Department for Environment, Food and Rural Affairs

The Expert Committee on Pesticide Residues in Food (PRiF)

Report on the pesticide residues monitoring programme: Quarter 2 2019

January 2020

This publication is available at www.gov.uk/government/groups/expert-committee-on-pesticide-residues-in-food-prif

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Introduction and summary results

Introduction to the work of the Expert Committee on Pesticide Residues in Food (PRiF)

The PRiF's role is to give Ministers, the Director of the Health and Safety Executive (HSE) and the Chief Executive of the Food Standards Agency (FSA) independent advice on the UK government's national rolling programme of surveys, in particular:

- the planning of surveillance programmes for pesticide residues in the UK food supply and the evaluation of the results;
- Procedures for sampling, sample processing, new methods of analysis, the assessment of variability of pesticide residues in food and related issues.

More information about PRiF

HSE working under Defra's authority has official responsibility to organise a monitoring programme of UK food for pesticide residues. The programme is made up of a risk-based national rolling programme of surveys and also includes participation in EU-wide monitoring. HSE is also responsible for considering the safety to people who eat the food (in co-operation with the Food Standards Agency if necessary) and following up adverse or unexpected results. They are also responsible for determining whether food is compliant with the law, specifically, whether any pesticide residue found is within the Maximum Residue Level. Maximum Residue Levels (MRLs) reflect levels of pesticides that could occur in produce, which has been treated in accordance with good agricultural practice. Where pesticides do not give rise to readily detectable residues, or are not approved for use on particular commodities, MRLs are set at the lowest level which can be identified in routine laboratory analysis. This provides a mechanism for statutory controls on pesticides in produce which is put into circulation and for monitoring the correct use of these chemicals.

Chair's summary of results

This is our second quarterly report for 2019. During this year's surveillance programme, we are looking for a range of up to 372 pesticides in the fruit and vegetable surveys. This quarter's programme surveyed 828 samples of 24 different foods (see contents page for a full list).

62 of the samples contained residues above the legal Maximum Residue Level (the maximum permitted levels by law). These results are in the surveys of beans with pods, cabbage, cheese (processed), grapes, milk, okra, potatoes, pre-packed salad and spinach. A summary table of all results can be found on page 7.

However, many of the exceedances were for chlorate findings, we do not think the findings of chlorate residues in cheese (processed), pre-prepared salad leaves and spinach should be treated as breaches of the legislation, and we have not highlighted them as such in the brand name annex. You can read updated information about work currently being done on chlorate residues in section 4.

HSE undertakes a screening risk assessment for every residue found, to determine whether the residues could lead to intakes above the relevant reference (safety) doses. HSE also produces detailed risk assessments for every case where the actual residue level found could lead to an intake above the safety levels. For two samples of potato one containing flonicamid at 0.3 mg/kg and one containing chlorpropham at 8.1 mg/kg it was necessary to undertake a detailed risk assessment. We have looked carefully at all of these findings including the detailed risk assessments. In all cases the presence of the residues found would be unlikely to have had any effect on the health of people who ate the food.

Full details of suppliers and retailers of the food sampled, and full analytical results, are available on data.gov.uk as ODF (Open Document Format) spreadsheet files. We hope this data format is useful for people wanting to look at the individual results in more detail.

We asked suppliers and the authorities of the exporting countries for an explanation of our findings. Any responses we have received specifically for publication are available in Section 2 sample details and supplier responses.

Dr Paul Brantom
Chairman of the Expert Committee on Pesticide Residues in Food

Summary of Table of Results

Food	Analysed	With residues at or below the MRL	With residues above the MRL	With residues of non- approved pesticides (UK only)	With multiple residues	Organic samples tested	Organic samples with residues
Apples	24	21	0	0	15	1	0
Barley	12	12	0	0	12	0	0
Beans with Pods	22	6	2	0	4	0	0
Butter	25	0	0	0	0	3	0
Cabbage	30	19	1	0	6	2	0
Cheese (processed)	29	0	3	0	0	0	0
Fish (sea)	30	3	0	0	1	0	0
Grapes	36	28	1	0	24	0	0
Honey	42	7	0	0	1	2	0
Lemons	30	29	0	0	26	1	0
Milk	91	1	1	0	0	16	0
Oats	24	23	0	1	21	2	1
Okra	30	6	7	0	6	0	0
Pasta	48	30	0	0	1	2	0
Peaches and Nectarines	28	19	0	0	15	0	0
Peppers	30	17	0	0	7	1	0
Plums	36	28	0	0	14	0	0
Potatoes	65	26	1	0	13	6	0
Pre-Packed Salad	40	4	36	0	34	1	1

Food	Analysed	With residues at or below the MRL	With residues above the MRL	With residues of non- approved pesticides (UK only)	With multiple residues	Organic samples tested	Organic samples with residues
Shellfish	18	1	0	0	0	0	0
Spinach	24	10	10	1	13	1	1
Strawberries	24	21	0	0	18	0	0
Tomatoes	18	7	0	0	3	0	0
Wine	72	46	0	0	21	1	0

Summary of Rapid Alert Notifications sent to FSA

Sample ID	Date of Sampling	Description	Country of Origin	Retail Outlet	Address	Brand Name	Packer / Manufacturer	Pesticide residues found in mg/kg (MRL)
Potatoes								
0073/2019	**22/05/2019**	**Gemson Potatoes**	**UK**	**Ralph Livesey Ltd**	**72b, Roman Way, Longridge Road, Preston PR2 5BE**	**None stated**	**T Dobson and Sons Produce Ltd Unit 1 Caxton Road, Preston PR2 9ZB**	**flonicamid (sum) 0.3 (MRL = 0.09)**

*** 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) where analytical methods can reasonably detect the presence of the pesticide. Either insufficient trials data are available on which to set a maximum residue level or there may be no use of the pesticide on that crop in the EU. However, they may be permitted elsewhere.

Summary of MRL Exceedances

Sample ID	Food	Country of Origin	Pesticide Detected	Residue Detected (mg/kg)	MRL (mg/kg)	MRL exceedance after allowing for measurement uncertainty
Beans with Pods						
2318/2019	Dwarf Beans	Morocco	bifenthrin	0.06	0.01*	Yes
0962/2019	Fine Beans	Zimbabwe	carbendazim (sum)	0.4	0.2	Yes
Cabbage						
3315/2019	Tender Heart Cabbage	UK	fluazifop-p (sum)	0.03	0.01*	Yes
Cheese (processed)						
2949/2019	Spreadable cheese	UK	chlorate	0.04	0.01	N/A
3336/2019	Spreadable cheese	France	chlorate	0.06	0.01	N/A
3412/2019	Spreadable cheese	Belgium	chlorate	0.04	0.01	N/A
Grapes						
5921/2019	Crimson Seedless Grapes	Chile	captan (sum)	0.07	0.03*	Yes
Milk						
2523/2019	Cows milk	UK	BAC (sum)	0.3	0.1	Yes
Okra						
0872/2019	Fresh	India	fenpyroximate	0.2	0.01*	Yes
0945/2019	Fresh	India	flonicamid (sum)	0.06	0.03*	Yes
5822/2019	Fresh	Jordan	clothianidin	0.03	0.01*	Yes
			thiamethoxam	0.07	0.01*	Yes
5852/2019	Fresh	Jordan	acetamiprid	0.4	0.2	Yes
			lufenuron	0.1	0.01*	Yes
5911/2019	Fresh	India	flonicamid (sum)	0.2	0.03*	Yes

Sample ID	Food	Country of Origin	Pesticide Detected	Residue Detected (mg/kg)	MRL (mg/kg)	MRL exceedance after allowing for measurement uncertainty
2909/2019	Frozen	India	flonicamid (sum)	0.04	0.03*	No
2962/2019	Frozen	China	chlorfenapyr	0.02	0.01*	No
			hexaconazole	0.03	0.01*	Yes
			thiamethoxam	0.02	0.01*	No
Potatoes						
0073/2019	New	UK	flonicamid (sum)	0.3	0.09	Yes
Pre-Packed Salad						
2969/2019	Iceberg lettuce	Spain	chlorate	0.2	0.01	N/A
4532/2019	Iceberg lettuce	UK	chlorate	0.2	0.01	N/A
4857/2019	Iceberg lettuce	UK	chlorate	0.06	0.01	N/A
2547/2019	Mixed Leaf	UK	chlorate	0.3	0.01	N/A
2614/2019	Mixed Leaf	UK	chlorate	0.5	0.01	N/A
2615/2019	Mixed Leaf	UK	chlorate	0.4	0.01	N/A
2849/2019	Mixed Leaf	UK	chlorate	0.2	0.01	N/A
2917/2019	Mixed Leaf	EU	chlorate	0.7	0.01	N/A
2918/2019	Mixed Leaf	UK	chlorate	0.9	0.01	N/A
2943/2019	Mixed Leaf	UK	chlorate	0.2	0.01	N/A
2944/2019	Mixed Leaf	UK	chlorate	0.3	0.01	N/A
3193/2019	Mixed Leaf	UK	chlorate	0.2	0.01	N/A
3328/2019	Mixed Leaf	UK	chlorate	0.03	0.01	N/A
4058/2019	Mixed Leaf	UK	chlorate	0.3	0.01	N/A
4059/2019	Mixed Leaf	UK	chlorate	0.4	0.01	N/A
4069/2019	Mixed Leaf	UK	chlorate	0.03	0.01	N/A

Sample ID	Food	Country of Origin	Pesticide Detected	Residue Detected (mg/kg)	MRL (mg/kg)	MRL exceedance after allowing for measurement uncertainty
4112/2019	Mixed Leaf	UK	chlorate	0.6	0.01	N/A
4136/2019	Mixed Leaf	UK	chlorate	0.3	0.01	N/A
4523/2019	Mixed Leaf	UK	chlorate	0.2	0.01	N/A
4531/2019	Mixed Leaf	UK	chlorate	0.9	0.01	N/A
4542/2019	Mixed Leaf	UK	chlorate	0.2	0.01	N/A
4573/2019	Mixed Leaf	UK	chlorate	0.9	0.01	N/A
4591/2019	Mixed Leaf	UK	chlorate	0.3	0.01	N/A
4614/2019	Mixed Leaf	UK	chlorate	0.4	0.01	N/A
4615/2019	Mixed Leaf	UK	chlorate	0.9	0.01	N/A
4656/2019	Mixed Leaf	EU	chlorate	0.04	0.01	N/A
4720/2019	Mixed Leaf	UK	chlorate	0.2	0.01	N/A
4778/2019	Mixed Leaf	UK	chlorate	0.2	0.01	N/A
4820/2019	Mixed Leaf	UK	chlorate	0.2	0.01	N/A
4856/2019	Mixed Leaf	UK	chlorate	0.4	0.01	N/A
2970/2019	Rocket	Spain	chlorate	0.02	0.01	N/A
3275/2019	Rocket	Spain	chlorate	0.04	0.01	N/A
3287/2019	Rocket	UK	chlorate	0.2	0.01	N/A
4111/2019	Rocket	Italy	chlorate	0.07	0.01	N/A
4806/2019	Rocket	Italy	chlorate	0.05	0.01	N/A
3286/2019	Watercress	UK	chlorate	0.04	0.01	N/A
Spinach						
2077/2019	Spinach - Fresh	UK	chlorate	0.1	0.01	N/A
4004/2019	Spinach - Fresh	UK	chlorate	0.08	0.01	N/A

Sample ID	Food	Country of Origin	Pesticide Detected	Residue Detected (mg/kg)	MRL (mg/kg)	MRL exceedance after allowing for measurement uncertainty
3139/2019	Baby Leaf - Frozen	Spain	chlorate	0.02	0.01	N/A
3197/2019	Spinach - Frozen	Belgium	chlorate	0.3	0.01	N/A
3457/2019	Spinach - Frozen	Belgium	chlorate	0.1	0.01	N/A
3490/2019	Spinach - Frozen	UK	chlorate	0.03	0.01	N/A
4643/2019	Spinach - Frozen	UK	chlorate	0.02	0.01	N/A
4645/2019	Spinach - Frozen	Belgium	chlorate	0.2	0.01	N/A
4852/2019	Spinach - Frozen	Belgium	chlorate	0.02	0.01	N/A
4853/2019	Spinach - Frozen	UK	chlorate	0.3	0.01	N/A

* 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) where analytical methods can reasonably detect the presence of the pesticide. Either insufficient trials data are available on which to set a maximum residue level or there may be no use of the pesticide on that crop in the EU. However, they may be permitted elsewhere.

Chlorate residues above the current LOD MRL have not been marked as exceedances, see Section 4 for explanation. Suppliers with residues above the MRL have been informed about the findings.

Section 1: findings by food

Apples

Summary of results

In a survey of 24 samples of apples collected between April and June 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

Survey design

The apple samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

24 samples were tested for up to 369 pesticide residues

Eating

- 6 samples came from the UK
- 6 samples were imported from outside the EU
- 12 samples came from the EU

Pesticide residues detected from those sought

3 samples contained no residues from those sought

21 samples contained residues above the reporting level

None of the samples contained residues above the MRL

1 sample was labelled as organic. None contained residues from those sought

Multiple residues

15 samples contained residues of more than one pesticide

- 6 samples contained 2 residues

- 5 samples contained 3 residues
- 2 samples contained 6 residues
- 1 sample contained 8 residues
- 1 sample contained 13 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health. Further information on the risk assessments undertaken by the Health and Safety Executive (HSE) is in section 3.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3.

Barley

Summary of results

In a survey of 12 samples of barley collected between May and June 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

Survey design

The barley samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

12 samples were tested for up to 370 pesticide residues

12 samples came from the UK

The country of origin on the packaging of barley does not necessarily indicate where the barley was grown. It may be where the barley was polished, or where it was packed for consumer purchase.

Pesticide residues detected from those sought

All samples contained residues

None of the samples contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

12 samples contained residues of more than one pesticide

- 3 samples contained 2 residues
- 7 samples contained 3 residues
- 2 samples contained 4 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health. Further information on the risk assessments undertaken by the Health and Safety Executive (HSE) is in section 3

Combined risk assessments

Some samples contained residues of more than one pesticide. Some of these residues are from pesticides which belong to similar chemical groups and may have similar toxicological effects. So, the risk assessors needed to consider their possible impacts on human health, both on their own and in combination.

HSE carried out a combined risk assessment of the relevant samples. We would not expect any of these combinations to have an effect on health.

Further information on how HSE assesses risks from multiple residues is in section 3.

Beans with pods

Summary of results

In a survey of 22 samples of beans with pods collected between April and June 2019, 2 samples (1 sample of dwarf beans and 1 sample of fine beans) contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

Survey design

The speciality bean samples were collected by the Animal and Plant Health Agency's Horticultural Marketing Inspectors from a range of points in the supply chain (wholesalers, retail depots, ports and import points) or they were bought by a market research company from retail outlets across the UK.

Samples of the other types of beans were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

22 samples were tested for up to 368 pesticide residues

Dwarf Beans

- 1 sample was imported from outside the EU

Fine Beans

- 9 samples were imported from outside the EU

Green Beans

- 8 samples were imported from outside the EU

Runner Beans

- 3 samples were imported from outside the EU
- 1 sample came from the EU

Pesticide residues detected from those sought

14 samples contained no residues from those sought

8 samples contained residues above the reporting level

2 samples contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

4 samples contained residues of more than one pesticide

- 3 samples contained 2 residues
- 1 sample contained 3 residues

Residues measured above the MRL

The laboratory detected 2 residues above the MRL in beans with pods

- 1 sample of dwarf beans from Morocco contained a residue of bifenthrin at 0.06 mg/kg. The MRL is 0.01* mg/kg.
- 1 sample of fine beans from Zimbabwe contained a residue of carbendazim (sum) at 0.4 mg/kg mg/kg. The MRL is 0.2 mg/kg.

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3.

Follow up actions

The secretariat has written to the suppliers of the samples with residues above the MRL. Any response received are in Section 2.

Butter

Summary of results

In a survey of 25 samples of butter collected between January and June 2019, no pesticide residues were detected. Chlorate residues were not sought in this survey. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

No pesticide residues detected.

Survey design

The butter samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

25 samples were tested for up to 38 pesticide residues

Butter

- 22 samples came from the UK
- 3 samples came from the EU

The country of origin of samples may not be the same as the country where the milk or butter was produced. It may be where the butter was packaged for consumer purchase or the address of the brand owner.

Pesticide residues detected from those sought

25 samples contained no residues from those sought

None of the samples contained residues above the reporting level

3 samples were labelled as organic. None contained residues from those sought

Risk assessments

The laboratory did not detect any residues, so we did not carry out a risk assessment.

Cabbage

Summary of results

In a survey of 30 samples of cabbage collected between April and June 2019, 1 sample contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

Survey design

The cabbage samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

30 samples were tested for up to 367 pesticide residues

15 samples came from the UK

15 samples came from the EU

Pesticide residues detected from those sought

10 samples contained no residues from those sought

20 samples contained residues above the reporting level

1 sample contained residues above the MRL

2 samples were labelled as organic. None contained residues from those sought

Multiple residues

6 samples contained residues of more than one pesticide

- 4 samples contained 2 residues
- 2 samples contained 3 residues

Residues measured above the MRL

The laboratory detected 1 residue above the MRL in cabbage

- 1 sample from the UK contained a residue of fluazifop-p (sum) at 0.03 mg/kg. The MRL is 0.01* mg/kg.

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3.

Follow up actions

The secretariat has written to the suppliers of the sample with a residue above the MRL. Any response received are in Section 2.

Cheese (processed)

Summary of results

In a survey of 29 samples of processed cheese collected between April and June 2019, 3 samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

We found chlorate in 3 samples of spreadable cheese.

We are testing a limited number of foods for chlorate in 2019, as we did in 2017 and 2018, to provide evidence on consumer safety and confirm that it is necessary to review the existing default MRL in order to take account of non-pesticide sources. Chlorine-based treatments of drinking and irrigation water as well as chlorine-based surface disinfectants are widely used to ensure microbiological safety. We agree with HSE and the FSA that the current MRL does not take account of these often-unavoidable sources.

Following the HSE's risk assessment, we do not expect any of the residues we found to have an effect on health. We do not view these residues as breaches of the legislation. We do not think any changes in production practice by the brand-owners or manufacturers is needed in response to these findings.

This adds to a growing body of evidence, from both official monitoring across the EU and from the food and farming industries, about the incidence of chlorate residues in food.

More information on work being done on chlorate in the diet is available in Section 4.

Survey design

The processed cheese samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

29 samples were tested for up to 110 pesticide residues

Cream Cheese

- 12 samples came from the UK
- 1 sample came from the EU

Soft Cheese

- 1 sample came from the UK
- 12 samples came from the EU

Spreadable cheese

- 1 sample came from the UK
- 2 samples came from the EU

The country of origin of samples may not be the same as the country where the milk or other ingredients were produced. It may be where the cheese was processed, where it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected from those sought

26 samples contained no residues from those sought

3 samples contained residues above the reporting level

3 samples contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

No samples contained residues of more than one pesticide

Residues measured above the MRL

The laboratory detected 3 residues above the MRL in spreadable cheese

- 1 sample from the UK contained a residue of chlorate at 0.04 mg/kg. The MRL for chlorate in all foods is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.
- 1 sample from France contained a residue of chlorate at 0.06 mg/kg. The MRL for chlorate in all foods is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.
- 1 sample from Belgium contained a residue of chlorate at 0.04 mg/kg. The MRL for chlorate in all foods is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.

Risk assessments

None of the individual residues detected by the laboratory would be expected to have an effect on health.

Follow up actions

The secretariat has written to the suppliers of the samples with residues above the MRL. Any response received are in section 2.

Fish (sea)

Summary of results

In a survey of 30 samples of sea fish collected between April and June 2019, 3 samples contained a pesticide residue. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

DDT

One sample of hake contained a residue of DDT. The use of DDT is banned or heavily restricted in many countries because the residues take a long time to breakdown in the environment and can accumulate in fatty tissue.

An interpretation of the analytical results shows that the DDT residue found was in the form of DDE which indicates historical use. More detailed information about DDT residues is in section 4 of this report.

Survey design

The fish samples were bought by a market research company from retail outlets across the UK.

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food.

Samples tested

30 samples were tested for up to 38 pesticide residues

Basa

- 1 sample was imported from outside the EU

Cod

- 1 sample came from the UK
- 16 samples were imported from outside the EU
- 1 sample came from the EU

Haddock

- 2 samples came from the UK

- 2 samples were imported from outside the EU

Hake

- 1 sample came from the UK
- 1 sample was imported from outside the EU

Sea bass

- 3 samples were imported from outside the EU
- 1 sample came from the EU

Sea bream

- 1 sample came from the UK

Where no sea area information is available, the country of origin on the packaging does not necessarily indicate where the fish was caught or farmed. It could be where it was landed or processed or where it was packed for retail sale.

Pesticide residues detected from those sought

27 samples contained no residues from those sought

3 samples contained residues above the reporting level

None of the samples were labelled as organic.

Multiple residues

One sample contained residues of more than one pesticide.

- 1 sample contained 2 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. Some of these residues are from pesticides which belong to similar chemical groups and may have similar toxicological effects. So, the risk assessors needed to consider their possible impacts on human health, both on their own and in combination.

HSE carried out a combined risk assessment of the relevant samples. We would not expect any of these combinations to have an effect on health.

Further information on how HSE assesses risks from multiple residues is in section 3.

Grapes

Summary of results

In a survey of 36 samples of grapes collected between April and June 2019, 1 sample contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected by the laboratory would be expected to have an effect on health

Survey design

The grape samples were collected by the Animal and Plant Health Agency's Horticultural Marketing Inspectors from a range of points in the supply chain (wholesale markets, retail depots, ports and import points).

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

36 samples were tested for up to 370 pesticide residues

36 samples were imported from outside the EU

Pesticide residues detected from those sought

7 samples contained no residues from those sought

29 samples contained residues above the reporting level

1 sample contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

24 samples contained residues of more than one pesticide

- 1 sample contained 2 residues
- 8 samples contained 3 residues
- 3 samples contained 4 residues
- 6 samples contained 5 residues
- 2 samples contained 7 residues

- 3 samples contained 9 residues
- 1 sample contained 10 residues

Residues measured above the MRL

The laboratory detected 1 residue above the MRL in grapes

- 1 sample from Chile contained a residue of captan at 0.07 mg/kg. The MRL is 0.03* mg/kg.

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. Some of these residues are from pesticides which belong to similar chemical groups and may have similar toxicological effects. So, the risk assessors needed to consider their possible impacts on human health, both on their own and in combination.

HSE carried out a combined risk assessment of the relevant samples. We would not expect any of these combinations to have an effect on health.

Further information on how HSE assesses risks from multiple residues is in section 3.

Follow up actions

The secretariat has written to the suppliers of the samples with residues above the MRL. Any response received are in Section 2.

* **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.

Honey

Summary of results

In a survey of 42 samples of honey collected between April and June 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected by the laboratory would be expected to have an effect on health

The pesticides we detected[1] are also used as veterinary medicines to treat bees and beehives for parasite and other insect infestations. Therefore, we do not think that the residues detected are from bees being exposed to pesticides that had been applied to crops they were foraging or in their environment. The Maximum Residue Level for pesticides in foods takes account of veterinary medicine as well as plant protection uses.

Survey design

The honey samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

42 samples were tested for up to 366 pesticide residues

31 samples came from the UK

2 samples were imported from outside the EU

9 samples came from the EU

The country of origin of samples may not be the same as the country where the honey was produced. It may be where the honey was processed, where it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected from those sought

35 samples contained no residues from those sought

7 samples contained residues above the reporting level

[1] Our analysis was carried out in line with pesticide residue analysis requirements.

None of the samples contained residues above the MRL

2 samples were labelled as organic. None contained residues from those sought

Multiple residues

1 sample contained residues of more than one pesticide

- 1 sample contained 2 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3.

Lemons

Summary of results

In a survey of 30 samples of lemons collected between April and June 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

Survey design

The lemon samples were collected by either the Animal and Plant Health Agency's Horticultural Marketing Inspectors from a range of points in the supply chain (wholesalers, retail depots, ports and import points) or they were bought by a market research company from retail outlets across the UK.

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

30 samples were tested for up to 366 pesticide residues

- 1 sample was imported from outside the EU
- 29 samples came from the EU

Pesticide residues detected from those sought

1 sample contained no residues from those sought

29 samples contained residues above the reporting level

None of the samples contained residues above the MRL

1 sample was labelled as organic. None contained residues from those sought

Multiple residues

26 samples contained residues of more than one pesticide

- 8 samples contained 2 residues
- 11 samples contained 3 residues
- 5 samples contained 4 residues
- 1 sample contained 6 residues

- 1 sample contained 7 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3.

Milk

Summary of results

In a survey of 91 samples of milk collected between April and June 2019, 1 sample contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected by the laboratory would be expected to have an effect on health. We do not think that the residue detected is from the cows' food or their environment. The pesticide we detected is more widely used as a disinfectant on surfaces and equipment used in food processing to main food hygiene. The Maximum Residue Level for pesticides in foods is intended to take account of disinfectant uses.

Survey design

The milk samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

91 samples were tested for up to 110 pesticide residues

Cows milk

- 90 samples came from the UK

Goats milk

- 1 sample came from the UK

Pesticide residues detected from those sought

89 samples contained no residues from those sought

2 samples contained residues above the reporting level

1 sample contained residues above the MRL

16 samples were labelled as organic. None contained residues from those sought

Multiple residues

No samples contained residues of more than one pesticide

Residues measured above the MRL

The laboratory detected 1 residue above the MRL in milk

- 1 sample from the UK contained a residue of BAC (sum) at 0.3 mg/kg. The MRL is 0.1 mg/kg.

Risk assessments

The residue detected by the laboratory would not be expected to have an effect on health.

Follow up actions

The secretariat has written to the suppliers of the samples with residues above the MRL. Any response received are in Section 2.

Oats

Summary of results

In a survey of 24 samples of oats collected in April 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

Survey design

The oat samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

24 samples were tested for up to 370 pesticide residues

20 samples came from the UK

4 samples came from the EU

The country of origin of samples may not be the same as the country where the oats were produced. It may be where the oats were processed or where they were packed for consumer purchase or the address of the brand owner.

Pesticide residues detected from those sought

1 sample contained no residues from those sought

23 samples contained residues above the reporting level

None of the samples contained residues above the MRL

2 samples were labelled as organic.1 contained residues from those sought

Multiple residues

21 samples contained residues of more than one pesticide

- 3 samples contained 2 residues
- 17 samples contained 3 residues
- 1 sample contained 4 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. Some of these residues are from pesticides which belong to similar chemical groups and may have similar toxicological effects. So, the risk assessors needed to consider their possible impacts on human health, both on their own and in combination.

HSE carried out a combined risk assessment of the relevant samples. We would not expect any of these combinations to have an effect on health.

Further information on how HSE assesses risks from multiple residues is in section 3.

Follow up actions

We have passed details of one sample of porridge oats from the UK that contained a residue of chlorpropham which is not approved for use on oats in the UK to HSE. HSE is investigating; brand name details will not be published until the investigations are complete.

The Secretariat has written to the supplier of the sample of organic porridge oats from Ireland with a residue of chlormequat which is not permitted in organic food production. Defra's Organic Farming branch and the organic certification organisation were also informed.

Okra

Summary of results

In a survey of 30 samples of okra collected between April and June 2019, 7 samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

We have found non-compliance in 4 samples of India okra. This food is already subject to increased import controls at the border. Also, one sample from Jordan and one from China contained residues above the MRL.

We continue to have some concerns that exporters may not be testing for the full residue definition for flonicamid[2] which is essential to judge whether goods are compliant. Suppliers should ensure that that the full legal definition is tested for by an accredited laboratory.

Survey design

The okra samples were collected by either the Animal and Plant Health Agency's Horticultural Marketing Inspectors from a range of points in the supply chain (wholesalers, retail depots, ports and import points) or they were bought by a market research company from retail outlets across the UK.

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

30 samples were tested for up to 368 pesticide residues

Fresh

- 22 samples were imported from outside the EU

Frozen

- 8 samples were imported from outside the EU

The country of origin of frozen samples may not be the same as the country where the okra was grown. It may be where the okra was frozen, or where it was packaged for consumer purchase or the address of the brand owner.

[2] Flonicamid (sum of flonicamid, TNFG and TNFA) -see section 5 for more information on complex residue definitions

Pesticide residues detected from those sought

17 samples contained no residues from those sought

13 samples contained residues above the reporting level

7 samples contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

6 samples contained residues of more than one pesticide

- 4 samples contained 2 residues
- 1 sample contained 3 residues
- 1 sample contained 6 residues

Residues measured above the MRL

The laboratory detected 11 residues above the MRL in okra:

Fresh

- 1 sample from India contained a residue of fenpyroximate at 0.2 mg/kg. The MRL is 0.01* mg/kg
- 1 sample from India contained a residue of flonicamid (sum) at 0.04 mg/kg. The MRL is 0.03 mg/kg
- 1 sample from Jordan contained:
    - a residue of clothianidin at 0.03 mg/kg. The MRL is 0.01 mg/kg.
    - a residue of thiamethoxam at 0.07 mg/kg. The MRL is 0.01* mg/kg.
- 1 sample from India contained a residue of flonicamid (sum) at 0.2 mg/kg. The MRL is 0.03* mg/kg
- 1 sample from Jordan contained:
    - a residue of acetamiprid at 0.4 mg/kg. The MRL is 0.2 mg/kg.
    - a residue of lufenuron at 0.1 mg/kg. The MRL is 0.01* mg/kg.

* **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.

Frozen

- 1 sample from China contained:
    - a residue of chlorfenapyr at 0.02 mg/kg. The MRL is 0.01* mg/kg.
    - a residue of hexaconazole at 0.03 mg/kg. The MRL is 0.01* mg/kg.
    - a residue of thiamethoxam at 0.02 mg/kg. The MRL is 0.01* mg/kg.
- 1 sample from India contained a residue of flonicamid (sum) at 0.04 mg/kg. The MRL is 0.03* mg/kg

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. Some of these residues are from pesticides which belong to similar chemical groups and may have similar toxicological effects. So, the risk assessors needed to consider their possible impacts on human health, both on their own and in combination.

HSE carried out a combined risk assessment of the relevant samples. We would not expect any of these combinations to have an effect on health.

Further information on how HSE assesses risks from multiple residues is in section 3.

Follow up actions

The secretariat has written to the suppliers of the samples with residues above the MRL. Any responses received are in Section 2.

Pasta

Summary of results

In a survey of 48 samples of pasta collected between January and June 2019, no samples contained a residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

Survey design

The pasta samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

48 samples were tested for up to 371 pesticide residues

1 sample came from the UK

1 sample was imported from outside the EU

46 samples came from the EU

The country of origin of samples may not be the same as the country where the pasta was produced, or the same as the country where the wheat was grown or the flour was produced. It may also be where the pasta was packaged for consumer purchase or the address of the brand owner.

Pesticide residues detected from those sought

18 samples contained no residues from those sought

30 samples contained residues above the reporting level

None of the samples contained residues above the MRL

2 samples were labelled as organic. None contained residues from those sought

Multiple residues

1 sample contained residues of more than one pesticide

- 1 sample contained 2 residues

Residues measured above the MRL

None of the residues measured above the MRL. A processing factor derived from wheat flour was applied to the MRL for the wheat grain. Details of the processing factors used can be found in section 4.

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3.

Peaches and nectarines

Summary of results

In a survey of 28 samples of peaches and nectarines collected between April and June 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health

Survey design

The peach and nectarine samples were collected by either the Animal and Plant Health Agency's Horticultural Marketing Inspectors from a range of points in the supply chain (wholesalers, retail depots, ports and import points) or they were bought by a market research company from retail outlets across the UK.

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

28 samples were tested for up to 369 pesticide residues

Nectarines

- 11 samples were imported from outside the EU
- 7 samples came from the EU

Peaches

- 2 samples were imported from outside the EU
- 8 samples came from the EU

Pesticide residues detected from those sought

9 samples contained no residues from those sought

19 samples contained residues above the reporting level

None of the samples contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

15 samples contained residues of more than one pesticide

- 5 samples contained 2 residues
- 4 samples contained 3 residues
- 4 samples contained 4 residues
- 1 sample contained 5 residues
- 1 sample contained 6 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3.

Peppers

Summary of results

In a survey of 30 samples of peppers collected between April and May 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health

Survey design

The pepper samples were collected by either the Animal and Plant Health Agency's Horticultural Marketing Inspectors from a range of points in the supply chain (wholesalers, retail depots, ports and import points) or they were bought by a market research company from retail outlets across the UK.

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

30 samples were tested for up to 369 pesticide residues

Fresh

- 4 samples were imported from outside the EU
- 26 samples came from the EU

Pesticide residues detected from those sought

13 samples contained no residues from those sought

17 samples contained residues above the reporting level

None of the samples contained residues above the MRL

1 sample was labelled as organic. None contained residues from those sought

Multiple residues

7 samples contained residues of more than one pesticide

- 5 samples contained 2 residues
- 1 sample contained 3 residues
- 1 sample contained 4 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3.

Plums

Summary of results

In a survey of 36 samples of plums collected between April and June 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health

Survey design

The plum samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

36 samples were tested for up to 368 pesticide residues

29 samples were imported from outside the EU

7 samples came from the EU

Pesticide residues detected from those sought

8 samples contained no residues from those sought

28 samples contained residues above the reporting level

None of the samples contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

14 samples contained residues of more than one pesticide

- 10 samples contained 2 residues
- 3 samples contained 3 residues
- 1 sample contained 4 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3.

Potatoes

Summary of results

In a survey of 65 samples of potatoes collected between April and June 2019, 1 sample contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

Flonicamid (sum)

One UK sample of potato contained a residue of flonicamid (sum) at 0.3 mg/kg, which is above the MRL, that required a detailed risk assessment. We have presented the risk assessment in full. Based on HSE's risk assessment of the residues detected, we consider an effect on health is unlikely.

The residue detected was made up from the metabolites of flonicamid included in the residue definition. Suppliers should ensure that that the full legal definition[3] is tested for by an accredited laboratory.

We have asked HSE to consider whether this residue may have occurred from use in accordance with the authorisation.

Chlorpropham

One sample contained a residue of chlorpropham at 8.1 mg/kg - which is below the current MRL of 10 mg/kg that required a detailed risk assessment. We have presented the risk assessment in full. Based on HSE's risk assessment of the residues detected, we consider an effect on health is unlikely.

We are aware that chlorpropham has not been renewed for use in the EU. No changes have yet been made to MRLs: we understand that the consideration of future MRLs is now underway and will specifically include residues in potatoes incurred from contamination from potato storage facilities rather than use. We are keeping up-to-date on the situation and any implications for the monitoring programme including the assessment of risks to consumers.

Survey design

The potato samples were collected by either the Animal and Plant Health Agency's Plant Health and Seed Inspectors from a range of points across the supply chain (wholesalers, potato processors, ports and import points) or they were bought by a market research company from retail outlets across the UK.

[3] Flonicamid (sum of flonicamid, TNFG and TNFA) -see section 5 for more information on complex residue definitions

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

65 samples were tested for up to 368 pesticide residues

Maincrop

- 32 samples came from the UK
- 7 samples were imported from outside the EU
- 1 sample came from the EU

New

- 16 samples came from the UK
- 8 samples were imported from outside the EU
- 1 sample came from the EU

Pesticide residues detected from those sought

38 samples contained no residues from those sought

27 samples contained residues above the reporting level

1 sample contained residues above the MRL

6 samples were labelled as organic. None contained residues from those sought

Multiple residues

13 samples contained residues of more than one pesticide

- 11 samples contained 2 residues
- 2 samples contained 3 residues

Residues measured above the MRL

The laboratory detected 1 residue above the MRL in new potatoes

- 1 sample from the UK contained a residue of flonicamid (sum) at 0.3 mg/kg. The MRL is 0.09 mg/kg.

Risk assessments

chlorpropham

One sample of potato (collected at a crisp producer) contained a residue of chlorpropham at levels where the effect on health needed to be considered in more detail. The highest level detected was 8.1 mg/kg. Risk assessment are presented for infant and toddlers. Toddlers are expected to consume the peel and the highest intakes, without applying a processing factor to provide a further refinement to the intakes are 172% of the ARfD. This intake is 58 times lower than a single dose which caused no observed adverse effect in the above mentioned dog study.

Toxicologists usually apply a factor of 100 to this dose to take into account uncertainties caused by using animal data and possible differences in susceptibility between people. We consider the reduced factor of 58 still enough to make an effect on health unlikely.

This estimate assumes that potatoes are eaten unpeeled (for example as jacket potato); much of the residue is expected to be associated with the peel. In conclusion, considering the form of potato consumed by infants and young children, we consider an effect on health to be unlikely.

The full risk assessment is on page 79. Further information on how HSE assesses risks is in section 3.

flonicamid

One sample of potato contained a residue of flonicamid at levels where the effect on health needed to be considered in more detail. The level detected was 0.3 mg/kg, the MRL is 0.09 mg/kg. The intakes for infants and toddlers exceeded the ARfD. The highest intake was for infants.

If infants ate large portions of potatoes containing flonicamid at 0.30 mg/kg, their intake of flonicamid could be 185% of the Acute Reference Dose. This intake is 54 times lower than a dose which caused no observed adverse effect in a developmental study in rabbits over 22 days. The European Food Safety Authority used this study as the basis of the ARfD.

Toxicologists usually apply a factor of 100 to this dose to take into account uncertainties caused by using animal data and possible differences in susceptibility between people. We consider the reduced factor of 54 still enough to make an effect on health unlikely. Based on HSE's risk assessment of the residues detected an effect on health is unlikely.

The full risk assessment is on page 79. Further information on how HSE assesses risks is in section 3.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3

Follow up actions

The secretariat has written to the suppliers of the sample with a residue above the MRL. Any response received are in Section 2.

We have informed the FSA about the sample with flonicamid (sum) at 0.9 mg/kg. They will determine if is necessary to draft a notification for the EC's Rapid Alert System for Food and Feed (RASFF) (see glossary for more details):

- One sample from UK containing flonicamid (sum) at 0.9 mg/kg.

Pre-prepared salad leaves

Summary of results

In a survey of 40 samples of the prepared salad leaves collected between April and June 2019, 36 samples contained a residue above the MRL. This survey tested for chlorate and pesticide residues that may have occurred from disinfectant use only. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health

Chlorate

We found chlorate in 36 samples of prepared salad leaves.

We are testing a limited number of foods for chlorate in 2019, as we did in 2017 and 2018, to provide evidence on consumer safety and confirm that it is necessary to review the existing default MRL in order to take account of non-pesticide sources. Chlorine-based treatments of drinking and irrigation water as well as chlorine-based surface disinfectants are widely used to ensure microbiological safety. We agree with HSE and the FSA that the current MRL does not take account of these often unavoidable sources.

Following the HSE's risk assessment, we do not expect any of the residues we found to have an effect on health. We do not think any changes in production practise by the brand-owners or manufacturers is needed in response to these findings.

This adds to a growing body of evidence, from both official monitoring across the EU and from the food and farming industries, about the incidence of chlorate residues in food.

More information on work being done on chlorate in the diet is available in Section 4.

Survey design

The prepared salad leaf samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

40 samples were tested for up to 366 pesticide residues

Iceberg lettuce

- 2 samples came from the UK

- 1 sample came from the EU

Mixed Leaf

- 28 samples came from the UK
- 2 samples came from the EU

Rocket

- 2 samples came from the UK
- 4 samples came from the EU

Watercress

- 1 sample came from the UK

The country of origin of samples may not be the same as the country where the salad leaves or any other ingredients were produced. It may be where the salad leaves were processed, where it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected from those sought

For comparative purposes, we have referenced the residues found against the MRL for lettuce when the salad contained mixed leaves.

All samples contained residues

36 samples contained residues above the MRL. These were all chlorate residues.

1 sample was labelled as organic.1 contained residues from those sought

Multiple residues

34 samples contained residues of more than one pesticide

- 5 samples contained 2 residues
- 10 samples contained 3 residues
- 5 samples contained 4 residues
- 4 samples contained 5 residues
- 4 samples contained 6 residues
- 4 samples contained 7 residues
- 1 sample contained 8 residues

- 1 sample contained 10 residues

Residues measured above the MRL

The laboratory detected 36 residues of chlorate above the MRL in prepared salad leaves However, we do not view any of these residues as a breach of the regulation: see section 4

- 10 samples from the UK contained a residue of chlorate at 0.2 mg/kg. The MRL is 0.01* mg/kg.
- 1 sample from Spain contained a residue of chlorate at 0.2 mg/kg. The MRL is 0.01 mg/kg.
- 1 sample from the UK contained a residue of chlorate at 0.06 mg/kg. The MRL is 0.01 mg/kg.
- 1 sample from the EU contained a residue of chlorate at 0.7 mg/kg. The MRL is 0.01 mg/kg.
- 4 samples from the UK contained a residue of chlorate at 0.9 mg/kg. The MRL is 0.01 mg/kg.
- 1 sample from the UK contained a residue of chlorate at 0.6 mg/kg. The MRL is 0.01 mg/kg.
- 6 samples from the UK contained a residue of chlorate at 0.3 mg/kg. The MRL is 0.01 mg/kg.
- 1 sample from the EU contained a residue of chlorate at 0.04 mg/kg. The MRL is 0.01 mg/kg.
- 4 samples from the UK contained a residue of chlorate at 0.4 mg/kg. The MRL is 0.01 mg/kg.
- 1 sample from the UK contained a residue of chlorate at 0.5 mg/kg. The MRL is 0.01 mg/kg.
- 1 sample from the UK contained a residue of chlorate at 0.03 mg/kg. The MRL is 0.01 mg/kg.
- 1 sample from Italy contained a residue of chlorate at 0.07 mg/kg. The MRL is 0.01 mg/kg.

* **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.

- 1 sample from Spain contained a residue of chlorate at 0.02 mg/kg. The MRL is 0.01* mg/kg.
- 1 sample from Spain contained a residue of chlorate at 0.04 mg/kg. The MRL is 0.01* mg/kg.
- 1 sample from Italy contained a residue of chlorate at 0.05 mg/kg. The MRL is 0.01* mg/kg.
- 1 sample from the UK contained a residue of chlorate at 0.04 mg/kg. The MRL is 0.01* mg/kg mg/kg.

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3

Follow up actions

The Secretariat has written to the supplier of the sample of organic baby leaf and rocket salad leaves from the UK with a residue of chlorate and dithiocarbamate which is not permitted in organic food production. Defra's Organic Farming branch and the organic certification organisation were also informed. Penthiopyrad residues were found in two samples of prepared leaves labelled as UK. Penthiopyrad is not approved for use on UK lettuce. Further follow-up indicated that the samples contained some leaves produced outside of the UK , so the penthiopyrad application may have taken place outside of the UK. No further action required.

* **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.

Shell fish

Summary of results

In a survey of 18 samples of shell fish collected between April and June 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health

Survey design

The shell fish samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

18 samples were tested for up to 38 pesticide residues

Clams

1 sample was imported from outside the EU

Langoustines

1 sample came from the UK

Mussels

1 sample came from the UK

1 sample was imported from outside the EU

1 sample came from the EU

Prawns

12 samples were imported from outside the EU

Scallops

1 sample came from the EU

Where no sea area information is available, the country of origin on the packaging does not necessarily indicate where the shell fish was caught. It could be where it was processed or where it was packed for retail sale.

Pesticide residues detected from those sought

17 samples contained no residues from those sought

1 sample contained residues above the reporting level

None of the samples contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

No samples contained residues of more than one pesticide

Spinach

Summary of results

In a survey of 24 samples of spinach collected between May and June 2019, 13 samples contained a pesticide residue above the MRL. This survey tested for chlorate and pesticide residues that may have occurred from disinfectant use only. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health

We found chlorate in 10 samples of spinach

We are testing a limited number of foods for chlorate in 2019, as we did in 2017 and 2018, to provide evidence on consumer safety and confirm that it is necessary to review the existing default MRL in order to take account of non-pesticide sources. Chlorine-based treatments of drinking and irrigation water as well as chlorine-based surface disinfectants are widely used to ensure microbiological safety. We agree with HSE and the FSA that the current MRL does not take account of these often unavoidable sources.

Following the HSE's risk assessment, we do not expect any of the residues we found to have an effect on health. We do not think any changes in production practise by the brand-owners or manufacturers is needed in response to these findings.

This adds to a growing body of evidence, from both official monitoring across the EU and from the food and farming industries, about the incidence of chlorate residues in food.

More information on work being done on chlorate in the diet is available in Section 4.

Survey design

The spinach samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

24 samples were tested for up to 368 pesticide residues

Baby Leaf - Fresh

- 9 samples came from the UK

Baby Leaf - Frozen

- 1 sample came from the EU

Spinach - Fresh

- 5 samples came from the UK
- 1 sample came from the EU

Spinach - Frozen

- 4 samples came from the UK
- 4 samples came from the EU

The country of origin of samples may not be the same as the country where the spinach was produced. It may be where the spinach was processed, where it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected from those sought

4 samples contained no residues from those sought

20 samples contained residues above the reporting level

10 samples contained residues above the MRL

1 sample was labelled as organic.1 contained residues from those sought

Multiple residues

13 samples contained residues of more than one pesticide

- 5 samples contained 2 residues
- 6 samples contained 3 residues
- 2 samples contained 4 residues

Residues measured above the MRL

The laboratory detected 10 residues above the MRL in spinach

- 1 sample from the UK contained a residue of chlorate at 0.08* mg/kg. The MRL is 0.01 mg/kg. However, we do not view this as a breach of regulation: see section 4

* **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

- 1 sample from the UK contained a residue of chlorate at 0.1 mg/kg. The MRL is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.
- 1 sample from Belgium contained a residue of chlorate at 0.02 mg/kg. The MRL is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.
- 1 sample from Belgium contained a residue of chlorate at 0.3 mg/kg. The MRL is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.
- 1 sample from Belgium contained a residue of chlorate at 0.1 mg/kg. The MRL is 0.01 mg/kg. However, we do not view this as a breach of regulation: see section 4
- 1 sample from Belgium contained a residue of chlorate at 0.2 mg/kg. The MRL is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.
- 1 sample from the UK contained a residue of chlorate at 0.3 mg/kg. The MRL is 0.01 mg/kg. However, we do not view this as a breach of regulation: see section 4
- 1 sample from Spain contained a residue of chlorate at 0.02 mg/kg. The MRL is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.
- 1 sample from the UK contained a residue of chlorate at 0.03 mg/kg. The MRL is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.
- 1 sample from the UK contained a residue of chlorate at 0.02 mg/kg. The MRL is 0.01* mg/kg. However, we do not view this as a breach of regulation: see section 4.

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3

Follow up actions

The secretariat has written to the suppliers of the samples with residues above the MRL. Any response received are in Section 2.

The Secretariat has written to the supplier of the sample of organic spinach from Italy with a residue of boscalid which is not permitted in organic food production. Defra's Organic Farming branch and the organic certification organisation were also informed.

We have passed details of 2 samples from the UK that contained a residue of clothianidin which is not approved for use on spinach in the UK to HSE to consider. This pesticide was approved for use until the end of 2018 as a seed treatment and hence it is possible that treated seed could have been planted during 2019. One of the producers confirmed that their investigation indicated there may have been contamination from equipment previously used to drill a cereal crop. HSE do not believe that there has been misuse and the supplier has taken action to clean the equipment for further avoidance. No further action required for this finding. We await further information on the other sample.

Strawberries

Summary of results

In a survey of 24 samples of strawberries collected between May and June 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health

Survey design

The strawberry samples were collected by either the Animal and Plant Health Agency's Horticultural Marketing Inspectors from a range of points in the supply chain (wholesalers, retail depots, ports and import points) or they were bought by a market research company from retail outlets across the UK.

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

24 samples were tested for up to 369 pesticide residues

Fresh

- 12 samples came from the UK
- 12 samples came from the EU

Pesticide residues detected from those sought

3 samples contained no residues from those sought

21 samples contained residues above the reporting level

None of the samples contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

18 samples contained residues of more than one pesticide

- 5 samples contained 2 residues
- 3 samples contained 3 residues

- 1 sample contained 4 residues
- 7 samples contained 5 residues
- 2 samples contained 8 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3

Tomatoes

Summary of results

In a survey of 18 samples of tomatoes collected between May and June 2019, none of the samples contained a pesticide residue above the MRL. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health

Survey design

The tomato samples were collected by either the Animal and Plant Health Agency's Horticultural Marketing Inspectors from a range of points in the supply chain (wholesalers, retail depots, ports and import points) or they were bought by a market research company from retail outlets across the UK.

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

18 samples were tested for up to 372 pesticide residues

Cherry

- 1 sample came from the UK
- 1 sample was imported from outside the EU
- 1 sample came from the EU

Plum

- 2 samples came from the EU

Salad

- 3 samples came from the UK
- 7 samples came from the EU

Vine

- 2 samples came from the UK
- 1 sample came from the EU

Pesticide residues detected from those sought

11 samples contained no residues from those sought

7 samples contained residues above the reporting level

None of the samples contained residues above the MRL

None of the samples were labelled as organic.

Multiple residues

3 samples contained residues of more than one pesticide

- 1 sample contained 2 residues
- 1 sample contained 3 residues
- 1 sample contained 6 residues

Combined risk assessments

Some samples contained residues of more than one pesticide. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider separately. Further information on how HSE assesses risks from multiple residues is in section 3

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Wine

Summary of results

In a survey of 72 samples of wine collected between January and March 2019, none of the samples contained a pesticide residue above the MRL for wine grapes. These results were reviewed by the Expert Committee on Pesticide Residues in Food (PRiF).

Comments by the PRiF

None of the residues detected would be expected to have an effect on health.

None of the residues detected would be expected to have an effect on health. We are aware that the residues reported for the pesticide folpet only contain one of the components of the full definition. HSE has indicated that it is possible that the residue found is a type of chemical called a phthalimide which can be a break down product during processing including fermentation. As we are unable to differentiate between the sources of the chemical, we have reported the results. More information on this is in section 4.

Survey design

The wine samples were bought by a market research company from retail outlets across the UK

Full sample details, including brand name information, pesticides sought and residues found are available in an accessible format at https://data.gov.uk/dataset/pesticide-residues-in-food

Samples tested

72 samples were tested for up to 369 pesticide residues

Red

- 1 sample came from the UK
- 13 samples were imported from outside the EU
- 20 samples came from the EU

Rose

- 3 samples came from the EU

Sparkling

- 1 sample was imported from outside the EU

White

- 1 sample came from the UK
- 16 samples were imported from outside the EU
- 17 samples came from the EU

The country of origin of samples may not be the same as the country where the wine grapes were produced. It may be where the wine was processed, where it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected from those sought

26 samples contained no residues from those sought

46 samples contained residues above the reporting level

None of the samples contained residues above the MRL for wine grapes.

1 sample was labelled as organic. None contained residues from those sought

Multiple residues

21 samples contained residues of more than one pesticide

- 11 samples contained 2 residues
- 7 samples contained 3 residues
- 3 samples contained 4 residues

Risk assessments

None of the individual residues or combined residues detected by the laboratory would be expected to have an effect on health.

Combined risk assessments

Some samples contained residues of more than one pesticide. Some of these residues are from pesticides which belong to similar chemical groups and may have similar toxicological effects. So the risk assessors needed to consider their possible impacts on human health, both on their own and in combination.

HSE carried out a combined risk assessment of the relevant samples. We would not expect any of these combinations to have an effect on health.

Section 2: Sample details and supplier responses

Sample details

The sample details are published on data.gov.uk as a dataset in ODS format.

About sample information

The following information is available on each sample collected this quarter:

- Date and place of collection
- Description (e.g. 'runner bean', organic milk);
- Country of origin or manufacture;
- Brand name and packer/manufacturer; and
- Residues detected (results shown in green indicate residues above the MRL).
- Where the brand name of a sample is given the produce involved may have been on sale in other retail premises at the same time.

The description and country of origin are taken from labelling on the food or at the point of sale. The country of origin of processed food may not be the country where the unprocessed produce was produced. This is true even of food that has undergone minimal processing, such as meat that has been butchered or frozen vegetables.

Samples with residues above the MRL are in bold, green text.

Some brand name details have been withheld – these will be published once enquiries are complete.

The Government's 'brand naming' policy

The Government has decided that brand name information should be published as part of the Government food chemical surveillance programme. Brand names have been published for most pesticide residue surveys since 1998. Certain samples are excluded from the release of brand name information. These include samples taken as part of any pesticide residues enforcement programme and those taken as part of surveys to study individual people/farms. This policy was reviewed in 2000/1, when Ministers agreed to its continuation.

Where we find residues above an MRL or the presence of non-approved pesticides brand owners/retailers/ growers are notified of the result in advance of publication of reports and given four weeks to comment.

Interpreting brand name information

There is no ready definition of what constitutes a brand in all cases. For clearly branded produce like breakfast cereals or biscuits the "brand owner" is shown. In the case of "own

brand" goods this may be one of the multiple retailers. For fruit and vegetables, the retailer is generally shown. For meat, milk and most other animal products the retailer is also generally shown. Finally, for all commodities the country of origin is shown where this was displayed either on the produce or in the store.

Our programme takes samples of produce in approximate proportion to the market share of the main retailers. This has been done to ensure we obtain an accurate representation of a sector (e.g. fruit and vegetables).

Individual programmes are not capable of generating statistically valid information on residues in particular crops from particular retailers. This would require the collection of a much larger number of samples: either substantially increasing costs or greatly reducing the range of different foods sampled in any one year. Therefore, results from an individual survey cannot be taken as a fair representation of the residues status of any particular brand.

However, we do collect samples from a variety of outlets in a range of locations, over a period of years. Successive programmes should therefore help generate information on the typical residues profile of particular types of produce and on major trends in the incidence and levels of pesticides. It should be noted that this quarterly report is not intended to give a comprehensive comparison with previous surveys of the same commodities.

A particular issue arises in relation to the country of origin of fruit and vegetables. The origins included in the reports are those recorded either on the produce or in the store. However, it is not uncommon for mixing to occur on shop shelves. We have responded by increasing the proportion of pre-packed goods sampled. However, pre-packed samples are not available for some produce in some stores and it could also introduce bias to surveys if loose produce were not sampled. Loose produce is therefore sampled but the origin of the sample should be interpreted with a degree of caution.

Action taken by HSE

HSE wrote to:

- The suppliers of all samples containing residues above the MRL
- The authorities of the exporting countries of all samples containing residues above the MRL
- The suppliers of UK samples that contained residues that were not approved for that crop.
- The Organics branch of Defra about samples that were labelled as organic and contained residues of pesticides not approved for organic production
- The suppliers and certification organisation of all organic samples containing residues of pesticides not approved for organic production.

Recipients of the letters are given 4 weeks to provide a statement for inclusion in the report. The Expert Committee on Pesticide Residues in Food reviews any replies received.

Supplier responses

Frozen spinach samples 3197/2019, 3457/2019, 4645/2019 and 4852/2019: Response from Asda

We have investigated the matter with our supplier thoroughly and please be reassured; we take any non-compliance extremely seriously.

The products supplied by two manufacturing sites both based in Belgium, using raw material grown in Belgium. A summary of the investigation is below:

- No chlorate-based pesticides have been used at the growing stages of the Spinach used within this product
- In Belgium, and across Europe, Sodium Hypochlorite and Chlorine Dioxide are widely used to disinfect local potable mains water, but not exceeding the World Health Organisation (WHO) guideline level of 0.7ppm.

Both our supplying sites for this product have controls for the following processes:

- Addition of Chlorine Dioxide to potable water used with the processing plants;
- Chlorine based disinfectants used for plant hygiene;
- Agronomists oversee operations and ensure that pesticide applications are controlled;

We strive to ensure compliance and maintain our focus on ensuring that chlorine usage is well managed and controlled, and I would like to re-assure you that we take these matters very seriously, and continue to work closely with our agents, suppliers and manufacturers to ensure Asda remain compliant with all relevant regulations.

Section 3: HSE assessment of risk

The surveillance programme is designed to enable the regulatory authorities to check that:

- specified pesticide MRLs are being respected;
- users of pesticides are complying with conditions of use specified in the authorisation;
- Dietary intakes of residues are within acceptable limits.

This section details how risks from dietary intakes are assessed.

When assessments are carried out

A screening assessment is done for each residue and commodity combination to identify residue levels that would lead to intakes above the relevant reference doses. Further information on this screening approach is available on request from HSE. Detailed assessments are then produced for every case where the actual residue level found could lead to an intake by any group above the reference dose.

Assessing Dietary intakes

Assessing the acceptability of dietary intakes is complicated. Consumer risk assessments are carried out for both short-term (peak) and long-term intakes. These assessments use information on food consumption collected in UK dietary surveys in conjunction with the residue levels we find. Occasionally, additional pesticide specific information on the losses of residues that occur during preparation and/or cooking of food is also used.

How the assessment is carried out

Short-term intakes (also called NESTIs) are calculated using consumption data for high-level consumers, based on single-day consumption values and the highest residue found in a food commodity. The residue found is multiplied by a variability factor to take account of the fact that residues may vary between individual items that make up the sample analysed. The estimated intake is compared to the Acute Reference Dose (ARfD). This is done for ten consumer groups; adults, infants, toddlers, 4-6 year olds, 7-10 year olds, 11-14 year olds, 15-18 year olds, vegetarians, elderly living in residential homes and elderly living in their own homes.

Long-term intakes (NEDI) are also calculated for high-level consumers, but in this case the consumption data are high-level long-term values rather than peak single-day events, and similarly the residue values used reflect long-term average levels rather than occasional high values. Again, these estimates are made for the ten consumer groups. In this case the estimated intake is compared to the Acceptable Daily Intake (ADI). More information on intake assessments is available on HSE's website: www.pesticides.gov.uk/guidance/industries/pesticides/topics/pesticide-approvals/pesticides-registration/data-requirements-handbook/consumer-intake-assessments-new-intake-calculation-models.

The reference doses (ADI, ARfD) are set by the Advisory Committee on Pesticides (ACP), or agreed within the EC (an increasing proportion of UK pesticide authorisations are now carried out in accordance with harmonised EU processes). However, where neither the UK nor the EC has set a reference dose, levels set by regulatory authorities in other countries

may be used. For a small number of pesticides, the reference doses used have been determined by HSE. These have not been independently peer-reviewed and should therefore be regarded as provisional.

Although MRLs are not safety levels, an MRL would not be established if the residue concentrations measured in the supervised trials used to support the MRL would give rise to health concerns. In most cases residues present at the MRL result in intakes below the ARfD and the ADI. So even if the MRL is exceeded this does not always lead to an intake above the ARfD or ADI.

In addition, an estimated intake that exceeds the ADI or ARfD does not automatically result in concerns for consumer health, because a protective approach is used in setting the ADI and ARfD. In the unusual circumstance of an intake exceeding the ADI or ARfD, an evaluation of the toxicological data is made, and details of this assessment would be presented.

Most consumer intake assessments are for short-term exposure rather than chronic exposure. This is because in most cases the monitoring data show the majority of samples to contain residues below the reporting limit and so chronic exposure would not present a concern. Long-term risk assessments have been carried out on a case-by-case basis but are not routinely reported. Long-term exposure assessments are done using median residue levels, rather than using the highest residues found. Therefore, long-term risk assessments would only need to be carried out where data indicated a high proportion of samples contained residues above the MRL (this would result in a higher median residue level than that previously assessed when setting the MRL), or where there is no MRL and acute toxicology is not considered relevant for the particular pesticide concerned.

Where intakes exceed a reference dose, it is necessary for the underlying toxicological studies (animal studies) to be considered to enable the significance of such an exceedance to be understood. Toxicological studies are conducted using different doses to determine the nature of any ill health effects as well as the levels at which such effects can be expected to occur.

Toxicological studies are conducted using test animals to identify the highest experimental dose that causes no detectable adverse effects (the NOAEL). Where there is more than one relevant toxicological study, the lowest appropriate NOAEL for the most sensitive adverse effect is typically used. There is some uncertainty in extrapolating between animals and people and it is therefore important to use a ‘safety factor’ to account for sources of variation. This safety factor is incorporated (by dividing the NOAEL by the safety factor) in deriving a reference dose, either an ADI or an ARfD, to which consumer intakes are compared. A safety factor therefore extrapolates from the animal testing to the general population. Factors in the order of x100 are commonly used, x 10 for animal to man, and x10 for within human population differences in sensitivity. However, toxicologists may propose different values (e.g. from 5 to 1000) based on scientific reasoning in accordance with study designs and the quality of the data that has been generated from the studies.

In order to ensure exposures to pesticides do not pose unacceptable risk to humans a wide range of investigations are performed. Most of these are performed on experimental animals because the only end-points that can be examined in human volunteers are those involving observation or blood and urine sampling. Human volunteer studies involving pesticides are not generated in current regulatory work. There is debate at the international level as to whether human studies that have been generated should be used for risk assessment purposes. In the EU, the policy is not to use these data in assessments; the

JMPR chose to apply judgement in the appropriate use of these data if available. The HSE risk assessments will usually refer to test animal species, such as dog, rat, and rabbit. All toxicological work is undertaken based on principles of minimising animal distress. Where scientifically valid human data are available the risk assessments will refer to these as they reduce the uncertainty in the assessment. Therefore, human data is only referred to in more limited circumstances.

Acute (short term) toxicology is not a concern for all pesticides, as some are not acutely toxic. In terms of the pesticides that have been found in fruit and vegetables through the surveillance programme an acute risk assessment would not be necessary on the following: tecnazene, maleic hydrazide, diphenylamine, furalaxyl, iprodione, kresoxim-methyl, pendimethalin, propargite, propyzamide, quintozene and tolclofos-methyl.

As the surveillance programme monitors residues in all types of food, from raw commodities (e.g. potatoes) to processed (e.g. wine), dried (e.g. dried fruit) and composite foods (e.g. fruit bread), consumer risk assessments are specifically tailored to address processed and mixed food products. MRLs are generally set for raw commodities, although when MRLs are established the assessment of dietary intakes takes into account the potential for residues to remain in processed foods produced from the raw agricultural commodities. MRLs have been set for processed infant foods, and in future may be extended to other processed food products.

Residues are usually reduced during food processing and occasionally may concentrate. The alteration of residues can be considered in consumer risk assessments, for example, in oil seed rape a fat-soluble pesticide may result in higher residues in the oil compared to residues in the raw seed. Consumption data are available for many major processed food items such as boiled potatoes, crisps, fruit juice, sugar, bread, and wine. Where such consumption data are not available, the intake estimates are based on the total consumption of the raw commodity, which would represent the worst-case (for example, breakfast cereals consumption would be based on total cereal products consumption). In the case of composite products, a suitable worst-case alternative would be used, for example total bread consumption for fruit bread consumption.

Dithiocarbamate residues

Dithiocarbamate residues are determined as carbon disulphide which is a common product from different dithiocarbamate pesticides; for the risk assessment a precautionary approach is taken: the worst case dithiocarbamate residue is calculated by assuming the residue is derived from ziram (a molecular weight conversion is applied to estimate the level of residue based on ziram) and this is compared to the ARfD for ziram. Where it can be confirmed that a specific dithiocarbamate was applied the equivalent residue of the specific active substance is estimated and the intake compared to the appropriate reference dose. We only present a detailed risk assessment when either the worst case assessment of intake (based on ziram) leads to an exceedance of the ziram ARfD and it has not been possible to further identify the dithiocarbamate source of the residues, or, when further refined assessments based on a specific knowledge of the dithiocarbamate pesticide applied in practice still lead to an exceedance of the ARfD for the known dithiocarbamate pesticide. The dithiocarbamate risk assessments used to consider ziram as worst case, whereas following the update to the ARfD for thiram in late 2018, the assessment now considers thiram as worst case.

Probabilistic Modelling

The standard calculations of consumer exposure use realistic consumption data and residue levels. However, they tend to overestimate intakes in most circumstances. This is due to the assumptions used; fruit and vegetables would contain high levels of residue in an individual unit and that these would be consumed by high-level consumers. They do not take into account the possible range of residue levels and consumption distributions that may occur in reality. These possible combinations of residues and consumption levels can be taken into account using modelling/simulation techniques to produce probability distributions of residue intake levels to indicate the range of consumer intakes, presented as a probabilistic assessment of consumer exposure. These techniques are not yet routinely used to estimate dietary intakes of pesticide residues in the EC.

Multiple residues

The risk assessment process is not standing still. We are aware that some consumers are concerned by the 'cocktail effect'- the possible implications of residues of more than one chemical occurring in, say, a single portion of fruit or vegetables or the interaction between mixtures of pesticides and veterinary medicines at residue levels.

Where more than one pesticide residue is found in a sample, we produce a separate table which identifies each sample and what was found (see Appendix D). If more than one organophosphate/carbamate is found, we will undertake an additional risk assessment. If the combination of pesticides found is either unusual or gives cause for concern then this will be detailed in the report.

The Food Standards Agency (FSA) asked the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment to assess these concerns. Their report "Risk Assessment of Mixtures of Pesticides and Veterinary Medicines" was published in 2002. https://cot.food.gov.uk/sites/default/files/cot/reportindexed.pdf

The Committee concluded that the probability of any health hazard from exposures to mixtures is likely to be small. Nonetheless, it identified areas of uncertainty in the risk assessment process and made recommendations for further work. These fell under the broad headings of regulatory, surveillance, research and public information issues. An action plan to take forward the recommendations was published by the FSA. A number of research projects were commissioned by the FSA to help progress the action plan.

Scientific methodologies have yet to be developed to deal with mixtures from groups of pesticides identified by the Committee. However, the Advisory Committee on Pesticides (ACP) has developed an approach for the anticholinesterase compounds. They have also recommended an approach for assessing compounds that might have combined toxicity. This includes a consideration of the proportion of the respective reference doses taken up by the predicted exposures to each active substance. If this is only a small proportion (e.g. <50% if there are two components; <33% for 3 etc.) then assuming simple additivity the risks would still be acceptable. However if exposures to each active substance represent a high proportion of the respective reference doses and the total exceeds 100% a more detailed consideration is needed (www.pesticides.gov.uk/guidance/industries/pesticides/topics/pesticide-approvals/pesticides-registration/data-requirements-handbook/toxicity-assessment-of-combinations-of-2-or-more-compounds-in-a-formulation).

We are keen to ensure our reports reflect consumer concerns. We therefore now regularly assess findings showing multiple residues of organophosphate and carbamate pesticides. Combined assessment is a new development in risk assessment, which is being taken forward at the international level, e.g. the European Food Safety Authority (EFSA) held a colloquium in 2006 and has set-up two working groups to help develop the methodology (http://www.efsa.europa.eu/en/events/event/colloque061128.htm; http://www.efsa.europa.eu/en/supporting/pub/117e.htm; http://www.efsa.europa.eu/en/efsajournal/pub/705.htm; http://www.efsa.europa.eu/en/efsajournal/pub/1167.htm). Further advances in risk assessment methodology will be taken into account in developing the approach to multiple risk assessments in the future.

Assessment of Risk to Human Health: Short-term intake estimates

Screening assessments have been done for all acutely toxic and potentially acutely toxic pesticides to check that predicted intakes are within the ARfD (or ADI, as appropriate, where an ARfD is not available). An acute exposure assessment is not done for pesticides which are not acutely toxic where it has been established that an ARfD is not required. Toxicological endpoints can be found in the DG SANCO EU Pesticides database which is available at http://ec.europa.eu/food/plant/protection/evaluation/database_act_subs_en.htm

The screening assessment uses the internationally agreed approach to short-term (acute) consumer exposure assessment with UK food consumption data as detailed within the UK NESTI model which is available on the HSE website at http://www.pesticides.gov.uk/approvals.asp?id=1687.

Table C: Short-term intake estimates

Screening assessments have been done for all acutely toxic and potentially acutely toxic pesticides to check that predicted intakes are within the ARfD (or ADI, as appropriate, where an ARfD is not available). An acute exposure assessment is not done for pesticides which are not acutely toxic where it has been established that an ARfD is not required. Toxicological endpoints can be found in the DG SANCO EU Pesticides database which is available at http://ec.europa.eu/food/plant/protection/evaluation/database_act_subs_en.htm

The screening assessment uses the internationally agreed approach to short-term (acute) consumer exposure assessment with UK food consumption data as detailed within the UK NESTI model which is available on the PSD website at http://www.pesticides.gov.uk/approvals.asp?id=1687.

For the Q2 (2019) assessments, the following approaches have been taken to refine the NESTI according to case-by-case issues and to ensure that appropriate consumption values are used for less frequently consumed commodities where available food consumption data may be limited:

- Data on beans with pods were used for okra and all forms of green beans.
- For salad leaves (in pre-prepared bags) lettuce data without use of a variability factor were used. The constituent salad leaves are small, and a whole product consideration which takes account of unit to unit variability is not considered relevant.

- Data on peaches were used for peaches and nectarines.
- Data on barley were used for pearl barley.
- Data on wheat were used for pasta.
- Data on fish were used for all forms of fish, including shellfish.
- Data on cheese were used for all forms of processed cheese.

Crop	Pesticide	Highest residue (mg/kg)	Intake (mg/kg bw/day)		ARfD (mg/kg bw/day)	Source
			Adult	Critical group†		
Potatoes	Chlorpropham	8.1	0.19	1.25 (infant) 0.86 (toddler) 0.65 (4-6 year old child)	0.5	EU, 2019

Comment on risk assessment

The intakes for infants, toddlers and 4-6 year old children exceeded the ARfD. The highest intake was for infants.

Assessment for infants:

If infants ate large portions of potato containing chlorpropham at 8.1 mg/kg their intake could be 249% of the Acute Reference Dose. This intake is 40 times lower than the single dose given to dogs without any adverse effects. The European Food Safety Authority used this study as the basis of the ARfD.

Much of the residue is expected to be associated with the peel. The available consumption data indicate no consumption of jacket potatoes by infants. Therefore, when considering the form of potatoes consumed, the highest intake is anticipated to be for toddlers.

Assessment for toddlers:

For toddlers that are expected to consume the peel, the highest intakes, without applying a processing factor to provide a further refinement to the intakes are 172% of the ARfD. This intake is 58 times lower than a single dose which caused no observed adverse effect in the above mentioned dog study.

Toxicologists usually apply a factor of 100 to this dose to take into account uncertainties caused by using animal data and possible differences in susceptibility between people. We consider the reduced factor of 58 still enough to make an effect on health unlikely.

This estimate assumes that potatoes are eaten unpeeled (for example as jacket potato); much of the residue is expected to be associated with the peel.

In conclusion, considering the form of potato consumed by infants and young children, we consider an effect on health to be unlikely.

Crop	Pesticide	Highest residue (mg/kg)	Intake (mg/kg bw/day)		ARfD (mg/kg bw/day)	Source
			Adult	Critical group†		
Potatoes	Flonicamid	0.3	0.0072	0.046 (infant) 0.032 (toddler)	0.025	EU, 2010

Comment on risk assessment

The intakes for infants and toddlers exceeded the ARfD. The highest intake was for infants. The residue was not parent flonicamid (which was sought but

not found above the reporting limit of 0.01 mg/kg) but included both the metabolites TFNG (0.3 mg/kg) and TFNA (0.02 mg/kg). The same reference value applies for the total flonicamid residue.

If infants ate large portions of potatoes containing flonicamid at 0.30 mg/kg, their intake of flonicamid could be 185% of the Acute Reference Dose. This intake is 54 times lower than a dose which caused no observed adverse effect in a developmental study in rabbits over 22 days. The European Food Safety Authority used this study as the basis of the ARfD.

Toxicologists usually apply a factor of 100 to this dose to take into account uncertainties caused by using animal data and possible differences in susceptibility between people. We consider the reduced factor of 54 still enough to make an effect on health unlikely.

†Highest intake of all ten consumer groups, or intakes for all consumer groups that exceed the ARfD

Acute risk assessments for samples containing more than one triazole fungicide, organophosphorus/carbamate, carbendazim/thiophanate-methyl, clothianidin/thiamethoxam or captan/folpet following screening assessment.

None

Section 4: issues arising in this report and updates on previous reports

Issues arising in this report

Chlorate (position as January 2020)

We have been testing a limited number of foods for chlorate since 2016. 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 (control microorganisms that cause food poisoning). 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 MRL. **We are not advising that food companies change their existing practices as a result of our findings, but they should be aware about the ongoing discussion in this area**.

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.

Enforcement of current MRLs

Departments have an approach to enforcement, which 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.

Proposals for changed EU MRLs

The European Commission has prepared proposals for MRLs. The current version of the proposal was considered at a series of Standing Committee and expert group meetings in 2019. The proposal is likely to be voted upon in early 2020.

The European Commission initially prepared proposals for MRLs based on monitoring data, 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 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. Upon the next publication of proposed MRLs for chlorate, we have comments directly to the European Commission[4] that 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

[4] https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2019-334046/feedback/F18048_en?p_id=368328

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, but the Commission has explained it considers it is bound under EU law to proceed with the proposals. The Commission has also indicated that if the proposals cannot be agreed, they will not take any further action to change the MRLs but will maintain the existing 0.01 mg/kg.

The proposals have included developing versions of some footnotes referring specifically to use of biocides. We are not able to comment on the intended effect of the current draft wording.

Best practice for use

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.

Drinking Water

Defra is also working on the EU recast of its Drinking Water Directive. Discussions are underway about the possible future monitoring of 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.

Advisory Committee on the Microbiological Safety of Food

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 any change to the overall risk to consumers taking into account both chemical and microbiological safety.

Dietary intakes

Since 2018 the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has been considering chlorate as part of its on-going 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[5] establishes appropriate health-based guidance values for chlorate exposure to protect against acute and chronic risks to health.

Residues below the MRL that exceed the ARfD

When MRLs are agreed at the EU level they are set at levels that are compatible with consumer safety. Occasionally, assessment of PRiF monitoring samples containing residues below or at the MRL will show consumer intakes could potentially be above the ARfD. This situation typically arises because of one of three reasons:

- the ARfD may have been lowered because of new information but there is a delay before MRLs have been reassessed or new MRLs are put in place;
- during the MRLs process the risk assessments are currently based on the highest residue level observed in residues trials used to support the MRL which will often be less than the actual MRL (it is expected that most residues found will be below the MRL, and if for this reason there are later samples which give intakes above the ARfD the numbers are expected to be low);
- the agreed EU approach might assume the commodity is peeled and data are used to reduce the intake in the risk assessment at the time of setting MRLs, whereas in the PRiF work risk assessments for the whole commodity are presented as routine and, if information showing the effects of processing on residues level is available to PRiF, a refined assessment is presented.

The first two of these reasons are common to EU assessments and the third represents a difference between the approach used by HSE for the risk assessment and that used at the time the MRL is set. We will highlight how our assessments differ from that done at the EU level so that readers are aware of the basis of the evaluation.

DDT

The use of DDT is banned or heavily restricted in many countries. 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 breakdown 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. We can tell from the chemical form that we detect whether the residues we have found are from historic use (which is what we usually find). We explain this every time we publish

[5] EFSA Journal 2015;13(6):4135 [103 pp.] http://ec.europa.eu/food/plant/standing_committees/sc_phytopharmaceuticals/index_en.htm

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.

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.

Folpet and phthalimide

The full residue definition for folpet is "sum of folpet and phthalimide, expressed as folpet". You can read more about multi-component residue definitions in Section 5

Folpet is a widely used fungicide. Phthalimide is included in the residue definition for folpet based on evidence phthalimide can form as a metabolite after folpet is used. [6] However chemical analysis cannot distinguish between any phthalimide we found formed in this way or from other non-pesticide sources of phthalimide. Phthalimide is present in many chemical products including medicines, dyes and the sweetener saccharine and also occurs naturally. Where we do not find folpet in the same sample, we think it's at least possible that the residue is from a source other than folpet use.

Processing factors and MRLs used for pasta

We have used the processing factors for wheat flour;

Active substance	Wheat MRL	Closest processed food	Processing factor	MRL
Glyphosate	10	Wheat flour	0.105	1.05
Pirimiphos-methyl	5	Wheat flour	0.19	0.95

Processing factors are taken from a compendium of publicly available, authoritative processing factors published by the German regulatory authority for pesticides[7].

About processing factors

In nearly all cases the EU MRL is set for the food in its raw, unprocessed form (these foods are listed in Annex I of Regulation 396/2005) but is then applied to processed foods using appropriate processing factors. Processing factors take account of the effect of

[6] Reasoned opinion on the review of the existing maximum residue levels (MRLs) for folpet according to Article 12 of Regulation (EC) No 396/200
EFSA Journal 2014;12(5):3700

[7] *BfR compilation on processing factors for pesticide residues, dated 20.10.2011*
Downloaded from http://www.bfr.bund.de/en/pesticides-579.html on 7 January 2014

processing on the food as traded. Different forms of processing may remove, concentrate, or dilute residues, and the effect may vary depending on the food and the pesticide concerned.

Follow-up from Previous Reports

Quarter 2 2018

Speciality vegetables

Chlorpropham: Sample numbers 0010/2018 and 0629/2018

We passed details of two samples of celeriac from the UK that contained chlorpropham to HSE. HSE's enquiries found that neither the farmer or the neighbouring farms spray records showed the pesticide had been used; therefore, it was unlikely that the residue came directly from the farm. We are aware that potato crates are used by the industry to store other root crops and it is possible that this could have occurred. The brand name details have been included in this report. No further investigation is required.

Quarter 4 2018

Broccoli

Triallate: Sample number 4693/2018

We passed details of a sample of broccoli from the UK that contained triallate to HSE. HSE's enquiries found that there was no evidence that triallate had been used on or near where the broccoli was grown. As there is no evidence of mis-use HSE have decided to close the case. There have been references to the possibility of volatilisation of the pesticide leading to residues carrying in the air to untreated crops. HSE will discuss this with those responsible for authorising the pesticide to see if any additional advice is needed for users.

Brand name details of samples where follow-up action is now complete

Sample ID	Date of Sampling	Description	Country of Origin	Retail Outlet	Address	Brand Name	Packer / Manufacturer	Pesticide residues found in mg/kg (MRL)
Q2 2018								
0629/2018	19/03/2018	Celeriac	UK	C Scruton Produce Ltd	Yorkshire Produce Centre, Pontefract Lane, Leeds, LS9 0PX	None stated	Jack Buck Farms Ltd Oakhouse. Holbeach Ban Spalding, Lincolnshire PE12 8BL	chlorpropham 0.02 (MRL = 0.05*) cyprodinil 0.02 (MRL = 0.3) fludioxonil 0.05 (MRL = 0.2) linuron 0.07 (MRL = 0.5)
0010/2018	06/03/2018	Celeriac Loose	UK	Total Produce Ltd.	D 28 - 33, C 32 - 34, New Smithfield Market, Whittworth Street, East Openshaw, Manchester M11 2WP	None stated	Jack Bucks Farm Green Lane Moulton Seas End, Spalding, Lincolnshire PE12 6LT	chlorpropham 0.01 (MRL = 0.05*) cyprodinil 0.03 (MRL = 0.3) fludioxonil 0.06 (MRL = 0.2) linuron 0.08 (MRL = 0.5)
Q4 2018								
4693/2018	26/11/2018	Broccoli	UK	Tesco Extra	2 Woolwell Crescent, Roborough, Plymouth PL6 7RF	Tesco	Tesco Stores Ltd Tesco House, Shire Park, Kestrel Way, Welwyn Garden City AL7 1GA	triallate 0.01 (MRL = 0.1*)

In our next report:

In Quarter 3 of 2019 we will look at results for:

- Apples
- Beans with pods
- Bread (ordinary)
- Bread (savoury)
- Cabbage
- Chocolate
- Cooked meats
- Curry leaves
- Fish (sea)
- Grapes
- Infant food (savoury)
- Lemons
- Lettuce
- Milk
- Okra
- Pasta
- Peaches and nectarines
- Peppers
- Plums
- Pork
- Potatoes
- Potatoes (processed)
- Spices (turmeric)
- Spinach
- Strawberries

Section 5: background and reference

Reasons for pesticide residue testing

Food safety is important. Modern food production processes have given us plentiful supplies of a wide range of good quality affordable produce.

In the food industry of today the production environment can be managed from the preparation of seeds used for crops, through to growth, harvesting and storage of the produce.

One of the ways the food industry controls the environment in which foodstuffs are produced is by applying pesticides. They help farmers and growers maximise the production of food stuffs by, for example, preventing weeds inhibiting the growth of the crop, or insects destroying or infesting them. Pesticides can also be used to help protect seeds or prolong the life of crops after they have been harvested. Biological and physical (cultural) controls are also used to protect crops or as part of an integrated system.

As pesticides are used to control unwanted pests, weeds and diseases, they can potentially also harm people, wildlife and the environment. This is why the UK, in common with most other countries, imposes legally enforceable conditions as to how and when pesticides can be used. No pesticide can be supplied or used on a food or ornamental crops in the UK without Government authorisation. To obtain this authorisation the manufacturer of the pesticide must show that it does not present a concern for people's health or the environment. Naturally derived and synthetic pesticides are subject to the same regulation.

Once the authorisation has been granted Government authorities carry out follow up checks to ensure that the authorisation is providing the necessary degree of protection to users, consumers and the environment and that those who use pesticides are complying with conditions specified within it.

The Government authority responsible for checking pesticide residues in foodstuffs is the Health and Safety Executive. Defra's Expert Committee on Pesticide Residues in Food (PRiF) oversees and provides an independent check on this work. We know that the use of pesticides on crops may lead to traces (residues) of these chemicals in food and we expect to find these in our monitoring programme.

Defra's Expert Committee on Pesticide Residues in Food (PRiF)

The Expert Committee on Pesticide Residues in Food was established in 2011. Our members have a broad range of expertise relating to the food supply industry. The main function of the Committee is to oversee Government's £2 million pesticide residues surveillance programme. Previously this work was carried out by the Pesticide Residues Committee.

Our Chairman, Dr Paul Brantom is an independent consultant in toxicological risk assessment. The Committee also includes members with expertise in toxicology, food production and supply as well as two public interest experts.

Information on the membership of the PRiF is also available on the PRiF's website: https://www.gov.uk/government/groups/expert-committee-on-pesticide-residues-in-food-prif

Our role is to advise Ministers, the Director of the Health and Safety Executive (HSE) and the Chief Executive of 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, new methods of analysis, the assessment of variability of pesticide residues in food and related issues.

Detail of reporting practice

Results by food commodity

- We include information about the survey (for instance where samples came from) for each commodity
- Detailed tabulated results are at the back of this report - these tables are also available for download from our website
- We summarise our findings and any follow-up action taken.

Risk assessments – single residues

- All results are screened by HSE to check for intakes above the Acute Reference Dose (ARfD). HSE assumes a relatively high level of intake and also assumes that most produce is eaten whole including peel/skin even when these are rarely consumed
- Where intakes above the ARfD are identified, we consider a detailed risk assessment prepared by HSE (at section II of this report).
- Our observations and the follow-up action taken are summarised in the section for that food.

Risk assessments – multiple combined residues

- Residues of more than one pesticide from the same category/class of particular categories of pesticides, which have a similar toxicological mode of action, are screened by HSE to check for intakes above the combined Acute Reference Dose (ARfD).
- Where combined intakes above the combined ARfD are identified, we consider a detailed combined risk assessment prepared by HSE (at section II of this report).
- Our observations and any follow-up action taken are summarised in the section for that food commodity.

Risk assessment - conclusions

- Where, in the light of current knowledge and considering the usual level of scientific uncertainty (or precaution) the intake will not cause ill health the conclusion will say no effect on health is expected.
- Where, in the light of current knowledge and considering a slightly higher level of scientific uncertainty (or less precaution) the intake is not likely to cause ill health, the conclusion will be less definite and state that an effect on health is unlikely.
- Where scientific uncertainty is greater more information is provided.

Residues in UK produce of pesticides which are not approved for use on that crop in the UK.

- All residues found in UK-produced foods are checked by HSE to make sure the pesticide is approved for use.

- Where no UK approval is identified, details of the sample are referred to HSE's Enforcement Section for follow up.

- Our observations and any follow-up action taken to date are summarised in the section for that food commodity. We may have to withhold details of samples while investigations are underway, in which case the details will be published in a later report.

Residues above the MRL, after taking into account measurement uncertainty

- Samples containing residues above the MRL are listed at Appendix B, and those which are clearly above the MRL after taking into account measurement uncertainty of plus or minus 50% are highlighted.

- Our observations and any follow-up action taken are summarised in the section for that food commodity.

- The results in our reports are rounded for publication but not adjusted for measurement uncertainty.

- We apply measurement uncertainty only to decide whether to highlight a result as over the MRL in the brand name annex. To do this we use the actual value reported by the laboratory before rounding. If after taking measurement uncertainty into account that value is found to be over the MRL the result will be highlighted in the brand name annex.

For example:

- The lab reports the results of duplicate analysis of a residue above an MRL at 0.023 mg/kg and 0.025 mg/kg giving an average value of 0.024mg/kg. For reporting purpose this value would be 0.02 mg/kg.

- If measurement uncertainty is then applied to the reported value of 0.02 mg/kg it could take the value to between 0.01 - 0.03 mg/kg. If the MRL is 0.01 mg/kg the lower value would be at the MRL and there is no exceedance.

- However, if measurement uncertainty is applied to the measured result, e.g. 0.024 mg/kg the value could then be in the range of 0.012 – 0.036 mg/kg. In this case the lower value is above the MRL and so will be treated as an exceedance.

Residues in organic food

- We monitor pesticide residues in all the UK food supply, including organic food.

- We are not responsible for checking compliance with the rules associated with organic production. However, when we do detect residues in an organic food, we explain whether or not those residues indicate a breach of the rules and inform Defra's Organic Farming Branch.

Brand Name Annex

- Full brand name details for samples included in this report are published in a brand name annex. Within this annex, samples with results of interest are highlighted.

- Brand name details are only published when enough follow-up work is completed for us to be reasonably sure whether a breach of the law or good practice has occurred.

- Therefore, sometimes brand name details are withheld pending completion of this work but are published in a later report.

Pesticides analysed as multi-component analytes and their reporting limits

Why some results cover more than one substance

Both the legal controls and our analytical tests are aimed at checking food for the presence of residues of specific pesticides. Residues are the chemical traces left behind after pesticides are used. In most cases the residue of a pesticide is measured by first identifying the pesticide and then measuring the quantity of that pesticide in the food itself. But for some pesticides the residue remaining in the food is known to be chemically different from the original pesticide and so the laboratory needs to look for more than one component. There are various reasons why this happens, for example:

- the animal or plant can change the pesticide into related chemicals
- the pesticide can change in the environment into related chemicals
- some pesticides are mixtures of chemicals , so the relevant components of the mixture need to be checked for
- in the laboratory sample preparation and/or analysis may change pesticides into related chemicals
- related chemicals may be pesticides in their own right

The MRL setting process takes account of all these issues. The EU may set a complex residue definition to ensure that the identity and quantity of the residue found is representative of the pesticide present. A complex residue definition may be set where it is necessary for safety reasons or to be able to accurately identify the pesticide residue present in the food. This definition usually includes the actual pesticide, plus other related chemicals. These residues are usually reported together as a "sum". Sometimes different foods need different definitions because different pesticide residues are known to occur in that food. For instances, plants and animals may metabolise a pesticide differently, which forms different residues.

The full definitions of pesticides that we have found in our surveys are described in the table below. If you would like more detail about a particular residue definition, please get in touch. You can email us at prif@hse.gov.uk and other contact details are on the back cover.

Where the detailed individual analysis results tell us something useful, we mention that in our conclusions.

How we calculate sums

Unless the definition says otherwise, the summed result is a simple addition. For individual components that are not detected that result is treated as a zero.

Where a residue definition says, "expressed as", that means that the individual component results are adjusted by molecular weight before being added together. The residue definition is

set this way so that the final calculated result for the whole definition is an expression of the level of the most toxic component, and so that value can be used directly in consumer risk assessment without further adjustment.

Complex residue definitions used in our reports

There are a large number of pesticides used and types of food in the world. So other complex residue definitions may apply to food/pesticide combinations not yet considered by PRiF. You can look up all the EU MRL definitions for pesticide residues at the European Commission's pesticide database at http://ec.europa.eu/food/plant/pesticides/pesticides_database/index_en.htm

Short name we use in our reports	Legal residue definition – These definitions apply to all foods unless otherwise stated
2,4-D (sum)	2,4-D (sum of 2,4-D and its esters expressed as 2,4-D)
abamectin (sum)	Abamectin (sum of Avermectin B1a, AvermectinB1b and delta-8,9 isomer of Avermectin B1a)
aldicarb (sum)	Aldicarb (sum of Aldicarb, its sulfoxide and its sulfone, expressed as Aldicarb)
aldrin and dieldrin	Aldrin and Dieldrin (Aldrin and dieldrin combined expressed as dieldrin), aka dieldrin (sum)
Amitraz	Amitraz (amitraz including the metabolites containing the 2,4 - dimethylaniline moiety expressed as amitraz)
BAC (sum)	Benzalkonium chloride (mixture of alkylbenzyldimethylammonium chlorides with alkyl chain lengths of C_8, C_{10}, C_{12}, C_{14}, C_{16} and C_{18})
benthiavalicarb (sum)	Benthiavalicarb (Benthiavalicarb-isopropyl (KIF-230 R-L) and its enantiomer (KIF-230 S-D) and diastereomers (KIF-230 R-L and KIF-230 S-D)
bixan (animal products)	Sum of bixafen and desmethyl bixafen expressed as bixafen This definition applies to animal products only
captan and folpet	Sum of captan and folpet aka captan/folpet This definition applies only to pome fruit (fruits such as apples and pears), strawberries, raspberries, currants, tomatoes and beans. For all other foods there are separate MRLs for captan only and for folpet only.
carbendazim (animal	Carbendazim and thiophanate-methyl, expressed as carbendazim

products)	
Carbendazim (sum)	Carbendazim and benomyl (sum of benomyl and carbendazim expressed as carbendazim)
carbofuran (sum)	Carbofuran (sum of carbofuran and 3-hydroxy-carbofuran expressed as carbofuran)
chlordane (animal products)	Chlordane (sum of cis- and trans-isomers and oxychlordane expressed as chlordane) This definition applies to animal products only
chlordane (sum)	Chlordane (sum of cis- and trans- isomers) This definition applies to all foods except animal products
chlorpropham (potatoes)	Chlorpropham only This definition applies only to potatoes
chlorpropham (sum for animal products)	Chlorpropham and 4-hydroxychlorpropham-O-sulphonic acid (4-HSA), expressed as chlorpropham This definition applies only to animal products
chlorpropham (sum)	Chlorpropham (Chlorpropham and 3-chloroaniline, expressed as Chlorpropham) This definition applies to all foods except potatoes and animal products
DDAC (sum)	Didecyldimethylammonium chloride (mixture of alkyl-quaternary ammonium salts with alkyl chain lengths of C_8, C_{10} and C_{12})
DDT (sum)	DDT (sum of p,p'-DDT, o,p'-DDT, p-p'-DDE and p,p'-TDE (DDD) expressed as DDT)
Dichlorprop	Sum of Dichlorprop, including dichlorprop-p and its conjugates, expressed as dichlorprop
dicofol (sum)	Dicofol (sum of p, p' and o,p' isomers)
Dimethenamid	Dimethenamid–p (Dimethenamid-p including other mixtures of constituent isomers (sum of isomers))
dimethoate (sum)	Dimethoate (sum of dimethoate and omethoate expressed as dimethoate)

disulfoton (sum)	Disulfoton (sum of disulfoton, disulfoton sulfoxide and disulfoton sulfone expressed as disulfoton)
dithiocarbamates	Dithiocarbamates are a group of pesticides that are chemically similar. Testing for them individually in routine analysis is not possible, so MRLs are set for a test for the group.
endosulfan (sum)	Endosulfan (sum of alpha- and beta-isomers and endosulfan-sulphate expresses as endosulfan)
fenamiphos (sum)	Fenamiphos (sum of fenamiphos and its sulphoxide and sulphone expressed as fenamiphos)
fenchlorphos (sum)	Fenchlorphos (sum of fenchlorphos and fenchlorphos oxon expressed as fenchlorphos)
fensulfothion (sum)	Fensulfothion (sum of fensulfothion, its oxygen analogue and their sulfones, expressed as fensulfothion).
fenthion (sum)	Fenthion (fenthion and its oxygen analogue, their sulfoxides and sulfone expressed as parent)
fenvalerate & esfenvalerate (all isomers)	Fenvalerate (any ratio of constituent isomers (RR, SS, RS & SR) including esfenvalerate)
fipronil (infant food)	Sum of fipronil and fipronil-desulfinyl, expressed as fipronil This definition applies to foods for babies only
fipronil (sum)	Fipronil (sum Fipronil and sulfone metabolite (MB46136) expressed as Fipronil) This definition applies to all foods except foods for babies
flonicamid (sum)	Flonicamid (sum of flonicamid, TNFG and TNFA) This definition applies to all food except animal products. The full definition must be sought. Residues found are usually of the metabolites.
fluazifop-p-butyl (sum)	Fluazifop-P-butyl (fluazifop acid (free and conjugate))
Fosetyl (sum)	Fosetyl-Al (sum of fosetyl, phosphonic acid and their salts, expressed as fosetyl)

haloxyfop (sum)	Haloxyfop including haloxyfop-R (Haloxyfop-R methyl ester, haloxyfop-R and conjugates of haloxyfop-R expressed as haloxyfop-R)
Heptachlor (infant food)	Sum of heptachlor and trans heptachlor epoxide This definition applies to foods for babies only
Heptachlor (sum)	Heptachlor (sum of heptachlor and heptachlor epoxide expressed as heptachlor) This definition applies to all foods except infant foods
hexachlorocyclohexane (sum)	Hexachlorocyclohexane (HCH), sum of isomers, except the gamma isomer This definition applies to all foods except animal products (For animal products the alpha and beta isomers have separate MRLs)
Malathion	Malathion (sum of malathion and malaoxon expressed as malathion)
MCPA (animal products)	[Residue definition, animal products] MCPA, MCPB and MCPA thioethyl expressed as MCPA This definition applies to animal products only
MCPA (sum)	MCPA and MCPB (MCPA, MCPB including their salts, esters and conjugates expressed as MCPA) This definition applies to all foods except animal products
Mepanipyrim (sum)	Mepanipyrim and its metabolite (2-anilino-4-(2-hydroxypropyl)-6-methylpyrimidine) expressed as mepanipyrim
methiocarb (sum)	Methiocarb (sum of methiocarb and methiocarb sulfoxide and sulfone, expressed as methiocarb)
methomyl (sum)	Sum of methomyl and thiodicarb expressed as methomyl
Oxydemeton-methyl (sum)	Oxydemeton-methyl (sum of oxydemeton-methyl and demeton-S-methylsulfone expressed as oxydemeton-methyl)
parathion-methyl (sum)	Parathion-methyl (sum of Parathion-methyl and paraoxon-methyl expressed as Parathion-methyl)

Permethrin	Permethrin (sum of isomers)
phorate (sum)	Phorate (sum of phorate, its oxygen analogue and their sulfones expressed as phorate)
phosmet (sum)	Phosmet (phosmet and phosmet oxon expressed as phosmet) This definition applies to all foods except animal products
pirimicarb (sum)	Pirimicarb (sum of Pirimicarb and Desmethyl pirimicarb expressed as Pirimicarb) for certain animal products. Pirimicarb only for fruit and vegetables and some animal products.
Prothioconazole (sum)	Prothioconazole (sum of prothioconazole-desthio and its glucuronide conjugate, expressed as prothioconazoledesthio) This definition applies to animal products only
PTU & propineb	Sum of PTU and propineb This definition applies to food for babies only
quintozene (sum)	Quintozene (sum of quintozene and pentachloro-aniline expressed as quintozene)
Prochloraz (sum)	Prochloraz (sum of prochloraz and its metabolites containing the 2,4,6-Trichlorophenol moiety expressed as prochloraz)
Terbufos (sum)	Terbufos (sum of terbufos, its sulfoxide and sulfone This definition applies only to foods for babies
thiamethoxam (sum)	Thiamethoxam (sum of thiamethoxam and clothianidin expressed as thiamethoxam) There are also separate clothianidin MRLs
tolylfluanid (sum)	Tolylfluanid (Sum of tolylfluanid and dimethylaminosulfotoluidide expressed as tolylfluanid)
triadimefon & triadimenol	Triadimefon and triademenol
vinclozolin (animal products)	Vinclozolin, iprodione, procymidone, sum of compounds and all metabolites containing the 3,5-dichloroaniline moiety expressed as 3,5-dichloroaniline

	This definition applies to animal products only
vinclozolin (sum)	Vinclozolin (sum of vinclozolin and all metabolites containing the 3,5-dichloraniniline moiety, expressed as vinclozolin) This definition applies to all foods except animal products

Glossary

This is a 'standard' glossary which defines the key terms used in the PRiF reports. Not all the terms listed here are used in this particular report.

Acceptable Daily Intake (ADI): This is the amount of a chemical which can be consumed every day for a lifetime in the practical certainty, on the basis of all known facts, that no harm will result. It is expressed in milligrams of the chemical per kilogram of body weight of the consumer. The starting point for the derivation of the ADI is usually the 'no observed adverse effect level' (NOAEL) that has been observed in animal studies for toxicity. This is then divided by an uncertainty factor (most often 100) to allow for the possibility that animals may be less sensitive than humans and also to account for possible variation in sensitivity between individuals. The studies from which NOAELs and hence ADIs are derived take into account any impurities in the pesticide active substance as manufactured, and also any toxic breakdown products of the pesticide.

Acetylcholine: Acetylcholine is a neurotransmitter, a chemical that carries signals through the nervous system. *See cholinergic*

Acetylcholinesterase: This is an enzyme which degrades acetylcholine and is involved in the regulation of nerve impulses.

Acute Reference Dose (ARfD): The definition of the ARfD is similar to that of the ADI, but it relates to the amount of a chemical that can be taken in at one meal or on one day without appreciable health risk to the consumer. It is normally derived by applying an appropriate uncertainty factor to the lowest NOAEL in studies that assess acute toxicity or developmental toxicity.

As a matter of policy, the EU does not use NOAELs from tests that involve deliberate administration of pesticides to humans to determine ADIs and ARfDs. However, where such data have been ethically and scientifically derived some authorities, e.g. the World Health Organization, do consider such data. Where human data are used there is usually less uncertainty in the resulting reference value compared to extrapolating from animal tests to humans, and a lower uncertainty factor (most often 10) is used to account for the variation in sensitivity between individuals.

The initial risk assessments in PRiF reports use the agreed EU reference values. However, where intakes are above the EU value and a reference value based on acceptable human data is available a refined assessment, which is a more appropriate indicator of the risk, is also reported.

Analyte: This is the name for the substance that the PRiF surveys look for and measure if present; it could be a pesticide itself or a product from a pesticide when it is degraded, or metabolised.

COLEACP (Europe-Africa-Caribbean-Pacific Liaison Committee): It aims to promote the competitive export of fresh fruit, vegetables, flowers and ornamental plants from the ACP. Its specialised information and advisory services are open to all ACP companies in the horticultural

export sector and are financed by the European Commission. It has two overriding objectives to enable ACP companies to comply with European food safety and traceability requirements and to consolidate the position of small-scale producers in the ACP horticultural export sector.

Cholinergic: In relation to the animal nervous system, processes and structures are cholinergic if they release or use acetylcholine.

Cryogenic Milling: Processing of commodities at very low temperatures can be achieved by milling/grinding pre-frozen samples in the presence of dry ice, a procedure known as 'cryogenic milling'.

Extensions of Authorisations for Minor Use (EAMUs): Users and authorisation holders of agricultural Plant Protection Products (PPP) may apply to have the authorisation of specific PPP's extended to cover uses additional to those authorised and shown on the manufacturer's product label. For many reasons, label recommendations of approved pesticides do not cover the control of every problem which may arise. This is particularly true for crops that are grown on a comparatively small scale in the UK as well as for pests and diseases that occur less often or which are new to the UK. As part of the process evidence on residues that would arise from the use is required, and consumer safety is evaluated and if necessary a specific MRL set. EAMU is pronounced "emu" these types of authorisations are also informally called "off labels".

Good Agricultural Practice in the Use of Pesticides (GAP): The nationally authorised safe uses of pesticides under conditions necessary for effective and reliable pest control (the way products should be used according to the statutory conditions of approval which are stated on the label). GAP encompasses a range of pesticide applications up to the highest authorised rates of use, applied in a manner which leaves a residue which is the smallest practicable. Authorised safe uses are determined at the national level and include nationally registered recommended uses, which take into account public and occupational health and environmental safety considerations. Actual conditions include any stage in the production, storage, transport, distribution and processing of food commodities and animal feed.

High-level Consumer: A term used in UK risk assessment calculations to describe the amount of food consumed by a person. In line with internationally agreed approaches, the PRiF uses the 97.5th percentile value, which is generally about three times the average amount consumed. This takes account of different eating patterns that may occur throughout the population.

Human Data: See under Acute Reference Dose

Import Tolerance: an MRL set for imported products where the use of the active substance in a plant protection product on a commodity is not authorised in the European Community (EC) or an existing EC MRL is not sufficient to meet the needs of international trade. All import tolerances are assessed for consumer safety.

Imported: The tables in the reports record whether the sample was of UK origin, or imported. This can mean different things depending on the commodity. See also 'Origin'. The PRiF report the country from where the produce has been imported only if this is clear from the packaging or labelling.

JMPR: Joint FAO/WHO Meeting on Pesticide Residues, which conducts scientific evaluations of pesticide residues in food.

LOD (Limit of Determination) and LOD MRLs: The Limit of Determination (LOD) is the lowest concentration of a pesticide residue or contaminant that can be routinely identified and quantitively measured in a specified food, agricultural commodity or animal feed with an acceptable degree of certainty by the method of analysis.

LOD MRL (Maximum Residue Levels set at the LOD): For some pesticides and commodities insufficient trials data are available on which to set a maximum residue level or there may be no use of the pesticide on that crop. In these cases, the MRL may be set at a default level i.e.; at the limit of determination (LOD) where analytical methods can reasonably detect the presence of the pesticide. **These MRLs are not based on Good Agricultural Practice (GAP).**

Off Label: See EAMUs

Maximum Residue Level (MRL): The maximum concentration of a pesticide residue (expressed as mg/kg) legally permitted in or on food commodities and animal feeds. MRLs are based on good agricultural practice data and residues in foods derived from commodities that comply with the respective MRLs are intended to be toxicologically acceptable.

MRLs are intended primarily as a check that GAP is being followed and to assist international trade in produce treated with pesticides. **MRLs are not in themselves 'safety limits'**, and exposure to residues in excess of an MRL does not automatically imply a hazard to health.

The MRLs applicable in the UK are now largely set under EC legislation.

Maximum Residue Levels (MRLs) reflect levels of pesticides that could occur in produce, which has been treated in accordance with good agricultural practice. Where pesticides do not give rise to readily detectable residues, or are not approved for use on particular commodities, MRLs are set at the lowest level which can be identified in routine laboratory analysis. Thus, they provide a mechanism for statutory controls on pesticides in produce which is put into circulation and for monitoring correct use of these chemicals.

If no use of a pesticide on a crop is identified when MRLs are set the tolerance for that pesticide/crop combination is set at the limit of determination (effectively zero). Limit of determination MRL are marked by a '*'

MRLs are established under the Pesticides (Maximum Residue Levels in Crops, Food and Feeding Stuffs) (England and Wales) Regulations 1999 (as amended), the Pesticides (Maximum Residue Levels in Crops, Food and Feeding Stuffs) (Scotland) Regulations 2000 and the Pesticides (Maximum Residue Levels in Crops, Food and Feeding Stuffs) Regulations (Northern Ireland) 2002. These Regulations list all statutory MRLs established under UK national or EC procedures. Today, virtually all these MRLs are set under an ongoing EC programme and the Regulations are amended periodically as levels are set for increasing numbers of pesticides.

There are a number of pesticides which do not yet have statutory MRLs. In the absence of such MRLs we advise suppliers to adhere to any appropriate levels established by the Codex Alimentarius Commission (CAC) a United Nations body established to promote global trading

standards. Codex MRLs are not statutory but have been risk-assessed when set and provide a suitable standard in the absence of a statutory MRL.

MRLs may be extended to composite and processed products but levels are not specifically laid down in legislation. They are derived by calculation on an individual basis.

Maximum Residue Levels set at the LOD (LOD MRL): See LOD MRL. For some pesticides and commodities, insufficient trials data are available on which to set a maximum residue level or there may be no use of the pesticide on that crop. In these cases, the MRL may be set at a default level, i.e. at the limit of determination (LOD) where analytical methods can reasonably detect the presence of the pesticide. **These MRLs are not based on Good Agricultural Practice (GAP).**

MRL exceedances: When a residue is found at a level higher than that set for the MRL.

MRL Exceedances and Relationship with the Acceptable Daily Intake (ADI): Before permitting any use of a pesticide, a detailed assessment is made to ensure that residues in foods derived from commodities comply with MRLs and will not give rise to unacceptable risks to consumers. MRLs do take account of consumer safety aspects and, in effect, are set at levels below safety limits. However, MRLs must not be confused with safety limits, which are expressed in terms of the acceptable daily intake (ADI) of a particular pesticide residue from all sources. The ADI (expressed as mg/kg bw/day) is the amount of chemical that can be consumed every day of an individual's entire lifetime in the practical certainty, on the basis of all known facts, that no harm will result. See ADI for further information.

Whenever unexpectedly high or unusual residues occur during monitoring, the risk to consumers, from exposure to residues at the highest levels found, is assessed by comparison of predicted intakes with the ADI or ARfD as appropriate.

No MRL: For certain pesticides an MRL may not have been set.

Metabolite: A degradation or conversion product from a pesticide when it is metabolised.

Multiple Residues: In this report this term is used to describe when more than one pesticide is found in an individual food sample. It may have arisen because the crop was treated at different times with pesticides applied singularly, or when pesticides are applied as mixtures (several pesticides mixed in the spray tank at the same time) or the marketed pesticide product contains more than one pesticide or any combination of these three situations. Mixtures may be used in response to specific pest pressures and also as part of strategies to minimise pesticide resistance building up on pest populations.

NEDI: National Estimate of Daily Intake. An estimate of intake of pesticide in the diet over the long-term to compare to the ADI. The NEDI is based on median or mean residue levels and a high level consumption (97.5th percentile value) for the daily amounts of the food item consumed over the long term. For further details on the calculation of NEDIs please refer to section 3 of the data requirements handbook: www.pesticides.gov.uk/guidance/industries/pesticides/topics/pesticide-approvals/pesticides-registration/applicant-guide/the-applicant-guide-contents.

NESTI: National Estimate of Short Term Intake. An estimate of peak intake of pesticide in the diet to compare to the ARfD. The NESTI is based on the highest residue found multiplied by a variability factor (see glossary description) and a high level consumption (97.5th percentile value) for the amount of the food item consumed over a single day. For further details on the calculation of NESTIs please refer to section 3 of the data requirements handbook: www.pesticides.gov.uk/guidance/industries/pesticides/topics/pesticide-approvals/pesticides-registration/applicant-guide/the-applicant-guide-contents.

Neurotoxicity: Neurotoxicity is the effect of substances (called neurotoxins) which alter the normal working of an animal's nervous systems and/or damage the nervous tissue.

No Observed Adverse Effect Level (NOAEL): The greatest concentration or amount of a substance, found by experiment or observation, which causes no detectable adverse alteration of morphology, functional capacity, growth, development or life span of the target organism under defined conditions of exposure.

Off Label: See EAMUs

Origin: The brand name annex reports the origins of the samples tested. This can mean different things depending on the commodity. For example, butter is often labelled as 'UK origin'; however, the majority of it comes in bulk from New Zealand and is split into smaller blocks and packaged in the UK. Lettuce is a fresh produce and 'UK origin' usually means that it has been grown and packaged in the UK. Processed commodities such as cereal bars often contain multiple raw ingredients, each of which may come from a different source/origin. Therefore, the origin of the produce usually reflects the place where it was manufactured. The PRiF report the origin as stated on the packaging or labelling of the commodity concerned, unless other more accurate information is available to indicate that the origin is from elsewhere. Some products are listed as 'unknown origin' because the labelling does not give this information.

Parent: The chemical form of a pesticide as applied to plants, as opposed to metabolites and breakdown products.

Percentile: A percentile is a value that divides a sample of measurements at a specific point when they are listed in ascending order of magnitude. For example, the 97.5th percentile from a food consumption survey is a value that is equal to or more than 97.5% of the measurements and equal to or less than 2.5% of the measurements. So, in a sample of 40 daily food consumption values, the 97.5th percentile is equal to or more than 39 of the measurements. Such high percentile estimates of food consumption are used in risk assessments as they are more protective than using average consumption levels.

Permitted Level (PL): The permitted levels (expressed as mg/kg), in specific commodities, of some substances which can be classified as pesticides but are controlled under the Miscellaneous Food Additives Regulations 1995 (S.I. 1995 No. 3187).

Pesticide: A pesticide is any substance, preparation or organism prepared or used for destroying any pest. The majority of pesticides sought by the PRiF in its monitoring are those used to control pests in agricultural crops, although non-agricultural products may be included

where there is a specific reason for doing so, e.g. where there are implications in terms of possible intakes of residues.

Probabilistic Modelling: The usual estimates of consumer exposure use single high values for both consumption amounts and residue levels. Whilst these are based on realistic UK dietary survey data and residue levels, they tend to overestimate most representative intakes. This is because they do not take into account actual variations in both amounts consumed and residue levels. Probabilistic modelling is a technique that considers all the possible different combinations of consumption and residue levels. This provides information on the probability of particular intakes occurring.

Rapid Alert System for Food and Feed (RASFF): The European Commission's Rapid Alert System for Food and Feed (RASFF) allows member authorities (EU and EFTA member States) to quickly exchange information about measures taken when responding to risks detected in food or feed. This exchange of information helps authorities in countries inside the European single market to act more rapidly and in a coordinated way in response to a possible health threats caused by food or feed.

RASFFs notifications about pesticide residues are sent when a residue is over the MRL taking into account measurement uncertainty and a potential consumer risk has been identified. For pesticide residues in food traded in the single market this means when a risk assessment has identified that risk to people eating the food cannot be ruled out.

More information is available on the European Commission website at https://ec.europa.eu/food/safety/rasff_en

Relationship between GAP and MRLs: The MRL can be defined as the maximum concentration of a pesticide residue (expressed as mg/kg) likely to **occur** in or on food commodities and animal feeds, after the use of the pesticide according to the GAP.

Reporting Limit: The reporting limit is the lowest calibrated level employed during analysis to detect residues. The reporting limit may vary slightly from laboratory to laboratory depending on the equipment available and operating procedures used.

'None were detected above the Set RL': This term is used in the Brand Name Annex, where no residues were found above their reporting limit.

Residue: Residues may be present in vegetable and animal products following the application(s) of a pesticide(s). They may not only include the pesticide that was applied but other degradation or reaction products and metabolites that may be of toxicological significance. The levels or amounts of residues present are expressed in milligrams of the chemical in a kilogram of crop/food/commodity (mg/kg), or parts per million.

Risk Assessment: A risk assessment is carried out when residues are found in foods to determine whether, at the levels found, they present a concern for consumer health or not. Consumer risk assessments are routinely conducted as part of the approval process for pesticides and are based on residue trials. Approval of a pesticide is only recommended when the consumer risk is acceptable.

Safety Factor: Values used in extrapolation from experimental studies in animals (usually 100) or humans (usually 10) to the population: for PRiF assessments this represents a value by which the NOAEL is divided to derive an ADI or ARfD. The value depends on the nature of the effect, the dose-response relationship, and the quality of the toxicological information available. The use of such a factor accounts for possible differences in susceptibility between the animal species tested and humans, and for variation between different individuals in the population. The terms 'uncertainty factor' and 'assessment factor' are also sometimes used for this factor; the PRiF will use 'safety factor'.

Sample: The nature of all samples is as designated in the EC's 'sampling' Directive – 2002/63/EC. Examples are: apple – at least 10 apples weighing at least 1 kg; grapes – at least 5 bunches, weighing at least 2 kg.

Technical Exceedances: When an MRL has been set at the LOD because there have been no data to support a higher level. In the context of this report, 'technical exceedances' always relate to produce from third countries.

Variability Factor: A value that describes the variation in residue levels between the highest unit level and the average level in samples made up of many units. Internationally this is agreed to be the 97.5th percentile unit residue level divided by the average of the sum. The variability factor multiplied by the measured residue level from a composite sample (i.e. a sample made up by mixing several units before analysis) gives an estimate of the likely higher residue levels that may have occurred in individual units. These estimated higher levels are used in short-term risk assessments involving fruit and vegetables where consumers eat only a portion of a single item, e.g. melon, or a small number of units e.g. apples and potatoes.