide residue detected	Residue level detected (mg/kg)	MRL (mg/kg)	Breach of the law after allowing for measurement uncertainty
Okra (frozen)						
3416/2018	Okra	India	amitraz (sum)	0.07	0.05*	No
			diafenthiuron	0.02	0.01*	Yes
			nitenpyram	0.03	0.01*	Yes
2034/2018	Okra	India	propargite	0.03	0.01*	Yes
2618/2018	Okra	India	flonicamid (sum)	0.04	0.03*	No
4628/2018	Okra	India	flonicamid (sum)	0.1	0.03*	Yes
1665/2018	Okra	Vietnam	chlorfenapyr	0.04	0.01*	Yes
Pears						
1935/2018	Conference pears	The Netherlands	chlormequat	0.1	0.07	No
Peppers						
0745/2018	Yellow peppers	Poland	ethephon	0.1	0.05*	Yes
0246/2018	California Wonder green sweet peppers	Poland	ethephon	0.6	0.05*	Yes
0313/2018	California Wonder sweet peppers	Poland	ethephon	4.0	0.05*	Yes
Potato						
5514/2018	Lady Rossetta potatoes	Germany	MCPA (sum)	0.06	0.05*	No
Soft citrus						
0074/2018	Clementines with leaves	Spain	propiconazole	6.0	5	No
0578/2018	Satsuma	Peru	thiabendazole	8.1	7	No
Speciality vegetables						
4716/2018	Eddoes	Spain	thiabendazole	2.4	0.01	Yes
Vine leaves						
2242/2018	Vine leaves; dried	Germany	boscalid	0.6	0.01*	Yes
			difenoconazole	0.08	0.05*	No
			flusilazole	0.02	0.01*	No
			iprodione	0.02	0.01*	No

Sample reference number	Food description	Country of origin	Pesticide residue detected	Residue level detected (mg/kg)	MRL (mg/kg)	Breach of the law after allowing for measurement uncertainty
2243/2018	Vine leaves; dried	Germany	boscalid	0.6	0.01*	Yes
			difenoconazole	0.08	0.05*	No
			iprodione	0.02	0.01*	No
2107/2018	Vine leaves; in brine	Turkey	dodine	0.6	0.01*	Yes
			lambda-cyhalothrin	0.2	0.02*	Yes
2185/2018	Vine leaves; in brine	Greece	tebuconazole	0.05	0.02*	Yes
4283/2018	Vine leaves; in brine	UK	azoxystrobin	0.02	0.01*	Yes
4537/2018	Vine leaves; in brine	Romania	dimethomorph	0.1	0.01*	Yes
			triadimefon & triadimenol	0.02	0.01*	No
4613/2018	Vine leaves; in brine	Egypt	acetamiprid	0.1	0.01*	Yes
			azoxystrobin	0.03	0.01*	Yes
			boscalid	0.05	0.01*	Yes
			carbendazim (sum)	1.3	0.1*	Yes
			chlorpyrifos	1.0	0.05*	Yes
			cyfluthrin (sum)	0.07	0.02	Yes
			dimethomorph	0.08	0.01*	Yes
			fipronil (sum)	0.02	0.005*	Yes
			flusilazole	0.2	0.01*	Yes
			iprodione	0.02	0.01*	Yes
			lambda-cyhalothrin	0.04	0.02*	Yes
			lufenuron	0.1	0.01*	Yes
			propiconazole	0.4	0.01*	Yes
			thiophanate-methyl	1.1	0.1*	Yes

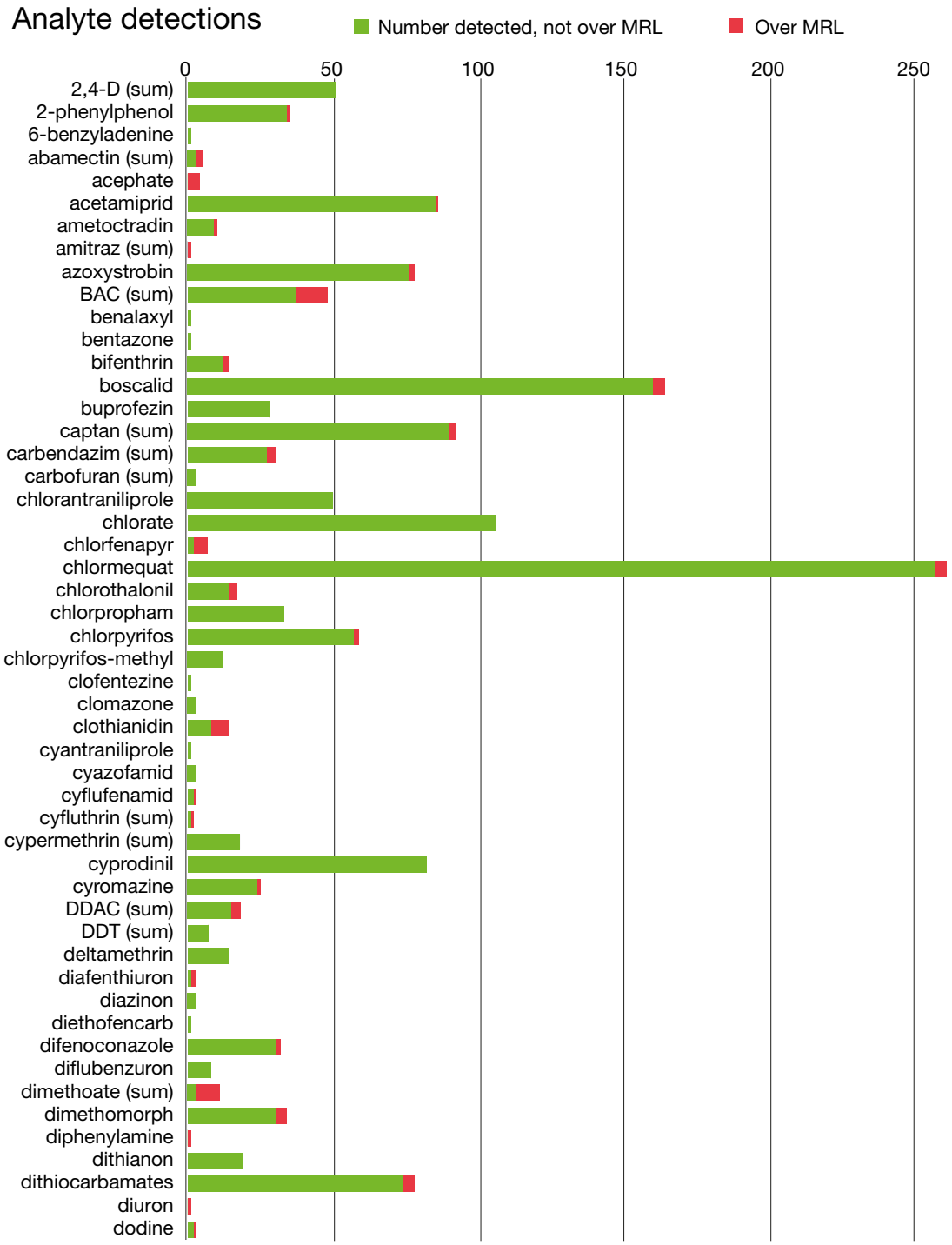
Sample reference number	Food description	Country of origin	Pesticide residue detected	Residue level detected (mg/kg)	MRL (mg/kg)	Breach of the law after allowing for measurement uncertainty
4614/2018	Vine leaves; in brine	Egypt	boscalid	0.05	0.01*	Yes
			chlorpyrifos	7.8	0.05*	Yes
			cyflufenamid	0.3	0.02*	Yes
			dithiocarbamates	0.2	0.05*	Yes
			emamectin	0.02	0.01*	Yes
			fenbutatin oxide	0.08	0.05*	No
			fluopyram	0.1	0.01*	Yes
			iprodione	0.09	0.01*	Yes
			methoxyfenozide	0.02	0.01*	Yes
			metrafenone	0.7	0.01*	Yes
			penconazole	0.2	0.05*	Yes
			proquinazid	0.04	0.02*	No
			pyrimethanil	0.2	0.01*	Yes
			spirotetramat (sum)	1.0	0.1*	Yes
			tebuconazole	0.06	0.02*	Yes
			tebufenpyrad	0.03	0.01*	Yes
4735/2018	Vine leaves; in brine	Bulgaria	dimethomorph	0.09	0.01*	Yes
			metrafenone	0.02	0.01*	No
4818/2018	Vine leaves; in brine	UK	ametoctradin	0.3	0.01*	Yes
			dimethomorph	0.02	0.01*	No
			dithiocarbamates	0.9	0.05*	Yes

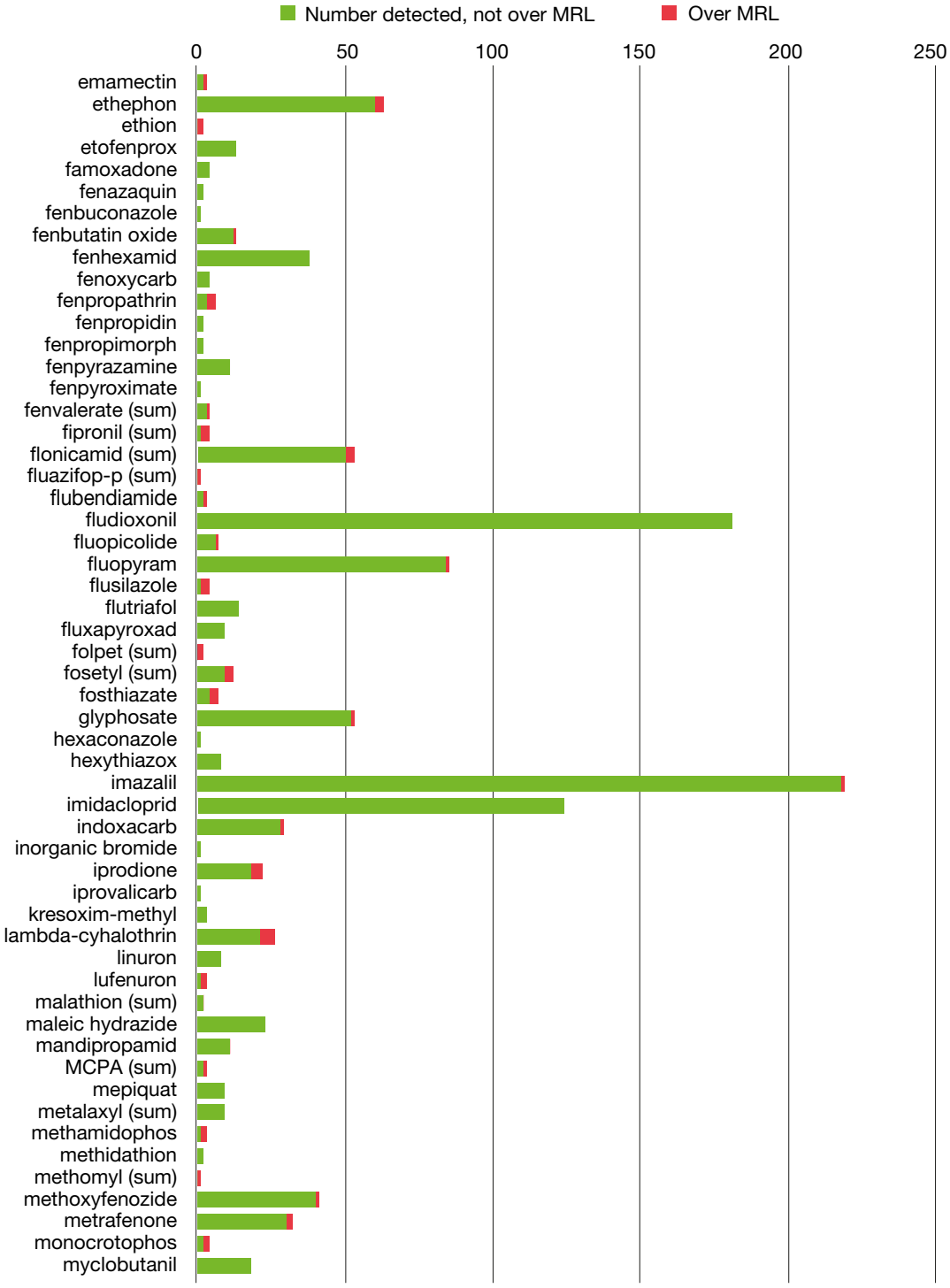
* Maximum Residue Levels set at LOD (LOD MRL): These MRLs are set at a default level, i.e. at the limit of determination (LOD) as specified in EC Regulation 396/2005.

21. Analyte detections

The UK programme tests for up to 376 pesticides. During 2018, 154 different pesticides were detected. This will vary each year depending on the different foods tested.

The graph below shows the number of detections of each analyte below the MRL and above the MRL. Some of the analytes are 'sum' residues, which means the full residue definition (such as parent and metabolites) was sought.




Number detected, not over MRL
Over MRL
0
50
100
150
200
250
emamectin
ethephon
ethion
etofenprox
famoxadone
fenazaquin
fenbuconazole
fenbutatin oxide
fenhexamid
fenoxycarb
fenpropathrin
fenpropidin
fenpropimorph
fenpyrazamine
fenpyroximate
fenvalerate (sum)
fipronil (sum)
flonicamid (sum)
fluazifop-p (sum)
flubendiamide
fludioxonil
fluopicolide
fluopyram
flusilazole
flutriafol
fluxapyroxad
folpet (sum)
fosetyl (sum)
fosthiazate
glyphosate
hexaconazole
hexythiazox
imazalil
imidacloprid
indoxacarb
inorganic bromide
iprodione
iprovalicarb
kresoxim-methyl
lambda-cyhalothrin
linuron
lufenuron
malathion (sum)
maleic hydrazide
mandipropamid
MCPA (sum)
mepiquat
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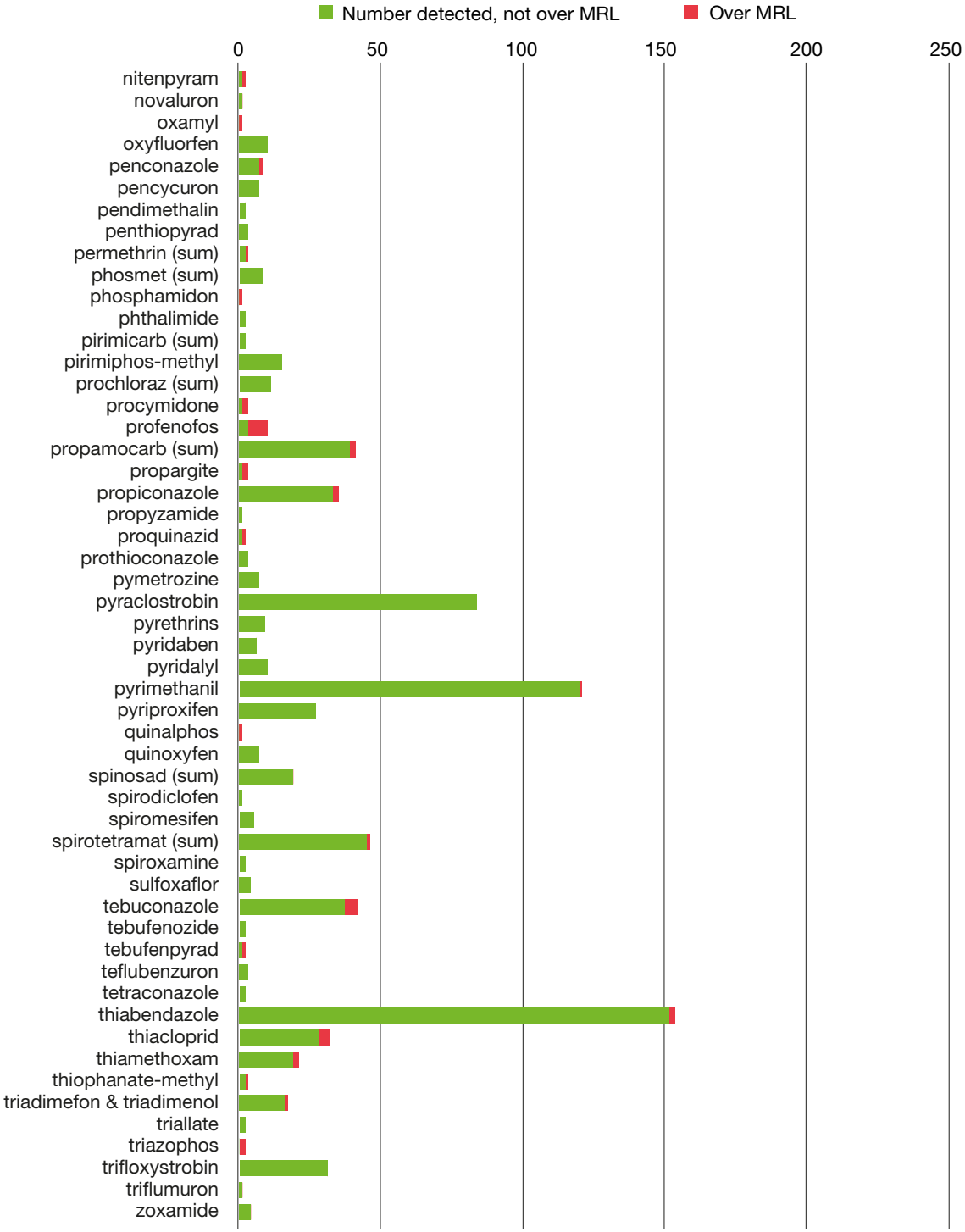
methamidophos
methidathion
methomyl (sum)
methoxyfenozide
metrafenone
monocrotophos
myclobutanil


Number detected, not over MRL
Over MRL
0
50
100
150
200
250
nitenpyram
novaluron
oxamyl
oxyfluorfen
penconazole
pencycuron
pendimethalin
penthiopyrad
permethrin (sum)
phosmet (sum)
phosphamidon
phthalimide
pirimicarb (sum)
pirimiphos-methyl
prochloraz (sum)
procymidone
profenofos
propamocarb (sum)
propargite
propiconazole
propyzamide
proquinazid
prothioconazole
pymetrozine
pyraclostrobin
pyrethrins
pyridaben
pyridalyl
pyrimethanil
pyriproxifen
quinalphos
quinoxyfen
spinosad (sum)
spirodiclofen
spiromesifen
spirotetramat (sum)
spiroxamine
sulfoxaflor
tebuconazole
tebufenozide
tebufenpyrad
teflubenzuron
tetraconazole
thiabendazole
thiacloprid
thiamethoxam
thiophanate-methyl
triadimefon & triadimenol
triallate
triazophos
trifloxystrobin
triflumuron
zoxamide

22. Frequently asked questions (FAQs)

About the results

Where can I find your results?

Our latest reports are on the UK government website: https://www.gov.uk/government/collections/pesticide-residues-in-food-results-of-monitoring-programme

Detailed results for individual samples including results of each test are separately available for download in spreadsheet format: https://data.gov.uk/dataset/5d5028ef-9918-4ab7-8755-81f3ad06f308/pesticide-residues-in-food

We can send you an email announcing publication of results and other news. We generally send at the most three emails a month. Please let us know if you'd like to join the mailing list by emailing us at prif@hse.gov.uk – all we need is an email address.

Are you finding more residues year-on-year?

Proportionally, the number of residues above the legal MRL and instances of residues which we think are of concern for consumers' health show little variation.

Over the years, as the knowledge and equipment of laboratories improves, we are increasingly able to test for more pesticides at lower amounts and so we do find more. A typical fruit and vegetable survey undertaken in 2003 by PRiF's predecessor, the PRC (Pesticide Residue Committee), looked for just over 150 pesticides, whereas in 2018 we looked for over 376 individual pesticides.

How can residues above the legal limit (MRL) still be safe?

MRLs are legal limits, not safety limits. Residues above the MRL are therefore not necessarily a cause for health concern.

MRLs are set at a level that is consistent with using the pesticide as authorised and in accordance with Good Agricultural Practice. Authorisation considers issues such as the personal safety of those exposed to the pesticide and environment safety, as well as safety for consumers. That means that MRL levels are often set far below levels that might otherwise be set just on consumer safety grounds alone.

All detected residues are screened for safety issues, whether or not they are above the MRL.

Do you consider the risk to children?

Yes. Our risk assessments consider the risk to several different groups of consumers (people who eat the relevant food) which includes various age groups including infants and children. As part of the risk assessment we take account of:

- the different eating habits, including the amounts of food that different people might eat
- people's different sizes (bodyweights and growth stages)

About the survey programme and the samples

Do you test imported food?

Yes. Imported food including food from Europe is part of the monitoring programme because it is part of the UK's general food supply.

We try to include imported samples in all surveys of any food roughly in proportion to the UK market share of the food. For example, when we survey bananas all the samples will be imported, but for swedes and turnips almost all samples will be from the UK.

Do you test baby food and baby milk?

Yes. Every year we test at least one sort of baby food or baby milk. We also take into account the law on pesticides residues in these special foods. They are separate, different legal controls for these foods which are intended to be extra precautionary.

You can find out more about the rules for baby food and baby milk at http://www.gov.uk/government/publications/infant-formula-and-foods-for-particular-nutritional-uses-parnuts-notification-requirements

Do you test organic food?

Yes. Organic food is part of the monitoring programme because it is part of the UK's general food supply. Our laboratories check many different foods for pesticide residues and organic samples are included among them. We try to include organic samples in all surveys of any food roughly in proportion to the UK market share of that food.

We consider whether any residues found could be a risk to consumer health and if so also consider what action should be taken.

Some pesticides are allowed to be used in organic food production as well as in conventional (non-organic) farming. When we test foods, we test all the samples of the same sort of food for the same range of pesticides.

We are not responsible for checking compliance with organic rules. So, when we find residues of pesticides in organic foods we send those findings through to the relevant organic certification company.

Do you test samples from all across the UK? Who collects your samples?

Yes. All year, every year, we collect samples from retail outlets across the UK. We change the particular locations used every year, as shown in our annual reports. We use market research shoppers at retail outlets for most of our surveys.

For some surveys, government inspectors collect samples from various points in the supply chain (such as ports, depots and pack houses) in England and Wales only. Plant Health and Seed Inspectors collect samples of potatoes, and Horticultural Marketing Inspectors collect samples of fresh fruit and vegetables.

How do you decide which foods to sample at retail (supermarkets and other shops) and which to sample from the food chain including wholesalers?

We tend to use inspectors to collect food at wholesale markets, import points and processing plants for foods that are:

- not routinely stocked by most retailers and even then often not stocked in large enough quantities to buy a sample – examples include okra, eddoes, quince and mooli (daikon)
- often sold loose at retail, which makes it harder for shoppers to collect traceability information – examples include oranges and grapes

We also use inspectors to collect samples of food where previously there have been compliance issues which have led to them being considered as a higher overall priority within the programme.

How do you decide where to get retail samples? Why do you keep coming to my shop?

We ask our shoppers to behave like normal shoppers. Our shoppers are based in a particular location, so that means they will go to the same supermarkets, greengrocers, butchers throughout the year.

Our aim is to get a snapshot that broadly reflects the market share of different chains and types of shops. We broadly collect in line with market share. We check to make sure that no particular retail chain or type of shop has been noticeably over or under represented.

We schedule special shopping trips to independent outlets such as market stalls, independent greengrocers, butchers and bakers, farm shops and so on.

How do you decide where to get samples from the non-retail parts of the food chain, such as wholesale markets and packers?

We ask the inspectors we use to collect samples alongside their normal work.

Horticultural Marketing Inspectors make sure that fresh fruit and vegetables are labelled with the right class standard (for instance 'class 1'). As well as working at wholesale markets they visit ports, airports, packing houses and shops.

Plant Health and Seed Inspectors have a wide range of duties relating to plant health. This includes checking that potatoes are free of diseases that could spread to growing potatoes and devastate harvests. They visit potato stores, potato packers, ports, airports, processors (for instance crisps and frozen chip factories) and farm shops.

What exactly do you tell shoppers and inspectors to do? What are the protocols for collecting samples?

Our protocols – or instructions to samplers – are based on international guidelines, which tell us everything about taking samples. As well as the size and make-up of the samples that we have to test, it tells us what a lot is and how many points in the lot we need to sample from.

We produce new sampling instructions every year for that year's programme, and if necessary we update them throughout the year. We don't publish these online as they go out of date so quickly. If you have any detailed questions or particular concern about the way a food is sampled, please do get in touch.

How much is a sample? For instance, is a sample of apples one apple?

To ensure results are comparable, we follow international guidelines on the size and make-up of the samples we test. We slightly increase the amounts recommended, to allow for things like miscounting and variation in weighing scales, otherwise the laboratory would have to reject the samples.

For example, for apples the guidance says a sample must be made up of at least 10 apples and must weigh at least one kilogram. We ask our samplers to get 12 apples and at least 1.2 kilograms to be on the safe side.

How do you prevent cross contamination during sampling and transport?

Our shoppers shop like ordinary shoppers: that includes wrapping and packing foods appropriately. Our shoppers and inspectors also wrap and pack samples with bubble wrap to prevent breakage and leakage in transit. Analysts expect this to be sufficient to prevent contamination. Samples are sent to the laboratory by a next-day courier service. If the laboratory thinks that contamination has occurred or that the contents have deteriorated in transit, then those samples are rejected.

About the tests (analysis)

What pesticides do you test for?

Most years our laboratories increase the number of pesticides they test for. This is driven by changes in the law about pesticides as much as improvements in analytical technology and techniques.

The actual pesticide tested for in each food also depends on the chemistry of that food. Some foods are just harder to analyse than others. They may be fatty, acidic, highly coloured or aromatic, all of which can affect the isolation and identification of the pesticide.

We publish details of the planned monitoring programme every year which includes information on pesticides we plan to test for. In our quarterly reports, we publish lists of all the pesticides we looked for but didn't find as well of course as the pesticides we did find.

Are your laboratories UKAS accredited? Are they accredited for all the tests they do for the programme?

Yes. Legislation requires all official laboratories to be appropriately accredited. HSE interpret that to mean that all results should be from tests covered by the laboratory's UKAS (United Kingdom Accreditation Service) accreditation under ISO/IEC 17025.

Do you test for neonicotinoid pesticides?

Yes. Our standard tests for fruit and vegetables include certain neonicotinoid pesticides. Other foods are also tested for certain neonicotinoids where appropriate. Each individual pesticide is tested for and reported separately and each has its own separate MRL.

Do you test for endocrine disrupting chemicals (EDCs)?

Endocrine disruption has only recently been recognised as a potential problem, (although data is already available for the possible effects of pesticides on reproduction including offspring).

The EU's scientific criteria for determining whether something is an endocrine disrupting chemical hasn't been finalised yet. Whatever the definition chosen, it is almost certain that we test for some pesticide residues that will fall into that or indeed other definitions.

Each individual pesticide is tested for and reported separately because each has its own separate MRL.

Where can I find out more about laboratory procedures and practices?

Our laboratories follow the latest version of 'Method Validation and Quality Control Procedures for Pesticide Residues Analysis in Food and Feed' as published by the Reference Laboratories for Pesticide Residues.

UKAS checks that our laboratories are following these rules as part of their accreditation checks.

How do the laboratories make sure the results are not due to cross-contamination or interference?

Our laboratories follow the rules for this in the analytical guidance. Any possible cross-contamination or interference is addressed during our Analytical Sub-Group's consideration of results.

About PRiF

Who are the members and who do they represent? Have they made declarations of interest?

We are appointed by Defra for our expertise to provide independent advice to the government. We do not act as representatives for particular sectors. We receive a basic fee and expenses for this work.

We have published a list of members including our biographical details as well as our declarations of interest.

What are your terms of reference?

Our terms of reference are:

To advise ministers, the Health and Safety Executive (HSE) and the Food Standards Agency (FSA) on:

- the planning of surveillance programmes for pesticide residues in the UK food supply and the evaluation of the results
- procedures for sampling, sample processing and new methods of analysis

The committee will make its findings and recommendations available to government, consumers and the food and farming industries in a way which aims to be comprehensive, understandable and timely.

23. Contact details

Expert Committee on Pesticide Residues in Food (PRiF)

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