Pesticide residues monitoring programme report

Quarter 1 2026

- Pesticide residue monitoring results from Quarter 1 2026
- Summary and actions taken by HSE

Aug-26

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Introduction and Summary

Introduction

The Health and Safety Executive (HSE), Chemicals Regulation Division (CRD) is responsible for administering an annual programme of pesticides residue testing on food and drink available to consumers in the United Kingdom (UK) of Great Britain (GB) and Northern Ireland (NI) to ensure that food is safe and meets legal requirements. This work contributes to fulfilling the statutory responsibilities of the Department for Environment, Food and Rural Affairs (Defra), along with the duties delegated to HSE by the devolved governments of Wales, Scotland, and Northern Ireland.

HSE collects samples of different food and drink commodities from across the UK. These samples are then sent to 4 different laboratories for analytical testing. HSE undertakes risk assessment, including screening of all pesticide residues found and detailed risk assessments, as required. This is to determine whether the residues present could lead to someone eating or drinking an amount above a level that is considered safe. HSE also produces detailed risk assessments for every case where the actual residue level found could lead to an intake above the safety levels.

HSE publish the full analytical results. Please visit the Pesticide residues in food: results of monitoring programme for details of suppliers and retailers of the foods sampled (these are in ODS (Open Document Spreadsheet)) format.

Since the UK left the European Union (EU), HSE report the results for samples collected in GB separately from those collected in NI. Surveys will be labelled as either GB or NI throughout the report to identify where the samples were collected. Samples collected in GB will be subject to GB Maximum Residue levels (MRLs). GB MRLs are set by inclusion in a GB MRL statutory register, implemented and updated by means of a database. For samples collected in NI, certain aspects of EU food law, including compliance with EU set MRLs, continue to apply under the terms of the Windsor Framework. In the detailed data files HSE are separating out UK, EU and non-EU origin foods in the results.

Samples with residues above the reporting limit (RL) are reported for each food and drink commodity. When a pesticide residue is found in a food or drink that is above the MRL or not authorised for use on that specific food or drink, HSE will ask suppliers and the authorities of the exporting countries for an explanation of these findings. Any responses received specifically for publication are available in the sample details and supplier responses sections.

If you have any feedback or comments on the monitoring programme or the reports produced, please email them to HSE at PesticideResiduesTeam@hse.gov.uk.

Summary of the residue monitoring programme and results

The 2026 pesticide residue monitoring programme is measuring up to 428 different pesticides in the quarterly food and drink surveys. In Quarter 1 the samples were collected between the beginning of January to the end of March 2026.

GB surveyed (full details in Table 1a GB):

- 662 samples
- 23 different foods
- 318 samples contained residues
- 49 samples contained residues above the MRL

NI surveyed (full details in Table 1b NI):

- 125 samples
- 14 different foods
- 56 samples contained residues
- 5 samples contained residues above the MRL

Following screening assessment, HSE needed to consider the potential short-term health effects of only a small minority of the residues found in more detail. In all but one of these cases, HSE concluded that effects on health were either unlikely or not expected. A high exceedance of the toxicological reference value was noted for a brown beans (dried beans) sample. This sample contained a high residue of lambda-cyhalothrin above the level of the MRL and other pesticides that HSE assessed in a combined exposure assessment. HSE concluded that the consumer exposure levels observed here are undesirable and in these cases some people might experience adverse health effects, which HSE expect would be short-lived and rapidly reversible. Full details are presented in detailed risk assessments. All other residues found did not cause any concern for short-term health.

HSE also needed to conduct a detailed risk assessment to assess long term exposure for copper residues found in all GB liver samples above the MRL. HSE concluded that effect on health is not expected.

These detailed considerations on the risk assessments as well as links to underlying information are covered in this report for dried beans, dried grapes, oranges, rice, and liver. HSE also needed to consider the potential genotoxic health effects of dichlorvos, chlorpyrifos and carbofuran found in a total of 8 samples across dried beans, dried grapes, oranges, rice and spring onions. Aside from one of these samples, each of these samples did not contain more than one pesticide that might have possible genotoxicity.

Additionally, aside from the liver samples noted above, none of the individual commodity long-term exposure screening assessments performed in this quarter (for each of the pesticides found in this report) indicated any potential for adverse long-term health effects. This was based on the assessment of dietary intakes as below the ADI or other established long-term health-based reference values.

Consumer risk summary

HSE screens each residue detected for any consumer health issues to identify which need to be considered in more detail. The approach that HSE apply to do this work, including follow up risk assessments where they are needed, is explained in HSE risk assessment methodology and in the report section HSE assessment of risk. HSE will comment on any risks that HSE have considered in detail in the full report, and HSE's detailed risk assessments are published.

HSE liaises with the Food Standards Agency (FSA) on consumer risk assessment.

Overview of survey results for Q1 in Great Britain and Northern Ireland

GB surveys that have an asterisk (*) are a requirement of the Multi-annual Great Britain control plan for pesticide residues.

NI surveys that have an asterisk (*) are a requirement of the EU Coordinated Programme required by Commission Implementing Regulation 2024/989.

Table 1a: Overview of the survey results for Q1 GB

Survey title (where samples collected)	Number of pesticides sought	Samples tested	Detailed risk assessment presented?	MRL exceedances (samples)
Beans (dried) (GB) *	428	53	Yes	8
Beans with Pods (GB)	420	24	No	2
Carrot (GB) *	399	25	No	1
Cauliflower (GB) *	393	24	No	0
Courgettes (GB)	394	24	No	0
Dried fruits (grapes) (GB)	422	24	Yes	1

Grapes (GB)	424	22	No	0
Kiwi Fruit (GB) *	397	29	No	0
Leeks (GB)	393	30	No	0
Liver (GB) *	124	26	Yes	26
Milk (GB)	119	78	No	0
Onions (GB) *	418	17	No	0
Orange juice (GB)	419	30	No	0
Oranges (GB) *	424	34	Yes	3
Parsnips (GB)	394	30	No	1
Pasta (GB)	423	24	No	0
Pears (GB) *	428	17	No	1
Potatoes (GB) *	424	32	No	0
Poultry Meat (GB) *	128	24	No	0
Rice (GB) *	427	37	Yes	3
Rye flour (GB) *	426	30	No	0
Speciality fruit (GB)	420	12	No	2
Spring onions (GB)	416	18	Yes	1

Table 1b: Overview of the survey results for Q1 NI

Survey title (where samples collected)	Number of pesticides sought	Samples tested	Detailed risk assessment presented?	MRL exceedances (samples)
Beans (dried) (NI) *	391	6	No	0
Beans with pods (NI)	391	9	No	0
Carrot (NI) *	402	9	No	0
Cauliflower (NI) *	401	9	No	0
Cherry (NI)	398	6	No	2
Courgettes (NI)	391	6	No	0
Fish (sea) (NI)	39	12	No	0
Grapes (NI)	405	9	No	0
Lamb (NI)	39	9	No	1
Leeks (NI)	390	8	No	0
Onions (NI) *	401	9	No	0
Parsnips (NI)	391	12	No	2
Potatoes (NI) *	402	15	No	0
Spring onions (NI)	395	6	No	0

Samples collected in GB must comply with GB set MRLs unless the goods are qualifying NI goods and are subject to unfettered access under the terms of the UK Internal Market Act 2020. For samples collected in NI, under the Windsor Framework, certain aspects of EU food law, including compliance with EU MRLs apply.

Other issues

Suspected unauthorised uses

HSE enforcement investigation is still ongoing for possible unauthorised uses in the following samples:

- 1 sample of UK parsnips that contained a residue of 1,4-Dimethylnaphthalene

An update will be provided in the next quarter.

Organic samples with residues

The Defra organic section and the organic certification organisations are responsible for follow up activity related to the presence of pesticide residues in organic samples.

HSE writes to the suppliers of samples of organic produce if they contain a pesticide residue which is not permitted under assimilated organic regulation Commission Regulation (EC) No 889/2008 and copies these bodies in:

- 1 sample of organic beans (dried) (GB) containing glyphosate
- 3 samples of organic beans (dried) (GB) containing fosetyl-Al
- 1 sample of organic grapes (dried) (GB) containing cypermethrin
- 1 sample of organic rice (GB) containing isoprothiolane
- 2 samples of organic rye flour (GB) containing chlormequat and mepiquat

The country of origin listed on some of the samples may not correspond to the country in which the samples were grown in. Instead, it may refer to the location where the sample was processed or packaged, or where the brand owner is based.

HSE writes to Defra organics if samples of organic produce contain a pesticide residue which is permitted under retained organic regulation Commission Regulation (EC) No 889/2008:

- HSE found no organic samples which contained residues of pesticides permitted for use.

Updates from previous reports

HSE enforcement investigation has been completed for the possible unauthorised uses from last quarter in the following sample:

- One UK lettuce sample that contained oxadixyl. The HSE enforcement investigation concluded that the residue is most likely to be a result of historical uses of oxadixyl.

Further information

You can find further information on the individual sample details in an accessible format by looking at the Pesticide Residues in Food Monitoring (PRFM) quarterly data.

This includes:

- brand name, sampling point and origin information
- pesticides sought and residues found
- HSE's detailed risk assessments

UK national monitoring programmes

HSE, work under Defra, the Scottish and the Welsh governments, and has the official responsibility to organise a monitoring programme of GB food for pesticide residues. Similarly, HSE working under DAERA's authority has official responsibility to organise a monitoring programme of NI food for pesticide residues, including participating in the EU multi-annual control programme.

The programmes are made up of a risk-based rolling programme of surveys and statutory programmes required by GB or EU law. It is a monitoring programme, which is designed based upon evidence gathered in the previous years, including previous results, and border control information. For efficiency reasons, the NI programme may differ in that some lower priority (primarily imported) foods or processed foods are not included. If the GB survey identifies issues in these foods, then they would be included in future testing in NI.

These surveys are not an enforcement programme, and the survey design is generally not adjusted during the year. HSE are responsible for determining whether food is compliant with the law, specifically, whether any pesticide residue found is within the MRL. HSE will consider the safety of people who eat the food and if adverse or unexpected results are found, they are referred to the FSA. The FSA will then conduct their own investigation on the food safety of the product and take any necessary action.

MRLs reflect levels of pesticides that could occur in food which has been treated in accordance with Good Agricultural Practice (GAP). Where pesticides do not give rise to readily detectable residues, or are not authorised for use on 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 food which is put into circulation and for monitoring the correct use of these chemicals.

HSE assessment of risk

HSE conducts a screening assessment of all the residues found in the pesticide residues monitoring programme. If screening identifies any dietary intakes exceeding the relevant health-based reference values, then HSE present more detailed risk assessments, to consider whether there are any implications for health. Detailed risk assessments, where needed, are presented under the findings by food in either GB or NI. If a pesticide residue has a risk of genotoxicity (has potential to cause damage to genetic material), this will be noted in the risk assessment.

Pesticide dietary intakes are assessed using models that combine data on the levels of residues in food with food dietary consumption values. If intakes are within the health-based reference values, then taking account of the precautions built into the

model assessments, HSE conclude that an effect on health is not anticipated. If dietary intakes exceed the reference values this does not automatically mean, there are expected adverse health effects. However, this acts as a ‘trigger’ for HSE to consider these cases more thoroughly. HSE conducts both short-term (acute) and long-term (chronic) assessments based on the residues found in the foods and drinks tested in the pesticide residues monitoring programme. Each assessment is tailored accordingly, with separate paragraphs outlining each explanation below.

For acute assessments, HSE use short-term estimation values that use the highest residue found in a commodity and short-term consumption values for calculating short-term dietary intakes. These are then compared to the ARfD, a suitable health-based reference value for effects that could be caused by a single day or one-off consumption of a higher than usual residue. For acute assessment, the variation in residues that could occur within a residue sample is considered. A variability (multiplication) factor is included for that purpose, in order to address exposure to a higher than usual residue in a single item, such as a single apple or potato.

For chronic assessments, HSE use long-term estimation values (based on median residues and long-term consumption values for calculating long-term dietary intakes) for each commodity survey and compare it to the ADI, a suitable health-based reference value for lifetime. The issue is more fully considered in regulatory contexts pre-authorisation and at the time of MRL review. Then the issue is considered across all commodities (so more precautionary) by pesticide levels determined in GAP compliant trials, intended to address highest likely residues that might arise following pesticide use according to label recommendations.

For fruit and vegetables that have peel or skin that might not be consumed, HSE present alternative risk assessments for ‘without peel -flesh only’ where peel versus pulp residue distribution data is available. As standard, the ‘worst case’ assessment is presented when all of the peel is consumed with the fruit.

The dietary intakes are calculated for different consumer groups, from infants, toddlers and children of varying age to adults, elderly, and vegetarians, to take account of people with low bodyweights and varying dietary habits. As such the assessments performed are protective for all consumers.

For multiple residues, HSE consider the possible implications to health of more than one pesticide being found in samples (sometimes called the ‘cocktail effect’). Currently, there is a focus in detail on selected groups that HSE think are a priority to consider based on toxicity considerations and prevalence.

2026 Survey design

Sampling points

Retail outlets - samples bought by market research contractor shoppers.

Supply chain - samples taken by inspectors from the Animal and Plant Health Agency (APHA) from a range of points in the supply chain (wholesalers, retail depots, ports and import points).

Reporting

Results for certain higher-priority foods are produced, followed up and published more frequently in the Pesticide Residues in Food reports.

All results are published in the quarterly report. Some surveys are included in every quarter; some are every other quarter and some in just one quarter.

The place of origin listed for the samples tested in this report is in the following categories:

- were imported from outside the EU. In this report this means outside of the EU and outside of the UK
- came from the UK
- came from the EU

GB surveys that have an asterisk (*) are a requirement of the Multi-annual Great Britain control plan for pesticide residues.

NI surveys that have an asterisk (*) are a requirement of the EU Coordinated Programme required by Commission Implementing Regulations 2024/989.

Table 2a: Fruit and vegetables

Commodity	Sampling points	Sampled during	Reporting
Baby corn (GB)	Retail outlets	Quarter 2 and 3	Quarter 2 and 3
Beans with pods (GB)	Retail outlets and supply chain	Quarterly	Quarterly
Beans with pods (NI)	Retail outlets	Quarterly	Quarterly
Carrot* (GB)	Retail outlets and supply chain	Quarterly	Quarterly
Carrot* (NI)	Retail outlets	Quarterly	Quarterly
Cauliflower* (GB)	Retail outlets and supply chain	Quarterly	Quarterly
Cauliflower* (NI)	Retail outlets	Quarterly	Quarterly

Cherry (GB)	Retail outlets and supply chain	Quarter 2 and 3	Quarter 2 and 3
Cherry (NI)	Retail outlets	Quarterly	Quarterly
Courgette (GB)	Retail outlets	Quarterly	Quarterly
Courgette (NI)	Retail outlets	Quarter 1,2 and 3	Quarter 1, 2 and 3
Grapes (table)* (GB)	Retail outlets and supply chain	Quarterly	Quarterly
Grapes (table)* (NI)	Retail outlets	Quarterly	Quarterly
Kiwi fruit* (GB)	Retail outlets and supply chain	Quarterly	Quarterly
Kiwi fruit (NI)	Retail outlets	Quarter 2 and 3	Quarter 2 and 3
Leeks (GB)	Retail outlets	Quarterly	Quarterly
Leeks (NI)	Retail outlets	Quarterly	Quarterly
Onions (bulb)* (GB)	Retail outlets	Quarterly	Quarterly
Onions (bulb)* (NI)	Retail outlets	Quarterly	Quarterly
Orange* (GB)	Retail outlets and supply chain	Quarterly	Quarterly
Orange* (NI)	Retail outlets	Quarter 2, 3 and 4	Quarter 2, 3 and 4
Parsnip (GB)	Retail outlets	Quarterly	Quarterly
Parsnips (NI)	Retail outlets	Quarter 1 and 4	Quarter 1 and 4
Pear* (GB)	Retail outlets and supply chain	Quarterly	Quarterly
Pear* (NI)	Retail outlets	Quarter 2, 3 and 4	Quarter 2, 3 and 4
Potato* (GB)	Supply chain	Quarterly	Quarterly
Potato* (NI)	Retail outlets	Quarterly	Quarterly
Speciality fruit (GB)	Retail outlets and supply chain	Quarterly	Quarterly
Spring onions (GB)	Retail outlets	Quarter 1, 3 and 4	Quarter 1, 3 and 4
Spring onions (NI)	Retail outlets	Quarterly	Quarterly

Table 2b: Animal Products

Commodity	Sampling points	Sampled during	Reporting
Fish (sea) (NI)	Retail outlets	Quarterly	Quarterly

Lamb (NI)	Retail outlets	Quarterly	Quarterly
Liver (bovine) (GB) *	Retail outlets	Quarterly	Quarterly
Liver (bovine) (NI) *	Retail outlets	Quarterly	Quarters 2, 3 and 4
Milk (GB)	Retail outlets	Quarterly	Quarterly
Poultry meat (GB) *	Retail outlets	Quarterly	Quarterly
Poultry meat (NI) *	Retail outlets	Quarterly	Quarters 2, 3 and 4

Table 2c: Cereal Products

Commodity	Sampling points	Sampled during	Reporting
Bread (GB)	Retail outlets	Quarter 2, 3 and 4	Quarter 2, 3 and 4
Bread (NI)	Retail outlets	Quarter 3 and 4	Quarter 3 and 4
Pasta (GB)	Retail outlets	Quarter 1 and 4	Quarter 1 and 4
Rice* (GB)	Retail outlets	Quarter 1, 2 and 3	Quarter 1, 2 and 3
Rice (brown)* (NI)	Retail outlets	Quarter 2 and 3	Quarter 2 and 3
Rice cakes (GB)	Retail outlets	Quarter 2	Quarter 2
Rye flour* (GB)	Retail outlets	Quarter 1, 2 and 3	Quarter 1,2 and 3
Rye flour* (NI)	Retail outlets	Quarter 2 and 3	Quarter 2 and 3

Table 2d: Miscellaneous Products

Commodity	Sampling points	Sampled during	Reporting
Beans (dried)* (GB)	Retail outlets	Quarter 1 and 4	Quarter 1 and 4
Beans (dried)* (NI)	Retail outlets	Quarterly	Quarterly
Dried fruits (grapes) (GB)	Retail outlets	Quarterly	Quarterly
Grapes (dried) (NI)	Retail outlets	Quarter 2 and 3	Quarter 2 and 3
Infant formula* (GB)	Retail outlets	Quarter 3	Quarter 3
Infant formula* (NI)	Retail outlets	Quarter 3	Quarter 3
Orange juice (GB)	Retail outlets	Quarter 1 and 3	Quarter 1 and 3

Summary of results for Q1 Great Britain and Northern Ireland

The following section outlines a summary of Q1 results from the UK National Monitoring Programmes across GB and NI. Tables 3a and 3b summarise the main findings in this quarter from samples tested in GB and NI.

Table 3a: Summary of results for Q1 GB

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
Beans (dried) (GB)	53	22	8	0	17	9	4
Beans with Pods (GB)	24	12	2	0	11	1	0
Carrot (GB)	25	17	1	0	12	3	0
Cauliflower (GB)	24	8	0	0	1	2	0
Courgettes (GB)	24	18	0	0	9	4	0
Dried fruits (grapes) (GB)	24	17	1	0	16	5	1
Grapes (GB)	22	22	0	0	19	0	0
Kiwi Fruit (GB)	29	12	0	0	1	2	0
Leeks (GB)	30	15	0	2	6	3	0
Liver (GB)	26	0	26	0	0	0	0

Milk (GB)	78	0	0	0	0	17	0
Onions (GB)	17	10	0	0	4	5	0
Orange juice (GB)	30	14	0	0	5	1	0
Oranges (GB)	34	31	3	0	34	0	0
Parsnips (GB)	30	26	1	1	21	2	0
Pasta (GB)	24	6	0	0	0	3	0
Pears (GB)	17	16	1	0	15	0	0
Potatoes (GB)	30	25	0	0	18	0	0
Poultry Meat (GB)	24	3	0	0	0	1	0
Rice (GB)	37	16	3	0	14	7	1
Rye flour (GB)	30	9	0	0	9	23	2
Speciality fruit (GB)	12	7	2	0	6	0	0
Spring onions (GB)	18	12	1	0	11	1	0

Table 3b: Summary of Results for Q1 NI

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
Beans (dried) (NI)	6	1	0	0	0	0	0
Beans with pods (NI)	9	5	0	0	4	0	0
Carrot (NI)	9	3	0	0	0	4	0
Cauliflower (NI)	9	2	0	0	0	0	0
Cherry (NI)	6	4	2	0	6	0	0
Courgettes (NI)	6	1	0	0	0	1	0
Fish (sea) (NI)	12	0	0	0	0	0	0
Grapes (NI)	9	8	0	0	5	1	0
Lamb (NI)	9	2	1	0	0	0	0
Leeks (NI)	8	5	0	0	3	1	0
Onions (NI)	9	5	0	0	1	2	0
Parsnips (NI)	12	10	2	1	11	0	0
Potatoes (NI)	15	6	0	0	0	2	0
Spring onions (NI)	6	4	0	0	2	0	0

Processing Factors

As the programme monitors residues in all types of food, from raw commodities (for example potatoes) to processed foods or drinks (for example, wine), dried produce (for example dried fruit) and composite foods (for example fruit bread), consumer risk assessments are 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 allow for 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.

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

In nearly all cases the MRL is set for the food in its raw, unprocessed form (the form of each food to which MRLs apply is listed in Annex I of assimilated Regulation 396/2005). These MRLs can be applied to processed foods using appropriate processing factors. Processing factors take account of the effect of 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. Multiplying the processing factor by the original MRL gives a calculated MRL that can indicate the food was made with an ingredient or ingredients which had residues over the original MRL.

Calculating the MRLs for processed goods is dependent on the information available. HSE will contact the supplier if residues exceed the calculated MRL to give them an opportunity to provide relevant information to support the calculation.

Processing factors for commodity type were taken from a published compilation of factors (unless indicated otherwise).

HSE applies the general principle that, if no specific processing factor is available, a default factor of 1 may be applied. When the impact of processing is unknown, HSE assume the MRL remains unchanged. This approach allows us to monitor the situation and update the assessment should a processing factor need to be introduced in the future. Further information can be found at the links below.

In this report, HSE have applied processing factors mostly from the European database of processing factors for pesticide residues in food European database of processing factors for pesticides residues in food version 5 May 2025

Table 4a: Processing factors and MRLs used for dried fruit (grapes) (GB)

Food	Pesticide	Processing factor	MRL for unprocessed grapes (mg per kg)	Dried grape MRL (mg per kg)
Dried fruit (grapes)	Acetamiprid	1.3	0.5	0.65
Dried fruit (grapes)	Ametoctradin	3.3	6	19.8
Dried fruit (grapes)	Azoxystrobin	1.3	3	3.9
Dried fruit (grapes)	Bifenthrin	5	0.3	1.5
Dried fruit (grapes)	Boscalid	2.4	5	12
Dried fruit (grapes)	Carbendazim (sum)	5	0.3	1.5
Dried fruit (grapes)	Chlorantraniliprole	3.5	1	3.5
Dried fruit (grapes)	Chlorpyrifos	5	0.01	0.05
Dried fruit (grapes)	Cyazofamid	0.53	2	1.06
Dried fruit (grapes)	Cyflufenamid	3.4	0.2	0.68
Dried fruit (grapes)	Cypermethrin (sum)	3.3	0.5	1.65
Dried fruit (grapes)	Cyprodinil	1.3	3	3.9
Dried fruit (grapes)	Deltamethrin	5	0.2	1
Dried fruit (grapes)	Difenoconazole	3.6	3	10.8

Food	Pesticide	Processing factor	MRL for unprocessed grapes (mg per kg)	Dried grape MRL (mg per kg)
Dried fruit (grapes)	Dimethomorph	2.7	3	8.1
Dried fruit (grapes)	Ethirimol	5	0.5	2.5
Dried fruit (grapes)	Etofenprox	2	4	8
Dried fruit (grapes)	Fenhexamid	1.9	15	28.5
Dried fruit (grapes)	Flonicamid (sum)	5	0.03	0.15
Dried fruit (grapes)	Fludioxonil	1.1	5	5.5
Dried fruit (grapes)	Fluopicolide	5	2	10
Dried fruit (grapes)	Fluopyram	2.9	1.5	4.35
Dried fruit (grapes)	Flupyradifurone	2.5	3	7.5
Dried fruit (grapes)	Fluxapyroxad	4.3	3	12.9
Dried fruit (grapes)	Folpet (sum)	1.2	6	7.2
Dried fruit (grapes)	Imidacloprid	5	1	5
Dried fruit (grapes)	Iprodione	5	0.01	0.05
Dried fruit (grapes)	Kresoxim-methyl	1.6	1.5	2.4

Food	Pesticide	Processing factor	MRL for unprocessed grapes (mg per kg)	Dried grape MRL (mg per kg)
Dried fruit (grapes)	Lambda-cyhalothrin	3	0.08	0.24
Dried fruit (grapes)	Mandipropamid	3	2	6
Dried fruit (grapes)	Mefentrifluconazole	3.7	0.9	3.3
Dried fruit (grapes)	Metalaxyl (sum)	2.8	2	5.6
Dried fruit (grapes)	Methoxyfenozide	2.3	1	2.3
Dried fruit (grapes)	Metrafenone	1.7	7	11.9
Dried fruit (grapes)	Myclobutanil	5	1	5
Dried fruit (grapes)	Penconazole	1.2	0.5	0.6
Dried fruit (grapes)	Pyraclostrobin	2.9	1	2.9
Dried fruit (grapes)	Pyrimethanil	3.7	5	18.5
Dried fruit (grapes)	Pyriproxyfen	2.3	0.05	0.115
Dried fruit (grapes)	Spirotetramat (partial sum)	5	2	10
Dried fruit (grapes)	Spiroxamine	5	0.6	3
Dried fruit (grapes)	Sulfoxaflor	5	2	10

Food	Pesticide	Processing factor	MRL for unprocessed grapes (mg per kg)	Dried grape MRL (mg per kg)
Dried fruit (grapes)	Tebuconazole	1.3	0.5	0.65
Dried fruit (grapes)	Thiophanate-methyl	0.25	0.1	0.025
Dried fruit (grapes)	Trifloxystrobin	3.1	3	9.3
Dried fruit (grapes)	Zoxamide	1.7	5	8.5

Table 4b: Processing factors and MRLs used for orange juice (GB)

Food	Pesticide	Processing factor	MRL for unprocessed orange (mg per kg)	Orange juice MRL (mg per kg)
Orange juice	Imazalil	0.03	4	0.12
Orange juice	Thiabendazole	<0.17	7	<1.19

Table 4c: Processing factors and MRLs used for pasta (GB)

Food	Pesticide	Processing factor	MRL for unprocessed wheat (mg per kg)	Pasta MRL (mg per kg)
Pasta	Glyphosate	0.12	10	1.2

Table 4d: Processing factors and MRLs used for rice (GB)

Food	Pesticide	Processing factor	MRL for unprocessed rice (mg per kg)	White rice MRL (mg per kg)
White rice	Azoxystrobin	<0.58	5	<2.9
White rice	Tricyclazole	0.53	0.3	0.16

Table 4e: Processing factors and MRLs used for rye flour (GB)

Food	Pesticide	Processing factor	MRL for unprocessed rye (mg per kg)	Wholemeal rye flour MRL (mg per kg)
Rye flour (wholemeal)	Glyphosate	1	10	10

Summary of MRL exceedances for Q1 Great Britain and Northern Ireland

Some shorthand has been used in this table. The asterisk symbol '*' means MRL's set at the limit of detection (LOD). These MRLs are set at a default level, for example, at the LOD where analytical methods can reasonably detect the presence of the pesticide. In these cases, these MRLs are not based on GAP. Where suitable trials data are available and demonstrate absence of residues, then the MRL can also be set based on GAP as an LOQ MRL (*).

Where processed goods have been tested, the MRL may be adjusted to take account of processing – see processing factors.

Measurement uncertainty is explained in quarterly reports on the pesticide residues monitoring programme: methodology, background and references.

Samples collected in GB must comply with GB set MRLs unless the goods are qualifying NI goods and are subject to unfettered access under the terms of the UK Internal Market Act for 2020. For samples collected in NI, under the Windsor Framework, certain aspects of EU food law, including compliance with EU set MRLs, continue to apply.

Summary of MRL exceedances for Q1 GB

Table 5a: Beans (dried) (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
0504/2026	Black Bean	China	Chlormequat	0.2	0.01*	Yes	No
0504/2026	Black Bean	China	Fosetyl-Al (sum)	3.8	2*	No	No
3023/2026	Brown Beans	UK	Dichlorvos	0.06	0.01*	Yes	No
3023/2026	Brown Beans	UK	Fosetyl-Al (sum)	2.4	2*	No	No
3023/2026	Brown Beans	UK	Lambda-Cyhalothrin	4.6	0.05	Yes	Yes
3168/2026	Butter Beans	Peru	Chlorfenapyr	0.03	0.01*	Yes	No
3168/2026	Butter Beans	Peru	Lufenuron	0.04	0.01*	Yes	No
3168/2026	Butter Beans	Peru	Paclobutrazol	0.04	0.01*	Yes	No
3185/2026	Desi Red Kidney Beans	UK	Haloxyfop (alternate sum)	0.09	0.01*	Yes	No
3184/2026	Moth Whole	UK	Fenvalerate (sum)	0.07	0.02*	Yes	No
0646/2026	Mung Beans	UK	2,4-D (sum)	0.1	0.05*	No	No
0646/2026	Mung Beans	UK	Haloxyfop (alternate sum)	1	0.01*	Yes	No

0661/2026	Mung Whole	India	Inorganic bromide	56	50	No	No
3154/2026	Moong Beans	UK	Pirimiphos-methyl	0.07	0.01*	Yes	No

Table 5b: Beans with Pods (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
3117/2026	Fine Beans	Kenya	Hexaconazole	0.05	0.01*	Yes	No
5057/2026	Guar	India	Diafenthiuron	0.2	0.01*	Yes	No

Table 5c: Carrots (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
0611/2026	Carrots	UK	Chlorate	0.3	0.15	No	No

Table 5d: Dried fruits (grapes) (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
3161/2026	Green Sultanas	UK	Iprodione	0.06	0.05	No	No

Table 5e: Liver (bovine) (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
0590/2026	Calves Liver	UK	Copper	173	30	Yes	No
0591/2026	Calves Liver	UK	Copper	272	30	Yes	No
0691/2026	Calves Liver	UK	Copper	129	30	Yes	No
2743/2026	Calves Liver	the Netherlands	Copper	215	30	Yes	No
2746/2026	Calves Liver	the Netherlands	Copper	202	30	Yes	No
2747/2026	Calves Liver	the Netherlands	Copper	133	30	Yes	No
3175/2026	Calf's Liver	the Netherlands	Copper	133	30	Yes	No
0625/2026	Ox Liver	UK	Copper	110	30	Yes	No
0676/2026	Ox Liver	UK	Copper	90	30	Yes	No
0677/2026	Ox Liver	UK	Copper	111	30	Yes	No
0690/2026	Ox Liver	UK	Copper	86	30	Yes	No
0711/2026	Ox Liver	UK	Copper	36	30	No	No
1038/2026	Ox Liver	UK	Copper	50	30	No	No

2543/2026	Ox Liver	UK	Copper	72	30	Yes	No
2557/2026	Ox Liver	UK	Copper	83	30	Yes	No
2742/2026	Ox Liver	UK	Copper	68	30	Yes	No
2744/2026	Ox Liver	UK	Copper	131	30	Yes	No
2745/2026	Ox Liver	UK	Copper	133	30	Yes	No
2829/2026	Asda Tender Ox Liver	UK	Copper	94	30	Yes	No
2941/2026	Ox Liver	UK	Copper	174	30	Yes	No
2942/2026	Ox Liver	UK	Copper	78	30	Yes	No
3029/2026	Ox Liver	UK	Copper	162	30	Yes	No
3106/2026	Ox Liver	UK	Copper	77	30	Yes	No
3123/2026	Liver - Ox Liver	UK	Copper	79	30	Yes	No
3173/2026	Sliced Ox Liver	UK	Copper	184	30	Yes	No
3198/2026	Ox Liver	UK	Copper	73	30	Yes	No

Table 5f: Oranges (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
5059/2026	Navel	Egypt	Cyfluthrin (sum)	0.03	0.02*	No	No
5119/2026	Navel	Egypt	Cyfluthrin (sum)	0.04	0.02*	Yes	No
5255/2026	Blood Oranges Moro	Italy	Dodine	0.04	0.01*	Yes	No

Table 5g: Parsnip (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
3244/2026	Baby Parsnips	UK	Prosulfocarb	0.1	0.08	No	No

Table 5h: Pears (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
5167/2026	Santa Maria	Turkey	Buprofezin	0.02	0.01*	No	No

Table 5i: Rice (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
2843/2026	Asda Brown Basmati Rice	the Netherlands	Inorganic bromide	93	50	No	No
3202/2026	Brown Basmati Rice	UK	Inorganic bromide	78	50	No	No
3157/2026	Long Grain Rice	UK	Fosetyl-Al (sum)	5.7	2*	Yes	No

Table 5j: Speciality fruit (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
0602/2026	Pomegranate	Peru	Imazalil	0.9	0.01*	Yes	No
2772/2026	Sharon Fruit	Israel	Acetamiprid	0.02	0.01*	No	No

Table 5k: Spring onions (GB)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
3205/2026	Jumbo Salad Onions	Egypt	Carbofuran (sum)	0.009	0.002*	Yes	Yes

Summary of MRL exceedances for Q1 NI

Table 6a: Cherry (NI)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
2991/2026	Cherry	Chile	Chlorate	0.45	0.05	Yes	No
3097/2026	Cherry	South Africa	Chlorate	0.12	0.05	Yes	No

Table 6b: Lamb (NI)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
2886/2026	Lamb leg steaks	UK	BAC (sum)	0.45	0.1	Yes	No

Table 6c: Parsnips (NI)

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected (mg per kg)	MRL (mg per kg)	MRL exceedance after allowing for measurement uncertainty	Sent to FSA for consideration
2984/2026	Parsnips	Ireland	Prosulfocarb	0.1	0.08	No	No
3057/2026	Parsnips	Ireland	Prosulfocarb	0.087	0.08	No	No

Action taken by HSE

HSE wrote to:

- the suppliers of all samples containing residues above the MRL
- the suppliers of GB and NI samples that contained residues which do not have a pesticide authorised for the crop they were detected in
- the suppliers of all organic samples that contained any residue which is not permitted under assimilated organic regulation Commission Regulation (EC) No 889/2008, the organics branch of Defra, and the relevant organic certification body.

Recipients of the letters are given 4 weeks to provide a statement for inclusion in the report.

Supplier responses

Samples were collected on the 3 March 2026 from Whitstable Nutrition Centre who supply GB organic products. From the samples collected, 4 bean samples were found to contain pesticide residues below the MRL. The supplier has submitted a statement for inclusion in this report.

Table 7: Samples which received a suppliers' response to be included in this report

Sample ID	Food type	Country of origin	Pesticide detected	Residue detected mg per kg)	MRL (mg per kg)
2735/2026	Mung beans	China	Glyphosate	0.05	15
2739/2026	Cannellini beans	Turkey	Fosetyl-Al (sum)	0.5	2
2740/2026	Butter beans	China	Fosetyl-Al (sum)	0.3	2
2741/2026	Haricot beans	China	Fosetyl-Al (sum)	1	2

The supplier response is as follows:

"Infinity Foods purchased these products in good faith from certified organic suppliers who provide product specifications validated by testing.

The HSE sampling test results for the 4 products are surprising, and we are cooperating with an ongoing investigation by the Soil Association to establish the root cause.”

HSE response:

Detections of pesticide residues in organic food below the MRL are not a MRL compliance issue from the perspective of HSE. It is the organic certification body that sets the requirements, and certification practices that suppliers must adhere to. The suppliers’ response states that they are working with their organic certifier (the Soil Association) to determine the root cause of the pesticide residues detected in the 4 samples of beans. Therefore, no further action is required.

Findings by food in GB and the UK detailed risk assessments

Summary

For more information on the results, read the:

- summary table of results in this report
- survey design in this report
- glossary in this report
- risk assessment - dietary intake assessments in this report
- HSE risk assessment methodology
- detailed pesticide residues in food quarterly data, which includes brand name, sampling point and origin information, pesticides sought, and residues found

Summary of GB samples which contained no residues

HSE's official laboratories did not detect any residues that they tested for in several food commodities, therefore, HSE did not carry out a risk assessment on these samples.

Table 8: Summary of GB samples with no residues

Commodity	Number of samples analysed	Number of pesticide residues tested up to	UK origin	EU origin	Non-EU origin	Number of organic samples	HSE Notes
Milk	78	119	78	0	0	17	HSE has no comments as no residues were found.

GB samples which contained residues above the Reporting Limit (RL)

For GB samples which have been found to contain pesticide residues above the reporting limit, they are listed below.

Beans (dried) (GB)

Samples tested

53 samples were tested for up to 428 pesticide residues

Adzuki

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

Black beans

- one sample was imported from outside the EU

Black turtle

- one sample came from the UK
- 3 samples were imported from outside the EU

Blackeye

- 3 samples came from the UK

Borlotti

- 2 samples came from the UK

Brown

- one sample came from the UK

Butter

- one sample came from the UK
- 4 samples were imported from outside the EU

Cannellini

- 5 samples were imported from outside the EU

Haricot

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

Kidney

- 10 samples came from the UK
- one sample was imported from outside the EU

Moth Bean

- one sample came from the UK

Mung

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

Pinto

- 7 samples were imported from outside the EU

Red Bean

- one sample was imported from outside the EU

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

Pesticide residues detected of those sought

- 23 samples contained no residues of those sought
- 30 samples contained residues above the reporting limit
- 8 samples contained residues above the MRL
- 9 samples were labelled as organic - 4 contained residues of those sought

Risk assessments

Following screening assessment, there were 2 pesticides, chlorpyrifos and lambda-cyhalothrin, found in dried beans where HSE wanted to assess whether there would be an effect on short-term health.

Chlorpyrifos: There were 3 samples containing chlorpyrifos, all with levels below the MRL of 0.01* mg per kg, with the highest level detected at 0.009 mg per kg. Based on the HSE assessment for chlorpyrifos (see the Risk Assessment - dietary intake assessments section in this report), HSE conclude that a short-term effect on health is not expected. As outlined in HSE's full risk assessment (see the Risk Assessment - dietary intake assessments section in this report), in 2019 EFSA issued a statement on the human health assessment of chlorpyrifos which included a

consideration of the potential for genotoxicity (whether damage to genetic material can occur). HSE conclude that on a precautionary basis any findings of chlorpyrifos are undesirable due to the uncertainty regarding genotoxicity. Due to the levels of chlorpyrifos (0.005, 0.005, and 0.009 mg per kg) in the samples of dried beans HSE consider risks of adverse health effects are low.

Lambda-cyhalothrin: 1 of the above-mentioned samples with chlorpyrifos, a brown beans sample, also contained a high residue of 4.6 mg per kg lambda-cyhalothrin, well above the MRL of 0.05 mg per kg, where HSE identified a short-term risk. HSE do not know the source of the residue which could have arisen from either application of lambda-cyhalothrin or gamma-cyhalothrin. Therefore, HSE conducted a least worst case (lambda-cyhalothrin) and a worst case (gamma-cyhalothrin) form of assessment as, although these pesticides cannot be distinguished analytically by the laboratory in the routine monitoring, they have different toxicological reference values. As outlined in HSE's full risk assessment (see the Risk Assessment - dietary intake assessments section in this report) the conclusion of these assessments was the same. Whilst the highest dietary intakes are tenfold lower than the dose level in a lambda-cyhalothrin dog toxicity study at which no adverse effects were observed, the safety factor has been eroded significantly in either form of the assessment. HSE concludes that some people might experience transient muscle tremors after eating large portions (97.5th percentile consumption) of dried beans (brown beans) containing the highest levels of lambda-cyhalothrin found in this report. Such effects would be expected to be short-lived and rapidly reversible. This sample also contained other residues that could impact the nervous system, and a combined assessment was performed (see below).

Other risk assessment screening work undertaken did not indicate any other expectation of effects on health. Refer to HSE risk assessment methodology for further details.

Combined risk assessments

Some samples contained residues of more than one pesticide. One of these samples contained residues from pesticides which belong to similar chemical group 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 sample.

HSE conducted a combined assessment to consider the additive exposure for chlorpyrifos and dichlorvos, since they are both known to inhibit acetyl cholinesterase (AChE). HSE concluded that a combined effect on short-term health, based on this mode of action was not expected. HSE also assessed the combined presence of some other pesticides in this sample (imidacloprid and cypermethrin), which together with chlorpyrifos, dichlorvos, and lambda-cyhalothrin (reported in the single substance risk assessment above) can impact the nervous system, particularly the motor, sensory and autonomic divisions. Given the lower levels of residue and consequent dietary intakes of the pesticides other than lambda-

cyhalothrin, HSE concludes that lambda-cyhalothrin is the dominant contributor to the assessment. As such, the conclusion above based on the single substance assessment for lambda-cyhalothrin (see above, where the possibility of an impact on health is not excluded) is still considered valid for this combined assessment. See the Risk Assessment - dietary intake assessments section, for this combined risk assessment in full.

Since both chlorpyrifos and dichlorvos were both found in this sample of brown beans, please refer to the section Substances that might be genotoxic for HSE's assessment regarding the potential for genotoxicity. HSE conclude that on a precautionary basis any findings of chlorpyrifos and dichlorvos are undesirable due to the concern for genotoxicity at low doses. HSE consider risks of adverse health effects due to genotoxicity are low. The other pesticides in the brown beans sample are not considered to be genotoxic.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected 8 samples containing residues above the MRL in beans (dried). Details are available in Table 5a.

HSE have passed details of the one sample of dried beans which contained lambda-cyhalothrin to the FSA for further consideration. The FSA recommended a withdrawal of any remaining stock.

HSE comments

3 samples of dried beans contained chlorpyrifos, one of which, a sample of brown beans, also contained dichlorvos. Both are undesirable due to concerns over genotoxicity. These pesticides are not authorised in the UK but can on occasion be found in some imported food. HSE concludes that, due to the low levels of chlorpyrifos detected in the dried beans samples (highest level 0.009 mg per kg) and the level of dichlorvos (0.06 mg per kg), the risk of adverse health effects due to genotoxicity is low. However, the sample containing both dichlorvos and chlorpyrifos also contained a high residue level of lambda-cyhalothrin significantly above the MRL which had a dietary intake value that indicated a large exceedance of the toxicological reference value.

HSE wrote to the supplier of the brown beans sample to ask for spray records, to determine whether lambda-cyhalothrin or gamma-cyhalothrin had been applied to the crop, so HSE could complete the risk assessment in a refined way. A response was not received and so HSE completed 2 forms of assessment, one for gamma-cyhalothrin and one for lambda-cyhalothrin.

This was the basis of the conclusion for this sample that short-term (acute) adverse health effects could not be excluded.

This sample also contained other pesticides which HSE considered in a combined exposure assessment. See the above summary of Risk assessments and Combined risk assessments.

This dried bean sample containing lambda-cyhalothrin was referred to the FSA for further consideration, where it was withdrawn from sale. The owner removed all affected products from sale immediately upon notification from the local authority of a toxicological concern and the likelihood of adverse acute effects in consumers.

Further information about the risk assessments carried out can be read in dietary intake assessments.

Beans with Pods (GB)

Samples tested

24 samples were tested for up to 420 pesticide residues

Fine beans

- 9 samples were imported from outside the EU

Green beans

- 9 samples were imported from outside the EU

Runner beans

- one sample was imported from outside the EU

Speciality beans

- 5 samples were imported from outside the EU

Pesticide residues detected of those sought

- 10 samples contained no residues of those sought
- 14 samples contained residues above the reporting limit
- 2 samples contained residues above the MRL
- one sample was labelled as organic. None contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for a combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected 2 samples containing residues above the MRL in beans with pods. Details are available in Table 5b.

HSE comments

Two samples of beans with pods were found to contain dithiocarbamates. HSE has requested spray records from the suppliers to determine which specific dithiocarbamate pesticide was used. No response to date has been received from either supplier; therefore, it was not possible to determine which specific dithiocarbamate pesticide had been used.

Carrot (GB)

Samples tested

25 samples were tested for up to 399 pesticide residues

Fresh

- 24 samples came from the UK
- one sample was imported from outside the EU

Pesticide residues detected of those sought

- 7 samples contained no residues of those sought
- 18 samples contained residues above the reporting limit
- one sample contained residues above the MRL
- 3 samples were labelled as organic. None contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. One of these samples contained residues from pesticides which belong to similar chemical group 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 sample. HSE would not expect this combination of pesticides in the sample to have an effect on health.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected one sample containing a residue above the MRL in carrots. Details are available in Table 5c.

Cauliflower (GB)

Samples tested

24 samples were tested for up to 393 pesticide residues

Fresh

- 17 samples came from the UK
- 6 samples came from the EU

Frozen

- one sample came from the UK

Pesticide residues detected of those sought

- 16 samples contained no residues of those sought
- 8 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 2 samples were labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

One sample contained residues of more than one pesticide. HSE do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in this sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider for combined risk assessment.

Further information of how HSE consider combined risk assessments is in HSE risk assessment methodology.

Courgettes (GB)

Samples tested

24 samples were tested for up to 394 pesticide residues

3 samples were imported from outside the EU
21 samples came from the EU

Pesticide residues detected of those sought

- 6 samples contained no residues of those sought
- 18 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 4 samples were labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is in HSE risk assessment methodology.

Dried fruits (grapes) (GB)

Samples tested

24 samples were tested for up to 422 pesticide residues

Currants

- one sample came from the UK
- 3 samples were imported from outside the EU
- 2 samples came from the EU

Raisins

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

Sultanas

- 2 samples came from the UK
- 7 samples were imported from outside the EU

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

Pesticide residues detected of those sought

- 6 samples contained no residues of those sought
- 18 samples contained residues above the reporting limit
- one sample contained residues above the MRL
- 5 samples were labelled as organic. One contained residues of those sought

Risk assessments

Following screening assessment, HSE needed to assess whether there would be an effect on health for one sample containing a residue of chlorpyrifos at 0.02 mg per kg below the level of the MRL (calculated as 0.05 mg/kg, Table 4a).

Based on the HSE assessment for chlorpyrifos (see the Risk Assessment - dietary intake assessments section in this report), HSE concluded that a short-term effect on health is not expected. As outlined in HSE's full risk assessment (see the Risk Assessment - dietary intake assessments section in this report), in 2019 EFSA issued a statement on the human health assessment of chlorpyrifos which included a consideration of the potential for genotoxicity (whether damage to genetic material can occur). HSE conclude that on a precautionary basis any findings of chlorpyrifos are undesirable due to the uncertainty regarding genotoxicity. Due to the level of

chlorpyrifos in the sample of dried grapes HSE consider the risks of adverse health effect are low.

Other risk assessment screening work undertaken did not indicate any other expectation of effects on health. Refer to HSE risk assessment methodology for further details.

Combined risk assessments

Some samples contained residues of more than one pesticide. 2 of these samples contained residues from pesticides which belong to similar chemical group 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. HSE would not expect the combination of pesticides in the 2 samples to have an effect on health.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected one sample containing a residue above the MRL in grapes (dried). Details are available in Table 5d.

HSE comments

One sample of dried grapes contained chlorpyrifos which is undesirable due to concerns over genotoxicity. This pesticide is not authorised in the UK but can on occasion be found in some imported food. HSE conclude that due to the low level of chlorpyrifos detected (0.02 mg per kg) in the dried fruits sample that the risks of adverse health effects are low.

Further information about the risk assessments carried out can be read in dietary intake assessments.

Grapes (GB)

Samples tested

22 samples were tested for up to 424 pesticide residues

22 samples were imported from outside the EU

Pesticide residues detected of those sought

- all samples contained residues
- none of the samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

Multiple samples contained residues of more than one pesticide. One of these samples contained residues from pesticides which belong to similar chemical group 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 sample. HSE would not expect this combination of pesticides in the sample to have an effect on health.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Kiwi Fruit (GB)

Samples tested

29 samples were tested for up to 397 pesticide residues

29 samples came from the EU

Pesticide residues detected of those sought

- 17 samples contained no residues of those sought
- 12 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 2 samples were labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

One sample contained residues of more than one pesticide. HSE do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in the sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Leeks (GB)

Samples tested

30 samples were tested for up to 393 pesticide residues

30 samples came from the UK

Pesticide residues detected of those sought

- 15 samples contained no residues of those sought
- 15 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 3 samples were labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Liver (GB)

Samples tested

26 samples were tested for up to 124 pesticide residues

Calf

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

Ox

- 19 samples came from the UK

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

Pesticide residues detected of those sought

- all samples contained residues
- 26 samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

Following screening assessment, HSE needed to consider the potential for a long-term impact on health due to the presence of residues of copper in all the bovine liver samples, above the level of the MRL of 30 mg per kg. The highest residue is 272 mg per kg, and the median residue is 110.5 mg per kg.

Intake of animal feed, where copper is used as a supplement, is expected to be the primary reason for these findings. Other animal dietary factors can influence the levels of copper that arise in liver. Further details about these contexts and that copper is an essential trace element and nutrient in people's diets are explained in HSE's detailed risk assessment (see table 12 and associated text under the Risk Assessment - dietary intake assessments section).

The body has natural homeostatic mechanisms that regulate copper. As part of this hepatic (liver) sequestration functions as a protective mechanism. HSE has referred to derivation of toxicological reference values internationally to address the anticipated chronic exposures, including ADIs set by the WHO, the UK Expert Committee on Vitamins and Minerals, and in the EU. For the latter, (EFSA (2023)) took an approach to protect against copper accumulating in the liver on a chronic basis to levels that are eventually harmful. The UK Committee on Toxicity (COT) discussed the draft EFSA Opinion when it was out for consultation and was broadly

supportive of the new ADI and for using the homeostatic approach as a predictor of the effects of longer-term exposure.

HSE's initial risk assessment showed exceedances of the ADI, most notably for infants and toddlers. The commentary provided in the Risk Assessment - dietary intake assessments section observes the way that consumption events recorded for liver in the period of the short-term dietary survey for infants and toddlers could give estimates of dietary intake that might not be sustained on a long term (lifetime) basis. As such the calculated risk assessment estimates for liver are considered highly conservative and uncertain. The exceedance by infants and toddlers are for an ADI which is based on copper accumulation in the liver over time by adults intended to prevent accumulation of copper in humans. Copper requirements are higher for infant and young children, and EFSA (2023) concluded that, while they identified modest levels of ADI exceedance in infants and young children, copper intakes were not expected to be maintained at levels that continuously exceeded nutritional requirements throughout childhood. Therefore, the exceedances of the ADI they identified in infants and young children would not pose a lifetime risk for copper toxicity and therefore, were not considered to be of concern.

Similarly, for the current assessment, potential exceedances of the ADI are estimated in infants and toddlers who eat this bovine liver, which are modest when considering new consumption data from the FSA, the low numbers of consumption events for bovine liver specifically, and that intakes are much lower in older age groups.

Therefore, HSE concluded that the residues of copper detected by the laboratory would not be expected to have an effect on health.

Other risk assessment screening work undertaken did not indicate any other expectation of effects on health. Refer to HSE risk assessment methodology for further details.

Combined risk assessments

None of the samples contained more than one residue, so HSE did not carry out a combined risk assessment.

Residues measured above the MRL

The laboratory detected 26 samples containing residues above the MRL in liver (bovine). Details are available in Table 5e.

HSE comments

The current GB MRL for bovine liver is 30 mg per kg. The EU MRL was increased from 30 mg per kg to 300 mg per kg from 5 May 2026. Residues of copper in liver above the current GB MRL are not expected to pose a risk to human health. HSE recognises the need to review the existing GB MRL and will consider the

appropriateness of this level in light of the concentrations of copper likely to occur in this commodity.

Onions (GB)

Samples tested

17 samples were tested for up to 418 pesticide residues

Fresh

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

Pesticide residues detected of those sought

- 7 samples contained no residues of those sought
- 10 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 5 samples were labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Orange juice (GB)

Samples tested

30 samples were tested for up to 419 pesticide residues

25 samples came from the UK
5 samples came from the EU

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

Pesticide residues detected of those sought

- 16 samples contained no residues of those sought
- 14 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- one sample was labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Oranges (GB)

Samples tested

34 samples were tested for up to 424 pesticide residues

10 samples were imported from outside the EU
24 samples came from the EU

Pesticide residues detected of those sought

- all samples contained residues
- 3 samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

Following screening assessment there were four pesticides, chlorpyrifos, imazalil, lambda-cyhalothrin and thiabendazole, found in oranges at levels within the respective MRLs, where the effect on health needed to be considered in more detail.

HSE always undertakes assessments that consider both when the peel is not eaten, and one where it is assumed that all of the peel is eaten. These assessments are detailed under the Risk Assessment - dietary intake assessments section and should be consulted for the full assessment of risk.

For these pesticides, if the oranges are consumed without the peel an effect on health is not expected. HSE has conducted a worst-case form of the assessment, assuming that all the peel is consumed with the fruit. In this case, an effect on health would be unlikely. Additionally, an effect on health would only be anticipated if a number of factors came together at the same time: the high residue found in the orange sample being consumed by the most critical consumer, a particularly high residue in an individual fruit, peak consumption levels (97.5th percentile), and a large proportion of peel from the fruit being consumed.

Other risk assessment screening work undertaken did not indicate any other expectation of effects on health. Refer to HSE risk assessment methodology for further details.

Combined risk assessments

All samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected 3 samples containing residues above the MRL in oranges Details are available in Table 5f.

HSE comments

In the oranges survey, imazalil was detected in 34 samples, thiabendazole in 14 samples, lambda-cyhalothrin in 8 samples, and chlorpyrifos in 1 sample. The potential health effects of these residues detected were considered in more detail.

HSE always undertakes short-term assessments for oranges that consider both when the peel is not eaten, and one where it is assumed that all of the peel is eaten. For all of these pesticides, if the oranges are consumed without the peel, the risk of adverse health effects is low.

Further information about the risk assessments carried out can be read in dietary intake assessments.

Parsnips (GB)

Samples tested

30 samples were tested for up to 394 pesticide residues

Fresh

- 30 samples came from the UK

Pesticide residues detected of those sought

- 3 samples contained no residues of those sought
- 27 samples contained residues above the reporting limit
- one sample contained residues above the MRL
- 2 samples were labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. Some of these contained residues from pesticides which belong to similar chemical group 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. HSE would not expect the combination of pesticides in these samples to have an effect on health.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected one sample containing a residue above the MRL in parsnips. Details are available in Table 5g.

Pasta (GB)

Samples tested

24 samples were tested for up to 423 pesticide residues

24 samples came from the EU

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

Pesticide residues detected of those sought

- 18 samples contained no residues of those sought
- 6 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 3 samples were labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

None of the samples contained more than one residue, so HSE did not carry out a combined risk assessment.

Pears (GB)

Samples tested

17 samples were tested for up to 428 pesticide residues

7 samples came from the UK
2 samples were imported from outside the EU
8 samples came from the EU

Pesticide residues detected of those sought

- all samples contained residues
- one sample contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected one sample containing a residue above the MRL in pears. Details are available in Table 5h.

HSE comments

One sample of pears from the UK was found to potentially contain dithiocarbamates. The use of dithiocarbamates is not authorised for pesticide use in the UK. HSE screens for dithiocarbamates using a routine method that tests for the carbon disulphide breakdown product. However, this test is not able to confirm the identity of any potential dithiocarbamates pesticide used, if any. Other sulphurous compounds which can be naturally occurring for example in the Brassicaceae family, and some

allium species (for example onions and garlic) and some other plant species could be determined as carbon disulphide during analysis.

HSE has requested spray records from the supplier to determine which specific dithiocarbamate pesticide was used, if any. No response to date has been received from the supplier; therefore, it was not possible to determine if any dithiocarbamate pesticide was used.

Potatoes (GB)

Samples tested

32 samples were tested for up to 424 pesticide residues

27 samples came from the UK
4 samples were imported from outside the EU
one sample came from the EU

Pesticide residues detected of those sought

- 7 samples contained no residues of those sought
- 25 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Poultry Meat (GB)

Samples tested

24 samples were tested for up to 128 pesticide residues

Chicken

- 13 samples came from the UK

Duck

- 2 samples came from the UK

Turkey

- 9 samples came from the UK

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

Pesticide residues detected of those sought

- 21 samples contained no residues of those sought
- 3 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- one sample was labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

None of the samples contained more than one residue, so HSE did not carry out a combined risk assessment.

Rice (GB)

Samples tested

37 samples were tested for up to 427 pesticide residues

Basmati

- 12 samples came from the UK
- 3 samples were imported from outside the EU
- 2 samples came from the EU

Brown

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

White

- 8 samples came from the UK
- 3 samples were imported from outside the EU
- 3 samples came from the EU

Wholegrain

- one sample came from the EU

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

Pesticide residues detected of those sought

- 18 samples contained no residues of those sought
- 19 samples contained residues above the reporting limit
- 3 samples contained residues above the MRL
- 7 samples were labelled as organic - one contained residues of those sought

Risk assessments

Following screening assessment, HSE needed to assess whether there would be an effect on health two samples containing chlorpyrifos at 0.006 and 0.007 mg per kg below the level of the MRL of 0.01* mg per kg.

Based on the HSE assessment for chlorpyrifos (read the dietary intake assessment in this report), HSE conclude a short-term effect on health is not expected. As outlined in HSE's full risk assessment (see the Risk Assessment - dietary intake assessments section in this report), in 2019 EFSA issued a statement on the human

health assessment of chlorpyrifos which included a consideration of the potential for genotoxicity (whether damage to genetic material can occur). HSE conclude that on a precautionary basis any findings of chlorpyrifos are undesirable due to the uncertainty regarding genotoxicity. Due to the low levels of chlorpyrifos in these rice sample HSE consider the risks of adverse health effect are low.

Other risk assessment screening work undertaken did not indicate any other expectation of effects on health. Refer to HSE risk assessment methodology for further details.

Combined risk assessments

Some samples contained residues of more than one pesticide. Some of these contained residues from pesticides which belong to similar chemical group 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. HSE would not expect any of these combinations of pesticides in these samples to have an effect on health.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected 3 samples containing residues above the MRL in rice. Details are available in Table 5i.

HSE comments

Two samples of rice contained chlorpyrifos which is undesirable due to concerns over genotoxicity. This pesticide is not authorised in the UK but can on occasion be found in some imported food. HSE concludes that, due to the low levels of chlorpyrifos detected in the rice samples (highest level 0.007 mg per kg), the risk of adverse health effects is low.

Further information about the risk assessments carried out can be read in dietary intake assessments.

Rye flour (GB)

Samples tested

30 samples were tested for up to 426 pesticide residues

28 samples 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 rye flour was produced. It may be where the rye flour was processed, where they were packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

- 21 samples contained no residues of those sought
- 9 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 23 samples were labelled as organic - 2 contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. Some of these contained residues from pesticides which belong to similar chemical group 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. HSE would not expect this combination of pesticides in these samples to have an effect on health.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Speciality fruit (GB)

Samples tested

12 samples were tested for up to 420 pesticide residues

Loquat

- one sample came from the EU

Papaya

- one sample was imported from outside the EU

Passion fruit

- one sample was imported from outside the EU

Persimmon

- one sample came from the EU

Pomegranates

- 4 samples were imported from outside the EU

Sharon Fruit

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

Pesticide residues detected of those sought

- 3 samples contained no residues of those sought
- 9 samples contained residues above the reporting limit
- 2 samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected 2 samples containing residues above the MRL in speciality fruit. Details are available in Table 5j.

HSE comments

One sample of speciality fruit (papaya) was found to contain dithiocarbamates. HSE has requested spray records from the suppliers to determine which specific dithiocarbamate pesticide was used. This was determined to be mancozeb which is not a risk issue.

Spring onions (GB)

Samples tested

18 samples were tested for up to 416 pesticide residues

18 samples were imported from outside the EU

Pesticide residues detected of those sought

- 5 samples contained no residues of those sought
- 13 samples contained residues above the reporting limit
- one sample contained residues above the MRL
- one sample was labelled as organic - none contained residues of those sought

Risk assessments

A sample of jumbo salad onions contained a residue of carbofuran at 0.009 mg per kg, above the level of the MRL of 0.002* mg per kg. Although a short-term risk was not identified for this sample following screening assessment, HSE conclude that on a precautionary basis any findings of carbofuran are undesirable due to the uncertainty regarding genotoxicity. Based on the level found, HSE consider the risks of adverse health effects are low.

Other risk assessment screening work undertaken did not indicate any other expectation of effects on health. Refer to HSE risk assessment methodology for further details.

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected one sample containing a residue above the MRL in spring onion. Details are available in Table 5k.

HSE comments

A jumbo salad onion sample contained carbofuran above the level of the MRL which is undesirable due to concerns over genotoxicity. This pesticide is not authorised in the UK but can on occasion be found in some imported food. HSE concludes that, due to the low levels of carbofuran detected in the salad onion sample (0.009 mg per kg), the risk of adverse health effects is low.

Further information about the risk assessments carried out can be read in dietary intake assessments.

Findings by food in NI and risk assessments

Summary

For more information on the results, read the:

- summary table of results in this report
- survey design in this report
- glossary in this report
- risk assessment - dietary intake assessments in this report
- HSE risk assessment methodology, and
- detailed pesticide residues in food quarterly data, which includes brand name, sampling point and origin information, pesticides sought, and residues found

Summary of NI samples which contained no residues

HSE did not detect any residues in several food commodities, therefore, HSE did not carry out a risk assessment on these samples.

Table 9: Summary of NI samples with no residues

Commodity	Number of samples analysed	Number of pesticide residues tested up to	UK origin	EU origin	Non-EU origin	Number of organic samples	HSE Notes
Fish (sea)	12	39	1	0	11	0	HSE has no comments as no residues were found.

NI samples which contained residues above the Reporting Limit (RL)

For NI samples which have been found to contain pesticide residues above the reporting limit, they are listed below.

Beans (dried) (NI)

Samples tested

6 samples were tested for up to 391 pesticide residues

Black Beans

- one sample was imported from outside the EU

Black Turtle Beans

- 2 samples were imported from outside the EU

Canelli Beans

- one sample was imported from outside the EU

Pinto Beans

- 2 samples were imported from outside the EU

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

Pesticide residues detected of those sought

- 5 samples contained no residues of those sought
- one sample contained residues above the reporting limit
- none of the samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

None of the samples contained more than one residue, so HSE did not carry out a combined risk assessment.

Beans with pods (NI)

Samples tested

9 samples were tested for up to 391 pesticide residues

Green Beans

- 9 samples were imported from outside the EU

Pesticide residues detected of those sought

- 4 samples contained no residues of those sought
- 5 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Carrot (NI)

Samples tested

9 samples were tested for up to 402 pesticide residues

Fresh

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

Pesticide residues detected of those sought

- 6 samples contained no residues of those sought
- 3 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 4 samples were labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

None of the samples contained more than one residue, so HSE did not carry out a combined risk assessment.

Cauliflower (NI)

Samples tested

9 samples were tested for up to 401 pesticide residues

Fresh

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

Pesticide residues detected of those sought

- 7 samples contained no residues of those sought
- 2 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

None of the samples contained more than one residue, so HSE did not carry out a combined risk assessment.

Cherry (NI)

Samples tested

6 samples were tested for up to 398 pesticide residues

Fresh

- 6 samples were imported from outside the EU

Pesticide residues detected of those sought

- all samples contained residues
- 2 samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

All samples contained residues of more than one pesticide. One sample contained residues of pesticides which belong to a similar chemical group 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 sample. HSE would not expect this combination of pesticides in this sample to have an effect on health.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected 2 samples contained residues above the MRL in cherries. Details are available in Table 6a.

Courgettes (NI)

Samples tested

6 samples were tested for up to 391 pesticide residues

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

Pesticide residues detected of those sought

- 5 samples contained no residues of those sought
- one sample contained residues above the reporting limit
- none of the samples contained residues above the MRL
- one sample was labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

None of the samples contained more than one residue, so HSE did not carry out a combined risk assessment.

Grapes (NI)

Samples tested

9 samples were tested for up to 405 pesticide residues

9 samples were imported from outside the EU

Pesticide residues detected of those sought

- one sample contained no residues of those sought
- 8 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- one sample was labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Lamb (NI)

Samples tested

9 samples were tested for up to 39 pesticide residues

Lamb

- 8 samples came from the UK
- one sample was imported from outside the EU

Pesticide residues detected of those sought

- 6 samples contained no residues of those sought
- 3 samples contained residues above the reporting limit
- one sample contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

None of the samples contained more than one residue, so HSE did not carry out a combined risk assessment.

Residues measured above the MRL

The laboratory detected one sample containing a residue above the MRL in lamb. Details are available in Table 6b.

Leeks (NI)

Samples tested

8 samples were tested for up to 390 pesticide residues

one sample came from the UK
7 samples came from the EU

Pesticide residues detected of those sought

- 3 samples contained no residues of those sought
- 5 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- one sample was labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

Some samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Onions (NI)

Samples tested

9 samples were tested for up to 401 pesticide residues

Fresh

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

Pesticide residues detected of those sought

- 4 samples contained no residues of those sought
- 5 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 2 samples were labelled as organic - none contained residues of those sought
- one sample contained 2 residues

Risk assessments

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

Combined risk assessments

One sample contained residues of more than one pesticide. HSE do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in the sample do not include more than one of the pesticides from the groups that the Health and Safety Executive (HSE) consider for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Parsnips (NI)

Samples tested

12 samples were tested for up to 391 pesticide residues

Fresh

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

Pesticide residues detected of those sought

- all samples contained residues
- 2 samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

Multiple 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. HSE would not expect any of these combinations of pesticides in these samples to have an effect on health.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Residues measured above the MRL

The laboratory detected 2 samples containing residues above the MRL in parsnips. Details are available in Table 6c.

Potatoes (NI)

Samples tested

15 samples were tested for up to 402 pesticide residues

13 samples came from the UK
2 samples came from the EU

Pesticide residues detected of those sought

- 9 samples contained no residues of those sought
- 6 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 2 samples were labelled as organic - none contained residues of those sought

Risk assessments

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

Combined risk assessments

None of the samples contained more than one residue, so HSE did not carry out a combined risk assessment.

Spring onions (NI)

Samples tested

6 samples were tested for up to 395 pesticide residues

6 samples were imported from outside the EU

Pesticide residues detected of those sought

- 2 samples contained no residues of those sought
- 4 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- none of the samples were labelled as organic

Risk assessments

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

Combined risk assessments

Two samples contained residues of more than one pesticide. HSE 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 for combined risk assessment.

Further information of how HSE consider combined risk assessments is under the HSE assessment of risk.

Risk Assessment - dietary intake assessments

Screening assessments have been done for all pesticides to check that predicted intakes are within the relevant health-based reference values. A short-term (acute) exposure assessment is not done for pesticides which are not acutely toxic where it has been established that an ARfD is not required. GB toxicological reference values are available at https://www.hse.gov.uk/pesticides/data-requirements-handbook/trv.htm. EU toxicological endpoints can be found in the EU Pesticides database.

Toxicological reference values set by the JMPR (The Joint FAO and WHO Meeting on Pesticide Residues) can be found in individual pesticide evaluations at JMPR Evaluations (an up to date index to pesticide evaluations is available in the latest report).

The screening assessment uses the internationally agreed approach to long term (chronic) and short-term (acute) consumer exposure assessment with UK food consumption data as detailed within the UK NEDI and NESTI models which are available on the HSE website.

For the Q1 2026 assessments, the following approaches have been taken to refine these assessments 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. These approaches are outlined below:

- data on beans with pods were used for all forms of green beans, including speciality beans
- data on dried beans (pulses) were used for all types of dried beans, including speciality dried beans
- data on dried grapes were used for all forms of dried grapes, including raisins, sultanas and currants
- data on meat (excluding poultry and offal) were used for lamb
- data on liver available for all forms of liver were used
- separate data for orange juice and oranges were used
- data on pineapples with a unit weight of 196.5 g and a variability factor of 7 were used for papaya
- data on kiwi were used for passion fruit
- data on wheat were used for all forms of pasta
- data on peaches were used for persimmon and Sharon fruit
- specific consumption data for pomegranate were used
- data on poultry meat were used for all forms of poultry
- data on rye were used for all forms of rye flour

- data on spring onions were used, although there are a low number of consumers in some of the consumer groups use of these consumption data was considered reasonable

Short-term dietary risk assessment – single substance assessments where exceedance of the ARfD has been identified during screening

Table 10a: Dried beans (GB)

Pesticide	Highest residue (mg per kg)	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source
Chlorpyrifos	0.009	0.000050	0.00016 (infants) 0.00011 (toddlers) 0.00010 (4 to 6 year olds) 0.000074 (7 to 10 year olds) 0.000067 (11 to 14 year olds) 0.000059 (15 to 18 year olds) 0.000057 (vegetarian) 0.000050 (adults) 0.000029 (elderly own home) 0.000027 (elderly residential)	No toxicological reference values established	EU, 2020

In Table 10a, 'critical group intake' means the highest intake of all 10 consumer groups, or intakes for all consumer groups that exceed the ARfD.

Comment on risk assessment

EFSA (2019) has indicated that no toxicological reference values could be determined for chlorpyrifos due to concerns over genotoxicity. Additionally, EFSA raised concerns over neurological effects in the developing foetus and young child. Chlorpyrifos is not approved in the EU and UK and pesticide products containing chlorpyrifos were withdrawn in 2020.

HSE considers that for short-term risk assessment, an indicative toxicological reference value of 0.0003 mg per kg bw can be used based on the LOAEL set by EFSA for a developmental neurotoxicity study and applying a safety factor of 1000 to account for the severe nature of the findings (effects on brain measurements in a developmental neurotoxicity study). Toxicologists usually use safety factors of between 100 and a 1000 when a NOAEL cannot be determined within a study. HSE proposed indicative toxicological reference value is conservative as it uses the highest uncertainty factor applied by toxicologists and is based on

a LOAEL from a study with repeated dosing. Overall, HSEs approach is considered precautionary in protecting the nervous system in the developing foetus and child.

None of the intakes exceeded the HSE proposed indicative toxicological reference value for short-term assessment. Based on the low short-term intakes, HSE concludes that a short-term effect on health is not expected.

Please refer to the section below on Substances that might be genotoxic for HSE's conclusions regarding potential genotoxicity.

Table 10b: Dried beans (GB)

Pesticide	Highest residue (mg per kg)	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source
lambda-cyhalothrin or gamma-cyhalothrin	4.6	0.015	0.049 (infants) 0.033 (toddlers) 0.031 (4 to 6 year olds) 0.022 (7 to 10 year olds) 0.020 (11 to 14 year olds) 0.018 (15 to 18 year olds) 0.017 (vegetarian) 0.015 (adults) 0.0086 (elderly own home) 0.0079 (elderly residential)	0.005 (lambda-cyhalothrin) 0.0025 (gamma-cyhalothrin)	EU, 2016 EU, 2014

In Table 10b, 'critical group intake' means the highest intake of all 10 consumer groups, or intakes for all consumer groups that exceed the ARfD.

Comment on risk assessment

Residues of lambda-cyhalothrin are indistinguishable analytically from gamma-cyhalothrin, and the residue could have arisen from application of either gamma-cyhalothrin or lambda-cyhalothrin. As HSE does not know the source of the residue, HSE is presenting below a range covering a least worst case and a worst-case form of assessment for this residue since these pesticides have different toxicological potencies, resulting in different Acute Reference Doses (ARfDs) for these substances.

These intake estimates are based on an assumption that the dried beans (brown beans) will be cooked before eating as dried beans are not eaten raw (and might be soaked and washed before cooking). Cooking dried beans leads to about 40% loss of residues. HSE has applied a processing factor of 0.58 which was reported for fresh bean seeds boiled in water (EU database of processing factors EU database of processing factors version 5). Dried beans, as pulses, will be boiled at high temperature for longer than fresh bean seeds, such as broad beans.

Least worst case: lambda-cyhalothrin

The intakes for infants, toddlers, 4 to 6 year olds, 7 to 10 year olds, 11 to 14 year olds, 15 to 18 year olds, vegetarians, adults, elderly living in their own home and elderly living in residential setting exceeded the ARfD for lambda-cyhalothrin of 0.005 mg per kg bw. The highest intake was for infants.

If infants ate large portions of dried beans containing lambda-cyhalothrin at 4.6 mg per kg their intake could be 975% of the ARfD. This intake is 10 times lower than a dose which caused no observed adverse effects in a 1-year oral toxicity study in dogs with lambda-cyhalothrin. The European Food Safety Authority used this study as the basis of the ARfDs that were set for gamma- cyhalothrin and lambda-cyhalothrin.

Toxicologists usually apply a factor of 100 to this dose to take into account the uncertainties caused by using animal data and possible differences in susceptibility between people. HSE consider this significant reduction in the factor of 100 (applied for lambda-cyhalothrin) to a level of 10 undesirable.

In conclusion HSE considers that some people might experience transient muscle tremors after eating large portions (97.5th percentile consumption) of dried beans (brown beans) containing the highest levels of lambda-cyhalothrin found in this report. Such effects would be expected to be short-lived and rapidly reversible.

Worst case: gamma-cyhalothrin

The intakes for infants, toddlers, 4 to 6 year olds, 7 to 10 year olds, 11 to 14 year olds, 15 to 18 year olds, vegetarians, adults, elderly living in their own home and elderly living in residential setting exceeded the ARfD for gamma-cyhalothrin of 0.0025 mg per kg bw. The highest intake was for infants.

If infants ate large portions of dried beans containing gamma-cyhalothrin at 4.6 mg per kg their intake could be 1950% of the ARfD. This intake is 10 times lower than a dose which caused no observed adverse effects in a 1-year oral toxicity study in dogs with lambda-cyhalothrin. The European Food Safety Authority used this study as the basis of the ARfDs that were set for gamma- cyhalothrin and lambda-cyhalothrin.

Toxicologists usually apply a factor of 100 to this dose to take into account the uncertainties caused by using animal data and possible differences in susceptibility between people. However, the factor used for gamma-cyhalothrin was two-fold greater (200) to reflect the greater neurotoxicological potency of gamma-cyhalothrin compared to lambda-cyhalothrin.

HSE consider this significant reduction in the factor of 200 (applied for gamma-cyhalothrin) to a level of 10 undesirable.

In conclusion HSE considers that some people might experience transient muscle tremors after eating large portions (97.5th percentile consumption) of dried beans (brown beans) containing the highest levels of lambda-cyhalothrin found in this report. Such effects would be expected to be short-lived and rapidly reversible.

HSE notes, that the conclusions of the risk assessment are the same for both the form of the assessment considering the residue as lambda-cyhalothrin or gamma-cyhalothrin, despite the more significant erosion of the safety factor for gamma-cyhalothrin. The possibility of an impact on health is not excluded for this residue of lambda-cyhalothrin (of 4.6 mg per kg) which is a large exceedance of the MRL of 0.05 mg per kg. The highest dietary intakes are tenfold lower than the dose level in the above referenced lambda-cyhalothrin dog toxicity study at which no adverse effects were observed.

Table 10c: Dried grapes (GB)

Pesticide	Highest residue (mg per kg)	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source
Chlorpyrifos	0.02	0.000014	0.000063 (toddlers) 0.000050 (elderly own home) 0.000047 (elderly residential) 0.000043 (4 to 6 year olds) 0.000025 (vegetarian) 0.000023 (11 to 14 year olds) 0.000020 (7 to 10 year olds) 0.000014 (adults) 0.000013 (15 to 18 year olds) No consumption data available for infants	No toxicological reference values established	EU, 2020

In Table 10c, 'critical group intake' means the highest intake of all 10 consumer groups, or intakes for all consumer groups that exceed the ARfD.

Comment on risk assessment

EFSA (2019) has indicated that no toxicological reference values could be determined for chlorpyrifos due to concerns over genotoxicity. Additionally, EFSA raised concerns over neurological effects in the developing foetus and young child. Chlorpyrifos is not approved in the EU and UK and pesticide products containing chlorpyrifos were withdrawn in 2020.

HSE considers that for short-term risk assessment, an indicative toxicological reference value of 0.0003 mg per kg bw can be used based on the LOAEL set by EFSA for a developmental neurotoxicity study and applying a safety factor of 1000 to account for the severe nature of the findings (effects on brain measurements in a developmental neurotoxicity study). Toxicologists usually use safety factors of between 100 and a 1000 when a NOAEL cannot be determined within a study. HSE proposed indicative toxicological reference value is conservative as it uses the highest uncertainty factor applied by toxicologists and is based on a LOAEL from a study with repeated dosing. Overall, HSEs approach is considered precautionary in protecting the nervous system in the developing foetus and child.

None of the intakes exceeded the HSE proposed indicative toxicological reference value for short-term assessment. Based on the low short-term intakes, HSE concludes that a short-term effect on health is not expected.

Please refer to the section below on Substances that might be genotoxic for HSE's conclusions regarding potential genotoxicity.

Table 10d: Oranges (GB)

Pesticide	Highest residue (mg per kg)	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source
Chlorpyrifos	0.005	0.00011	0.00066 (infants) 0.00050 (toddlers) 0.00036 (4 to 6 year olds) 0.00025 (7 to 10 year olds) 0.00018 (11 to 14 year olds) 0.00015 (15 to 18 year olds) 0.00013 (vegetarian) 0.00011 (adults) 0.00010 (elderly residential) 0.000095 (elderly own home)	No toxicological reference values established	EU, 2020

In Table 10d, 'critical group intake' means the highest intake of all 10 consumer groups, or intakes for all consumer groups that exceed the ARfD.

EFSA (2019) has indicated that no toxicological reference values could be determined for chlorpyrifos, due to concerns over genotoxicity. Additionally, EFSA raised concerns over neurological effects in the developing foetus and young child. Chlorpyrifos is not approved in the EU and UK, and pesticide products containing chlorpyrifos were withdrawn in 2020.

HSE considers that for short-term risk assessment, an indicative toxicological reference value of 0.0003 mg per kg bw can be used based on the LOAEL set by EFSA for a developmental neurotoxicity study and applying a safety factor of 1,000 to account for the severe nature of the findings (effects on brain measurements in a developmental neurotoxicity study). Toxicologists usually use safety factors of between 100 and a 1,000 when a NOAEL cannot be determined within a study. The HSE proposed indicative toxicological reference value is conservative as it uses the highest uncertainty factor applied by toxicologists and is based on a LOAEL from a study with repeated dosing. Overall, the HSE approach is considered precautionary in protecting the nervous system in the developing foetus and child.

Oranges flesh after peeling

The dietary intakes calculated based on the peel being removed before consumption indicate that there are no exceedances of the indicative toxicological reference value of 0.0003 mg per kg bw. In this case, a short-term effect on health is not expected. This is because it has been reported that only 2 percent of the residue of chlorpyrifos remains (EFSA, 2017) in the flesh when the fruit is peeled. This approach is in line

with the risk assessment performed when the MRL was established. The below risk assessment only applies if all of the peel is consumed.

Whole orange, including all the peel

HSE consider that an effect on health would be unlikely. Any effect on health would depend on a number of factors which would need to come together at the same time (the high residue found in the sample being consumed by the most critical consumer, a particularly high residue in an individual fruit, peak consumption levels (97.5th percentile), and a large proportion of peel from the fruit being consumed).

The following risk assessment assuming all of the peel is consumed, is presented, although HSE considers this to be a 'worst case' form of assessment for the reasons explained above:

The intakes for infants, toddlers and 4 to 6 year old children exceeded the HSE indicative toxicological reference value of 0.0003 mg per kg bw. The highest intake was for infants (0.00066 mg per kg bw per day). These initial assessments are based on consumption data which include all forms of the commodity being considered. Orange juice is a significant portion of the total amount of orange consumed. In this case, chlorpyrifos residues are mainly on the peel, peel is not included in juice, and residues of chlorpyrifos have not been found in orange juice from 368 samples (2006, 2009, 2012, 2015, 2020 and 2023 surveys). Therefore, the intakes shown here will overestimate representative exposures.

When excluding the dietary contribution of orange juice, toddlers become the critical group. Their intake could be 0.00039 mg per kg bw per day, 130 percent of the above mentioned HSE proposed indicative toxicological reference value for short-term exposure. These intakes are approximately 770 times lower than the lowest intake in repeat-dose animal studies which was reported to cause effects in a developmental neurotoxicity study where pregnant rats were dosed from day 6 of pregnancy through until the pups were 11 days old. The proposed (short-term) indicative toxicological reference value from HSE is precautionary. These exposures are undesirable but are unlikely to cause any adverse short-term effect.

Overall, HSE concludes that a short-term effect on health would be unlikely in the case of consumption including all of the peel and not expected in the case of peeling orange prior to consumption.

Please refer to the section below on Substances that might be genotoxic for HSE's conclusions regarding potential genotoxicity.

Table 10e: Oranges (GB)

Pesticide	Highest residue (mg per kg)	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source
Imazalil	2.2	0.050	0.29 (infants) 0.22 (toddlers) 0.16 (4 to 6 year olds) 0.11 (7 to 10 year olds) 0.080 (11 to 14 year olds) 0.067 (15 to 18 year olds) 0.056 (vegetarian)	0.1 (General population) 0.05 (Pregnant and nursing female)	EFSA, 2007

In Table 10e, 'critical group intake' means the highest intake of all 10 consumer groups, or intakes for all consumer groups that exceed the ARfD.

Oranges flesh after peeling

The dietary intakes calculated based on the peel being removed before consumption indicate that there are no exceedances of the ARfD. In this case, an effect on health is not expected. This is because it has been reported that only 7 percent of the residue of imazalil remains (EFSA, 2018) in the flesh when the fruit is peeled. This approach is in line with the risk assessment performed when the MRL was established. The below risk assessment only applies if all of the peel is consumed.

Whole orange, including all the peel

HSE consider that an effect on health would be unlikely. Any effect on health would depend on a number of factors which would need to come together at the same time (the high residue found in the sample being consumed by the most critical consumer, a particularly high residue in an individual fruit, peak consumption levels (97.5th percentile), and a large proportion of peel from the fruit being consumed). HSE are presenting the following risk assessment which assumes all of the peel is consumed. However, HSE considers this to be a 'worst case' form of assessment for the reasons explained above.

Pregnant and nursing women

The intakes for 11 to 14 year old children, 15 to 18 year old children and vegetarians exceeded the ARfD (for pregnant and nursing females). The highest intake was for 11 to 14 year old children.

If 11 to 14 year old children ate or drank large portions of oranges containing imazalil at 2.2 mg per kg, their intake of imazalil could be 160 percent of the Acute Reference Dose of 0.05 mg per kg bw per day. This intake is 62 times lower than a dose which caused no observed adverse effect in a 13 day repeat dose rabbit developmental study (the ARfD is based on a NOAEL of 5 mg per kg bw per day for foetal toxicity

(increased resorptions; a marker of early foetal deaths)). 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. HSE consider the reduced factor of 62 still sufficient to make an effect on health unlikely.

General population

The intakes for infants, toddlers, 4 to 6 year old children and 7 to 10 year old children exceed the acute reference dose of 0.1 mg per kg bw per day (for the general population excluding pregnant and nursing females). The highest intake was for infants.

If infants ate or drank large portions of orange containing imazalil at 2.2 mg per kg their intake of imazalil could be 292 percent of the Acute Reference Dose of 0.1 mg per kg bw per day. This intake is 34 times lower than a dose which caused no observed adverse effects in a rabbit developmental study, used as the basis of the ARfD (the ARfD is based on a NOAEL of 10 mg per kg bw per day for reduced bodyweight gain and food consumption in dams). 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. It is noted that an ARfD based on maternal toxicity in a developmental study with repeated dosing (13 days) might be over-protective for the general population. HSE consider the reduced factor of 34 still sufficient to make an effect on health unlikely.

This risk assessment assumes that peel of oranges is consumed. However, if the peel is not consumed then the risk assessment on which the MRL is based applies (see the assessment above under ‘orange flesh after peeling’). Then intakes in all groups are within the ARfD and an effect on health is not expected.

Table 10f: Oranges (GB)

Pesticide	Highest residue (mg per kg)	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source
Lambda-cyhalothrin	0.07	0.0016	0.0093 (infants) 0.0070 (toddlers) 0.0050 (4 to 6 year olds)	0.005	EU, 2016

In Table 10f, ‘critical group intake’ means the highest intake of all 10 consumer groups, or intakes for all consumer groups that exceed the ARfD.

Comment on risk assessment

Residues of lambda-cyhalothrin are indistinguishable analytically from gamma-cyhalothrin. Based on the pesticide uses on citrus, HSE expect that the residues in

these Egyptian or Spanish oranges comes from use of lambda-cyhalothrin (the least toxic form) rather than gamma-cyhalothrin, so the risk assessment has been undertaken using the ARfD for lambda-cyhalothrin (which is two-fold higher than the ARfD for gamma-cyhalothrin).

Oranges flesh after peeling

The dietary intakes calculated based on the peel being removed before consumption indicate that there are no exceedances of the ARfD. In this case, an effect on health is not expected. This is because it has been reported that only 25 percent of the residue of cyhalothrin remains (EFSA, 2015) in the flesh when the fruit is peeled. This approach is in line with the risk assessment performed when the MRL was established.

The below risk assessment only applies if all of the peel is consumed.

Whole orange, including all the peel

HSE consider that an effect on health would be unlikely. Any effect on health would depend on a number of factors which would need to come together at the same time (the high residue found in the sample being consumed by the most critical consumer, a particularly high residue in an individual fruit, peak consumption levels (97.5th percentile), and a large proportion of peel from the fruit being consumed).

The intakes for infants, toddlers and 4 to 6 year olds exceeded the ARfD. The highest intake was for infants.

If infants ate or drank large portions of oranges containing lambda-cyhalothrin at 0.07 mg per kg their intake of lambda cyhalothrin could be 186 percent of the ARfD. This intake is 54 times lower than a dose which caused no observed adverse effects in a 1 year oral toxicity study in dogs with lambda-cyhalothrin. 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. HSE consider the reduced factor of 54 still sufficient to make an effect on health unlikely.

However, if the peel is not consumed then the risk assessment on which the MRL is based applies (see the assessment above under ‘orange flesh after peeling’). Then intakes in all groups are within the ARfD and an effect on health is not expected.

Table 10g: Oranges (GB)

Pesticide	Highest residue (mg per kg)	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source
Thiabendazole	1.3	0.029	0.17 (infants) 0.13 (toddlers)	0.1	EU, 2017 and associated EU Review Report

In Table 10g, 'critical group intake' means the highest intake of all 10 consumer groups, or intakes for all consumer groups that exceed the ARfD.

Comment on risk assessment

Oranges flesh after peeling

The dietary intakes calculated based on the peel being removed before consumption indicate that there are no exceedances of the ARfD. In this case, an effect on health is not expected. This is because it has been reported that only 4.7 percent of the residue of thiabendazole remains (EFSA, 2021) in the flesh when the fruit is peeled. This approach is in line with the risk assessment performed when the MRL was established.

The below risk assessment only applies if all of the peel is consumed.

Whole oranges, including all the peel

HSE consider that an effect on health would be unlikely. Any effect on health would depend on a number of factors which would need to come together at the same time (the high residue found in the sample being consumed by the most critical consumer, a particularly high residue in an individual fruit, peak consumption levels (97.5th percentile), and a large proportion of peel from the fruit being consumed).

HSE are presenting the following risk assessment which assumes all of the peel is consumed. However, HSE considers this to be a 'worst case' form of assessment for the reasons explained above.

The intakes for infants and toddlers exceeded the ARfD. The highest intake was for infants.

If infants ate or drank large portions of oranges containing thiabendazole at 1.3 mg per kg, their intake of thiabendazole could be 172 percent of the ARfD. This intake is 58 times lower than a dose which caused no observed adverse effect in a developmental study in rats over 11 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. HSE consider the reduced factor of 58 still sufficient to make an effect on health unlikely.

This estimate assumes that peel of oranges is consumed. However, if the peel is not consumed then the risk assessment on which the MRL is based applies. Then intakes in all groups are within the ARfD and an effect on health is not expected.

Table 10h: Rice (GB)

Pesticide	Highest residue (mg per kg)	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source
Chlorpyrifos	0.007	0.000043	0.000088 (toddlers) 0.000077 (7 to 10 year olds) 0.000076 (4 to 6 year olds) 0.000060 (15 to 18 year olds) 0.000058 (11 to 14 year olds) 0.000053 (vegetarian) 0.000043 (adults) 0.000039 (infants) 0.000027 (elderly own home) 0.000013 (elderly residential)	No toxicological reference values established	EU, 2020

In Table 10h, 'critical group intake' means the highest intake of all 10 consumer groups, or intakes for all consumer groups that exceed the ARfD.

Comment on risk assessment

EFSA (2019) has indicated that no toxicological reference values could be determined for chlorpyrifos due to concerns over genotoxicity. Additionally, EFSA raised concerns over neurological effects in the developing foetus and young child. Chlorpyrifos is not approved in the EU and UK and pesticide products containing chlorpyrifos were withdrawn in 2020.

HSE considers that for short-term risk assessment, an indicative toxicological reference value of 0.0003 mg per kg bw can be used based on the LOAEL set by EFSA for a developmental neurotoxicity study and applying a safety factor of 1000 to account for the severe nature of the findings (effects on brain measurements in a developmental neurotoxicity study). Toxicologists usually use safety factors of between 100 and a 1000 when a NOAEL cannot be determined within a study. HSE proposed indicative toxicological reference value is conservative as it uses the highest uncertainty factor applied by toxicologists and is based on a LOAEL from a study with repeated dosing. Overall, HSEs approach is considered precautionary in protecting the nervous system in the developing foetus and child.

None of the intakes exceeded the HSE proposed indicative toxicological reference value for short-term assessment. Based on the low short-term intakes, HSE concludes that a short-term effect on health is not expected.

Please refer to the section below on Substances that might be genotoxic for HSE's conclusions regarding potential genotoxicity.

Short-term dietary risk assessment – multiple assessments needed following screening assessment of samples

Samples which contain more than one pesticide from the groups HSE consider, and where a more detailed assessment was needed following screening:

- triazoles
- organophosphates and, or carbamates
- captan and folpet
- DDAC and BAC
- chlormequat and mepiquat

Table 11: Dried beans (GB)

Values represent the critical consumer group (infants) for a sample containing this combination of active ingredients.

Pesticide	Residue (mg per kg)	Intake (mg per kg bw)	Intake Percentage ARfD	ARfD	Source
Dichlorvos	0.06	0.0011	55.0	0.002	EFSA, 2006
Chlorpyrifos	0.009	0.00016	Not applicable	Not established	EU, 2020

The total (sum of the dietary intakes of each pesticide taken together in that commodity (when expressed as a percentage of its own reference value)) could not be calculated in this screening assessment.

Comment on risk assessment:

This sample of dried beans (brown beans) contained residues of dichlorvos and chlorpyrifos (both organophosphate insecticides). The known effect of each of these pesticides is on acetyl cholinesterase (AChE). This was the basis for the previous ARfD of 0.005 mg per kg bw (EU, 2015) set for chlorpyrifos. The HSE proposed indicative toxicological reference value for short-term assessment for chlorpyrifos was based on reported changes in brain measurements in a developmental neurotoxicity study (please see single substance assessment reported above). The relationship between the reported changes in brain morphometry and AChE inhibition is unclear. The estimated highest intake of chlorpyrifos represents 3.3 percent of the previous ARfD based on AChE inhibition (EU, 2015) and the estimated highest intake of dichlorvos represents 55 percent of its own ARfD.

Therefore, the presence of these organophosphate insecticides together is not expected to inhibit acetyl cholinesterase.

Note, this sample also contained the high residue of lambda-cyhalothrin at 4.6 mg per kg, well above the level of the MRL of 0.05 mg per kg. The potential for adverse effects based on this residue of lambda-cyhalothrin is discussed above in the single substance risk assessment for this finding in this sample of dried beans. Further pesticides (which do not inhibit AChE) were also found in the sample, namely cypermethrin, imidacloprid and fosetyl aluminium. Fosetyl aluminium is not acutely toxic but the others have the potential to exert neurotoxicity via modes of actions other than AChE inhibition (EFSA, 2019). Therefore, for this particular sample, HSE have taken an approach to assess the additive exposure of all of the pesticides present in the sample that, based on EFSA, 2019, could impact the nervous system, particularly the motor, sensory and autonomic divisions. Across these pesticides there are three different modes of actions groups, covering (1) lambda-cyhalothrin and cypermethrin, (2) imidacloprid, and (3) dichlorvos and chlorpyrifos. Whilst lambda-cyhalothrin is present in the sample at 4.6 mg per kg, these other pesticides cypermethrin (0.02 mg per kg), imidacloprid (0.04 mg per kg), dichlorvos (0.06 mg per kg) and chlorpyrifos (0.009 mg per kg), were present at much lower levels. Given their relative prevalence and that the highest intakes of each of these pesticides are well below their own respective ARfDs (or other reference value, see the above value of 3.3 percent for chlorpyrifos), HSE concludes that lambda-cyhalothrin is the dominant contributor to the assessment. See Table 11 and Table 10b above for dietary intakes of chlorpyrifos, dichlorvos and lambda-cyhalothrin for this sample of brown beans. The highest dietary intakes of each of imidacloprid and cypermethrin in this sample were calculated to be less than 1 percent of their respective ARfDs. As such, the conclusion above based on the single substance assessment for lambda-cyhalothrin is still considered valid for this combined assessment. The possibility of an impact on health is not excluded for this residue (please refer to the conclusion above for the single substance assessment above for lambda-cyhalothrin).

Please refer to the section Substances that might be genotoxic for HSE's conclusions regarding potential genotoxicity for chlorpyrifos and dichlorvos. The other pesticides in the brown beans sample are not considered to be genotoxic.

Long-term dietary risk assessments needed following screening assessment of samples

As noted in HSE's assessment of risk total long-term dietary assessments across all commodities are not performed for these quarterly assessments. The issue is more fully considered in regulatory contexts pre-authorisation and at the time of MRL review. Then the issue is considered across all commodities (so more precautionary) by pesticide levels determined in GAP compliant trials, intended to address highest likely residues that might arise following pesticide use according to label recommendations.

However, for the HSE quarterly assessments, HSE do perform a screening exercise for all of the residues found for an individual commodity to see if the long-term intakes (commodity by commodity) show any indication of exceedance of the ADI. If an exceedance was observed, then HSE would consider further, and HSE would present a more detailed risk assessment.

In HSE's long-term exposure screening assessment for this report NI and GB samples were combined.

Aside from copper, none of the individual commodity long-term exposure screening assessments performed in this quarter (for each of the pesticides found in this report) indicated potential for adverse long-term health effects. HSE assessed the dietary intakes to be below the ADI or other established long-term health-based reference value.

A detailed assessment is presented below for copper, as copper was found in all samples of bovine liver and the screening assessment indicated the need for a more detailed form of risk assessment.

Table 12: Liver (GB)

Pesticide	Median residue	Pesticide	Median residue	Pesticide	Median residue
Copper	110.5	0.052	0.26 (toddlers) 0.25 (infants) 0.076 (elderly own home) 0.066 (11 to 14 year olds) 0.053 (elderly residential) 0.052 (adult) 0.048 (7 to 10 year olds) 0.038 (4 to 6 year olds) 0.032 (15 to 18 year olds) (no consumption reported for vegetarians)	0.15	EU, 2018

In Table 12, 'critical group intake' means the highest intake of all 10 consumer groups, or intakes for all consumer groups that exceed the ADI.

Comment on risk assessment

The risk assessment for copper is complex, since copper is an essential trace element and nutrient in people's diets. The body has natural homeostatic mechanisms that regulate copper. As part of this hepatic (liver) sequestration functions as a protective mechanism. Therefore, the most relevant nature of the potential toxicity needs to come from long term studies that consider hepatic retention of copper as well as the potential for adverse effects. International evaluations have set an ADI, as reflected in the above tabulated HSE long term exposure assessment but not an acute reference dose.

Residues in bovine liver

Intake of animal feed, where copper is used as a supplement, is expected to be the reason for these high residues in liver, all above the GB MRL of 30 mg per kg. Total levels of copper in animal liver will be as a result of copper supplementation and wider dietary exposure. Copper exposure and liver accumulation is a complex and multi-factorial issue. There will be fluctuations across the year in the exposures of cattle to copper due to natural variation in forage, variation in mode and level of copper supplementation in animal feed and copper will vary in different sources of liver, and also depending on cattle age, sex and breed. Other components in the animal diet can impact copper absorption and accumulation in the liver.

Whilst the GB MRL is at 30 mg per kg, reflecting an expectation of appreciable levels of copper in liver, the EU has recently raised the EU MRL from 30 mg per kg to 300 mg per kg in bovine liver. The EU MRL is higher in bovine and lambs' liver than other

forms of liver. This is based on the assessment by EFSA (2025), following the EFSA 2023 Scientific Committee Opinion on Health Based Guidance Values for copper (EFSA, 2023).

Toxicity assessment

The GB ADI of 0.15 mg per kg bw per day (set by EFSA, 2018), is in line with that set as a safe upper level (SUL) set by the UK Expert Committee on Vitamins and Minerals in 2003 of 0.16 mg per kg bw day. The approaches underpinning these levels, were set based on relatively short-term human studies and animal data (a 90-day rat study with an established NOAEL of 16 mg copper per kg of bw per day). These values are also in line with values established by the WHO for copper upper level intake (WHO, 1996) based on human data for infants.

EFSA's latest Scientific Opinion (EFSA, 2023) on Health based Guidance Values for copper aims to protect against copper accumulating in the liver on a chronic basis to levels that are eventually harmful. As such the new ADI proposed by EFSA (2023) is about half the level of the previous health-based guidance values explained above.

The new EFSA ADI (2023) of 0.07 mg per kg bw per day is based on short-term studies of copper balance in human volunteers and assuming that copper would continue to accumulate. The principle behind this is that hepatic sequestration of copper is initially protective against adverse effects, but subsequent hepatic retention from continuous exposure at elevated levels is a prerequisite for copper toxicity and constitutes an early biological process within the pathway to toxicity.

The UK Committee on Toxicity (COT) discussed the draft EFSA Opinion when it was out for consultation and was broadly supportive of the new ADI and for using the homeostatic approach as a predictor of the effects of longer-term exposure.

Therefore, the UK (HSE and FSA) are supportive of the approach recently taken by EFSA in the derivation of the new EU ADI of 0.07 mg per kg bw per day.

Consumer exposure

The highest intakes above, represent 'high level average' chronic consumption intakes. To be protective of high-level consumers of foods, the risk assessment addresses the 97.5th percentile consumer, but this is for only those that are consumers of liver rather than the population as a whole. Each consumer's recorded average over the survey period contributes to deriving the high-level estimate, the 97.5th percentile. However dietary intakes for chronic assessment are recognised as uncertain because they seek to extrapolate from short-term surveys to provide an estimate of long term (lifetime) exposure. Especially for some, perhaps infrequently consumed, foods such as liver, the model chronic consumption estimates may be an overestimate. The critical group is toddlers, and underpinning survey data represent consumption recorded over a four-day period. Any consumption in this short period

of the survey might not be sustained on a long term (lifetime) basis. As such the above risk assessment estimates for liver are considered highly conservative.

More modern consumption data (than used in the UK NEDI model) for total liver consumption are available, which reflects a larger and more recent data set (years 1 to 11 of the National Diet and Nutrition Survey (NDNS) and the Diet and Nutrition survey of infants and young children (DNSIYC, 2011). The numbers of consumers eating bovine liver represented in this survey are much lower than for other forms of liver consumption (such as lambs' liver or pork liver which might be consumed as pate). These data are further discussed below under "Implications of exceedance of the ADI values".

Implications of exceedance of the ADI values

The above intakes are especially markedly higher for infants and toddlers than other consumers on a bodyweight basis. These dietary intakes (and how they compare to the EFSA, 2018 and EFSA, 2023 ADIs) are represented below.

HSE model (total liver consumption): 354 percent of the ADI (of 0.07 mg per kg bw per day) in infants and 377 percent of the ADI (of 0.07 mg per kg bw per day) in toddlers, or 165 percent of the ADI (of 0.15 mg per kg bw per day) in infants and 176 percent of the ADI (of 0.15 mg per kg bw per day) in toddlers.

FSA consumption data (total liver consumption) based on NDNS years 1-11 and DNSIYC: 221 percent of the ADI (of 0.07 mg per kg bw per day) in infants and 114 percent of the ADI (of 0.07 mg per kg bw per day) in toddlers, or 103 percent of the ADI (of 0.15 mg per kg bw per day) in infants and 53 percent of the ADI (of 0.15 mg per kg bw per day) in toddlers.

HSE has deduced that from the NDNS years 1-11 and DNSIYC data, only two out of the 43 infant and none out of the 18 toddler consumers recorded eating all forms of liver were consuming bovine liver. This compared to 93 and 60 infants and toddlers respectively consuming liver (all forms) in the HSE model data reflecting that consumption of liver, especially non pate forms, has overall reduced in more recent years.

EFSA (2025) discussed evidence of higher copper requirements in infants and that copper utilisation in children is also higher than adults to meet the higher nutrient demands during the age range of physical growth. EFSA observed that there is uncertainty about the levels of copper intake that begin to exceed the higher requirements for growth in children. In concluding, EFSA considered that dietary copper intake is variable, and it is not expected to be maintained at levels that continuously exceed nutritional requirements throughout childhood. EFSA's assessment (2025), which formed the basis of the proposed upwards revision of the MRL in copper in bovine liver from 30 mg per kg to 300 mg per kg, considered copper from all dietary sources, including but not limited to animal products such as liver. Overall, EFSA (2023) has concluded that the modest exceedances of the ADI they identified in younger age groups would not pose a lifetime risk for copper toxicity and therefore were not considered to be of concern to health.

Conclusion

HSE concludes that the estimated dietary long-term intakes from the consumption of liver are uncertain. The exceedance by infants and toddlers are for an ADI which is based on copper accumulation in the liver over time by adults intended to prevent accumulation of copper in humans. Copper requirements are higher for infant and young children, and EFSA (2023) concluded that, while they identified modest levels of ADI exceedance in infants and young children, copper intakes were not expected to be maintained at levels that continuously exceeded nutritional requirements throughout childhood. Therefore, the exceedances of the ADI they identified in infants and young children would not pose a lifetime risk for copper toxicity and therefore, were not considered to be of concern. Similarly, potential exceedances of the ADI are estimated in infants and toddlers who eat this bovine liver, which are modest when considering the new consumption data from the FSA, and intakes are much lower in older age groups. Therefore, HSE considers that an effect on health is not expected.

Substances that might be genotoxic

Read an explanation of genotoxicity in the section on HSE's assessment of risk.

During regulatory assessment, careful consideration is given to any pesticides that may exhibit any potential to be genotoxic (able to damage genetic material) in live animals, so HSE need to consider the significance to the consumer when these residues are found. There are a small number of examples of older pesticides that might be genotoxic, where modern data to investigate the true genotoxic potential is not expected to be made available. It is likely that these will only be found in imported foods. For many of these old pesticides, the toxicological reference doses are low and HSE uses low reporting limits to ensure that these residues are found even at very low levels, as HSE know they are of particular interest to consumers. The evaluation of possible health implications for these findings is complex as tests for genotoxicity are commonly performed at higher doses (orders of magnitude higher) than the dietary exposure levels that are assessed in HSE reports. As such it is difficult to conclude specifically, and to extrapolate the findings in the laboratory to the context of findings in the HSE monitoring and the presence of residues at low levels in foods. Where relevant some reassurance that any risks are likely to be small can be gained if increased cancer incidence, which may be due to gene mutations, does not occur in long term animal feeding studies, designed to detect such observations. Where relevant HSE will indicate this. Due to the uncertainty about the potential for genetic damage (genotoxicity) at low doses, HSE will always conclude that on a precautionary basis any findings of genotoxic substances in food are undesirable.

Assessment of genotoxicity (Q1 2026) and conclusions:

Substances that might be genotoxic

Residues found in this report that have genotoxic potential (concluded from laboratory studies on animals): dichlorvos

Dichlorvos was previously evaluated by the UK Committees on Mutagenicity and Carcinogenicity, which concluded that dichlorvos should be regarded as genotoxic at initial sites of contact in the body such as the oesophagus (gullet or food pipe) and there was some limited evidence of causing some tumours in studies in mice. They advised that exposure to dichlorvos should be as low as reasonably practicable. Therefore, any residue finding of dichlorvos is undesirable. However, the dose levels that caused small numbers of tumours in mice following exposure over a lifetime were more than 18,000 times higher than estimated acute intakes for consumption of these dried beans (for the residue finding of dichlorvos in brown beans outlined in this report) and therefore any risk is expected to be low.

Conclusions: HSE conclude that any residue finding of dichlorvos is undesirable due to its genotoxicity and limited evidence for carcinogenicity. However, HSE consider any risks of adverse health effects are low at the highest levels of exposure after eating large portions (97.5th percentile consumption) of dried beans containing the level of dichlorvos found in this report.

Residues found in this report where toxicological data are suggestive of genotoxicity but not certain: chlorpyrifos and carbofuran

It is unclear whether these pesticides can damage genetic material (are genotoxic).

Regarding carbofuran and chlorpyrifos, there is some evidence from studies performed in vitro and, or in vivo that they may be genotoxic. For both of these substances, whilst there are negative results in the available in vivo studies, the currently recommended in vivo follow up studies, that may clarify the genotoxic potential have not been performed. There is some reassurance that risks of developing ill health effects following single or repeat exposures are likely to be low, since they did not cause cancer in cancer or other long-term studies with repeat daily doses in animals over their lifespan. The doses used in these studies were orders of magnitude higher than the exposures estimated in this assessment. It is not known if lower doses which are not toxic also have this effect.

Conclusions: Overall, HSE conclude that on a precautionary basis any residue finding of carbofuran and chlorpyrifos is undesirable due to the uncertainty regarding genotoxicity at low doses; however, HSE consider any risks of adverse health effects are low after eating large portions (97.5th percentile consumption) of the foods containing the levels of these pesticides found in this report.

Issues arising in this report and plans for the quarter 2 2026 report

Issues arising in this report

Chlorate

HSE 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 or UK. However, HSE are confident that the residues detected come from use of chlorine-based disinfectants used to maintain microbiological safety (control microorganisms that cause food poisoning). HSE are not advising that food companies change their existing practices because of our findings, but they should be aware about the ongoing discussion in this area.

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

How chlorate MRLs take account of use of biocides

The footnote included in the chlorate MRLs allow for chlorate residues incurred during the processing of food (from treated water or processing aids, such as biocides). The footnote exceptionally specifies that for considering compliance with chlorate MRLs, simple types of processing, such as packing, washing, chopping and freezing can be considered. Chlorate in irrigation water is allowed for in the MRLs as set and no further adjustment can be considered.

The responsibility for providing evidence showing that residues from processing can be considered, lies with the food business operator, and so HSE will be interested to see such evidence where appropriate. HSE will decide whether the footnote can be applied and if so, this will be reflected in the quarterly report.

The Food and Biocides Industry Group have produced more detailed information and guidance on this topic which is available on the Chilled Food Association's website.

Infant food

Infant food MRLs are set under separate legislation managed by UK health departments. The footnote that applies to other foods cannot be used for infant foods, although residues occur for the same reasons. UK health departments are working with HSE and FSA to resolve this.

Sanitisers

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 contain small amounts of chlorate. The FSA has worked with industry who promote best practice and guidance for use of sanitisers.

Drinking water

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.

Microbiological safety of food

The HSE is 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 to allow for 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 establishes appropriate health-based guidance values for chlorate exposure to protect against acute and chronic risks to health.

Fosetyl-Al (sum)

The full residue definition is "fosetyl-Al (sum of fosetyl, phosphonic acid and their salts, expressed as fosetyl)". Throughout this report that definition is reflected as fosetyl (sum). All the residues reported as fosetyl (sum) in this report were detected as phosphonic acid.

Fosetyl-Al breaks down to phosphonic acid, but phosphoric acid can also be a residue left by use of pesticides containing disodium phosphonate or potassium phosphonates. Additionally, products sold as fertilizers also can contain or break down to phosphonic acid. And finally, phosphonic acid also occurs naturally in the environment. The presence of phosphonic acid does not necessarily mean that a pesticide was used. Those producing food need to be aware that the use of products that contain phosphonic acid or break down to phosphonic acid may lead to produce which breaches the MRL.

This pesticide can only be detected using a single residue method technique.

Dichlorodiphenyltrichloroethane (DDT)

The use of DDT is banned or heavily restricted in many countries. It is not allowed for use on food crops anymore, 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 HSE do expect, and do see, occasional DDT residues in the monitoring results. Overall, the incidence and the size of residues have fallen steadily over time, which is what HSE would expect. In recent years none of the findings were unusual, unexpected or of concern. HSE can tell from the chemical form that HSE detect whether the residues HSE have found are from historic use (which is what HSE usually find). Historic use is indicated by the detection of DDE which is a break down product of DDT. HSE explain this every time HSE publish DDT results to try to make it as clear as HSE 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 HSE 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, HSE take care to ensure HSE look thoroughly at this, and the FSA also actively involved in the considerations.

Dithiocarbamates residues

Dithiocarbamate residues are determined as carbon disulphide (CS_2), which is a common product from different dithiocarbamate pesticides. The MRL is set as dithiocarbamates expressed as (CS_2), including maneb, mancozeb, metiram, propineb, thiram and ziram.

For the risk assessment, HSE present a range, including a least worst-case option through to a worst-case option. This is to give an indication of the impact of various possible scenarios on the conclusion of the risk assessment for a sample under consideration. For the least worst-case option, HSE will consider the risk assessment for maneb, as this has the highest ARfD of all the dithiocarbamate fungicides. For the worst-case assessment HSE take a precautionary approach presenting the risk assessment for thiram (and also for metiram for NI samples, since an ARfD has been set for metiram in the EU).

For short-term assessment, the dithiocarbamate residue is calculated by assuming the residue is derived from thiram (a molecular weight conversion is applied to estimate the level of residue based on thiram) and this is compared to the ARfD for thiram. A similar approach is taken to the assessment for metiram and maneb. In the worst case assessment, if the ARfD for thiram is exceeded, it might be possible for additional laboratory analysis to determine if the residue could have resulted from either thiram, propineb or ziram. The latest analytical techniques can now determine the possible source of CS_2 detection. The limitation of these methods is that

individual dithiocarbamates cannot be distinguished from each other within the same class. For example, presence of markers and derivatives associated with ethylenebisdithiocarbamate class can indicate presence of metiram. However, same markers may also mean that other dithiocarbamates of the same class (for example mancozeb) are present.

Where it can be confirmed that a specific dithiocarbamate was applied to the crop, the equivalent residue of the specific active substance is estimated and the intake compared to the appropriate reference dose. HSE might be able to select an alternative worst case dithiocarbamate if the laboratory analyses indicate absence of specific types. The reports will only present a detailed short-term risk assessment when dietary intake exceeds either the thiram or other suitable reference dose.

There is some uncertainty as to whether residues of ziram could be genotoxic (able to damage genetic material). Since 2024, ziram is no longer approved in GB and it is not authorised for use in any GB or NI pesticide products. It is an approved active substance in the EU, and ziram and other dithiocarbamate fungicides are used globally. If it can be confirmed that that a specific dithiocarbamate was applied to the crop, then HSE will take that into account in our risk assessment work. HSE will note the potential for genotoxicity in our reports if it is confirmed that the CS_2 residue analysed in the routine testing is from use of ziram.

The analysis of dithiocarbamates is further complicated by an expectation that some types of crops, such as members of Brassicaceae (for example, watercress) and Caricaceae (for example, papaya) might contain natural sources of sulphur compounds that could be also determined as carbon disulphide during analysis in the laboratory. HSE will consider and explain in the report whether residues reported as dithiocarbamates could be from natural sources or whether they have arisen as a result of fungicide treatment.

Quarter 2 2026 report

Samples collected in GB

In quarter 2 of 2026 HSE will look at results from samples collected in GB for:

- Baby corn / corn on the cob
- Beans with pods
- Bread
- Carrots
- Cauliflower
- Cherry
- Courgettes
- Dried fruit (grapes)
- Grapes
- Kiwi fruit
- Leeks
- Liver (bovine)
- Milk
- Onions (bulb)
- Oranges
- Parsnips
- Pears
- Potatoes
- Poultry meat
- Rice
- Rice cakes
- Rye flour
- Speciality fruit

Samples collected in NI

In quarter 2 of 2026 HSE will look at results from samples collected in NI for:

- Beans (dried)
- Beans with pods
- Carrot
- Cauliflower
- Cherry
- Courgette
- Fish (sea)
- Grapes
- Grapes (dried)
- Kiwi fruit
- Lamb
- Leeks
- Liver (bovine)
- Onions (bulb)
- Oranges
- Pears
- Potatoes
- Poultry meat
- Rice
- Rye flour
- Spring onions

Glossary

This is a ‘standard’ glossary which defines terms used in HSE pesticide residues in food reports. Not all the terms listed here are used in every report.

97.5th percentile consumer

See the definition for High level consumer.

Acceptable daily intake (ADI)

This is the estimate of the amount of a chemical in food which can be consumed every day over a lifetime where 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 to account for possible variation in sensitivity between individuals. The studies from which NOAELs and hence ADIs are derived to allow for any impurities in the pesticide active substance as manufactured, and any toxic breakdown products of the pesticide.

Acetylcholine

Acetylcholine is a neurotransmitter, that acts as a chemical messenger that carries signals through the nervous system. See the definition for cholinergic .

Acetylcholinesterase

This is an enzyme which breaks down acetylcholine and is involved in the regulation of nerve impulses. Inhibition of this enzyme can interfere with nerve transmission function. This is a short-term effect of concern with residues of organophosphate and carbamate pesticides at levels above the Acute Reference Dose (ARfD).

Acute reference dose (ARfD)

The definition of the ARfD is similar to that of the ADI, but it relates to the estimate of 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 European Union (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, for example, the World Health Organization (WHO), 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 HSE 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

HSE commissioned the laboratories to look for and measure, if present certain substances. The name of these is the analyte, it could be a pesticide itself or a product from a pesticide when it is broken down, or metabolised.

Cocktail effect

See the definition for multiple residues .

Codex

The Codex Alimentarius (Latin for “food code”) is a collection of international food standards, guidelines and codes of practice on food safety and food standards.

The Codex Alimentarius, also known as the CAC, is the central part of the Joint Food and Agriculture Organization of the United Nations (FAO)/WHO Food Standards Programme. Established by the United Nations FAO and WHO, it aims to protect consumer health and promote fair practices in food trade.

The Codex Committee on Pesticide Residues (CCPR) is responsible for establishing Codex maximum residue levels (MRLs) for pesticide residues in specific food items or in groups of food. These Codex MRL (CXLs) are internationally agreed food standards. HSE is responsible for assessing and recommending which CXLs are adopted in Great Britain.

COLEAD (Committee Linking Entrepreneurship-Agriculture-Development)

It aims to promote the competitive export of fresh fruit, vegetables, flowers and ornamental plants from Africa, the Caribbean, and Pacific (ACP) countries. 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 2 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 the animal nervous system, processes or structures are considered to be cholinergic if they produce, release or use the neurotransmitter acetylcholine.

Cryogenic milling

In the laboratory, samples are processed at very low temperatures by milling or 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 extend an existing product authorisation so that it covers additional uses not included on the manufacturer's label. There are many reasons why label recommendations of authorised PPPs 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 EAMU process, applicants must provide evidence on residue levels that would arise from the proposed use, and consumer safety is evaluated. EAMU is pronounced "emu" these types of authorisations are also informally called "off labels".

More information on EAMUs can be found here: Extension of Authorisation - Search Page

Genotoxicity

Genotoxicity is the effect of substances (called genotoxins) which can alter or damage the genetic material (DNA, RNA, or chromosomes) within a cell. Cells have the capacity to protect themselves from genotoxic effects by many repair processes, meaning many genotoxic events are corrected before they become detectable as mutations. Where mutations occur, this can lead to cancer or effects that can be passed to unborn children (for example, birth defects, inherited diseases).

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, specifically how products should be used according to the statutory conditions of authorisation 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 allow for 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.

Great Britain

Great Britain is the official collective name of England, Scotland and Wales and their associated islands.

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 HSE 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 the definition for Acute Reference Dose.

In vitro

A test performed in vitro (Latin for “in the glass”) means that it is performed outside of a living organism and usually involves isolated tissues, organs or cells.

In vivo

Latin for “in life” – means live animal studies.

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, or an existing MRL is not sufficient to meet the needs of international trade. All applications for import tolerances need to be assessed for consumer safety by HSE before importing produce into Great Britain with residues that may exceed the GB MRL.

Imported

The tables in the reports record whether the sample was of UK origin or imported into the UK. The meaning of this can vary depending on the commodity. See the definition for origin.

HSE only reports the country of import for produce if this is clear from the packaging or labelling.

INFOSAN (International Food Safety Authority network)

Since the end of the EU transition period, in Great Britain (GB – England, Scotland and Wales), notifications are submitted via FAO/WHO’s International Food Safety Authority network (INFOSAN) of which UK is a member. Non compliances that do not present a food safety risk are not communicated by GB to other countries and there is an expectation that non-compliance notifications will be communicated by the importer/exporter in liaison with the local authority (LA).

NI continues to be part of the EU Rapid Alert System for Food and Feed (RASFF) (See the definition for RASFF) network under the terms of the Windsor Framework so where appropriate will email notifications via the RASFF network, including for non-compliances under Administrative Assistance and Cooperation Network (AAC) procedures.

JMPR

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

Limit of determination

The 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. Note, exceptionally HSE test at levels lower than the LOD MRL to determine incidence of certain pesticides of specific interest.

Limit of Determination – LOD MRL (maximum residue levels set at the LOD)

These are marked by an asterisk (*). For some pesticides and commodities insufficient trials data are available on which to set a MRL or there may be no use of the pesticide on that crop. In these cases, the MRL may be set at a default level for example, at the Limit of Determination (LOD) where analytical methods can reasonably detect and quantify the presence of the pesticide. The Limit of Determination may also be referred to as the Limit of Quantification. In these cases, these MRLs are not based on GAP. Where suitable trials data are available and demonstrate absence of residues, then the MRL can also be set based on GAP as an LOD MRL (*). Also, see the definition for Reporting Limit.

Limit of quantification (LOQ)

The LOQ 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. The Limit of Quantification may also be referred to as the Limit of Determination. Note, following additional validation work, HSE test at levels lower than the legal LOD MRL to determine incidence of certain pesticides of specific interest. Also, see the definition for Reporting Limit.

Lowest observed adverse effect level (LOAEL)

The lowest concentration or amount of a substance, found by experiment or observation, which causes detectable adverse alteration of morphology, functional capacity, growth, development or life span of the target organism under defined conditions of exposure.

Maximum residue level (MRL)

An MRL is the maximum concentration of a pesticide residue (expressed in mg per kg) in or on food or feed of plant and animal origin that is legally tolerated when a plant protection product (PPP) is applied correctly (following GAP).

MRLs apply to most food commodities, although they are not currently applied to fish and produce grown exclusively for animal feed. They are not set specifically for processed commodities. Instead, the MRLs for the raw agricultural commodities apply, with processing factors applied to determine the compliance of processed goods.

An import tolerance is an MRL set on imported food or feed to meet the needs of international trade.

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 greater than the MRL does not automatically imply a hazard to health.

MRLs reflect levels of pesticides that could occur in produce, which has been treated in accordance with GAP. Where pesticides do not give rise to readily detectable residues, or are not authorised for use on 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 and crop combination is set at the limit of detection (effectively zero). Limit of detection MRL (see definition for LOQ MRL) are marked by a '*'.

MRLs are regulated in Northern Ireland under Regulation (EC) 396/2005.

MRLs are regulated in Great Britain under Assimilated Regulation No 396/2005. GB MRLs are listed in the GB MRL Statutory Register.

Maximum residue levels set at the LOQ (LOQ MRL)

See definition for LOQ MRL.

MRL exceedances

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

MRL exceedances and relationship with the ADI and ARfD

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 ADI or ARfD of a particular pesticide. See the definition for ADI and ARfD 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.

Metabolite

A substance formed as a degradation or conversion product from a pesticide when it is metabolised.

Margin of exposure (MOE)

Is a tool used within a risk assessment to evaluate safety concerns arising from the presence of a potentially toxic substance (for example genotoxic or carcinogenic) where no safe intake level can be established.

Multiple residues

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 3 situations. Mixtures may be used in response to specific pest pressures and as part of strategies to minimise pesticide resistance building up on pest populations. HSE consider the possible implications to health of more

than one pesticide being found in samples (sometimes called the ‘cocktail effect’). Refer to ‘Multiple residues’ under HSE risk assessment methodology for further details.

National Estimate of Daily Intake (NEDI)

A NEDI is an estimate of the intake of a 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, refer to the Consumer Exposure section of the Data Requirements Handbook on the HSE Pesticide website. Here you will find information and further links.

National Estimate of Short-Term Intake (NESTI)

National Estimate of Short-Term Intake (NESTI). 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 and a high-level consumption (97.5th percentile value) for the food item consumed over a single day. See the definition for variability factor. For further details on the calculation of NESTIs, refer to the Consumer Exposure section of the Data Requirements Handbook on the HSE Pesticide website. Here you will find information and further links.

Neurotoxicity

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

Neurotransmitter

A neurotransmitter is a chemical messenger that carries signals (messages) between nerve cells, or between nerve cells and muscles.

No MRL

In certain cases, an MRL may not have a specific value set. However, all pesticides have had statutory MRLs in place since 2008. If a specific pesticide is not listed, a default MRL equal to the limit of detection (typically 0.01 mg per kg) applies. Some commodities, such as fish, currently do not have pesticide MRLs established, although these may be introduced in the future. A small number of pesticides are exempt from MRL setting (Part 4 of the GB MRL Statutory Register), based on criteria demonstrating very low potential for consumer exposure.

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 the definition for Extensions of Authorisations for Minor Use (EAMUs).

Origin

The Brand Name Annex reports the origins of the samples tested. This can mean different things depending on the commodity.

For fresh, unprocessed fruits and vegetables the origin must be declared on the label.

For other products the country of origin is where the food product was produced, which may not be where the raw material was produced.

For example, butter could be labelled as ‘UK origin’ because although it came from another country (such as New Zealand or Denmark), it was imported in bulk and was split into smaller blocks and packaged in the UK. Bags of mixed salad could be labelled as ‘UK origin’ because that is where the ingredients were prepared and packed, but some ingredients may have been grown outside 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. HSE 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. For some products the origin listed may be the home country of the brand-owner. Unusually, food may be 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 per 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 also known as a 'plant protection product' (PPP) is any substance, preparation or organism which are used to control pests, weeds and diseases. Most pesticides sought by the HSE in its monitoring programme 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, for example, 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 allow for 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 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 threat caused by food or feed.

RASFFs notifications about pesticide residues are sent when a residue is over the MRL allowing for 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 RASFF - Food and Feed Safety Alerts.

Relationship between GAP and MRLs

The MRL can be defined as the maximum concentration of a pesticide residue (expressed as mg per 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 level at which residues will be reported by a laboratory for a survey, as agreed in advance with the laboratory. It can be equal to or higher than the limit of detection (sometimes also referred to as the limit of determination). The limit of detection is the lowest concentration that has been validated to meet strict acceptance criteria and may vary slightly from laboratory to laboratory depending on the equipment available and operating procedures used. The reporting limit should be at or below the MRL. For a small number of pesticides for example, monocrotophos, HSE are looking for the pesticide below the LOQ MRL because HSE are specifically interested in prevalence in food due to the nature of the pesticide. In such cases, tests are performed in the laboratory to support the lower reporting limits by validating the method at lower limits. '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 of pesticides (or biocides). They may not only include the applied pesticide (or biocides) but also degradation or reaction products and metabolites that could be toxicologically significance. The levels or amounts of residues present are expressed in milligrams of the chemical in a kilogram of crop, food, or commodity (mg per 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 a factor of 100) or humans (usually a factor of 10) to the population. These values represent 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; HSE will use ‘safety factor’.

Sample

The nature of what makes a sample is designated in the ‘sampling’ under Assimilated Regulation No Directive 2002/63/EC. For example, a sample of apples must be made up of at least 10 apples and weigh at least 1 kg in total, and a sample of grapes must be made up of at least 5 bunches and weigh at least 2 kg in total.

United Kingdom

The United Kingdom of Great Britain and Northern Ireland refers to the political union between England, Wales, Scotland and Northern Ireland. The UK is a sovereign state, but the nations that make it up are also countries in their own right.

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 (for example, 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, for example, melon, or a small number of units for example, apples and potatoes.