Pesticide residues monitoring programme report

Quarter 2 2026

- Pesticide residue monitoring results from Quarter 2 2026
- Summary and actions taken by HSE

Nov-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 publishes 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 reports 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 is 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 our 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 send 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 427 different pesticides in the Quarter 2 food/drink surveys. In Quarter 2 the samples were collected between the beginning of April to the end of June 2026.

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

- 644 samples
- 23 different foods
- 381 samples contained residues
- 29 samples contained residues above the MRL

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

- 302 samples
- 21 different foods
- 131 samples contained residues
- 22 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. In the case of a finding of chlorpyrifos in Asian (Nashi) pear, HSE concluded that the consumer exposure levels observed here are undesirable and it is not possible to conclude on whether there might be any adverse short term health effects if a large portion of pear containing the level found in this report was eaten. 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 and NI liver samples. 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 our reports for kiwi, liver, oranges, pears, rice and speciality fruits. HSE also needed to consider the potential genotoxic health effects of chlorpyrifos found across 3 samples of rice, Asian pear and lychee. Chlorpyrifos is

not authorised in the UK but can on occasions be found in some imported food. HSE concluded that a risk of an adverse effect on health due to genotoxicity would be low.

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 Q2 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 2025/854.

Table 1a: Overview of the survey results for Q2 GB

Survey title (where samples collected)	Number of pesticides sought	Samples tested	Detailed risk assessment presented?	MRL exceedances (samples)
Baby corn/corn on the cob (GB)	421	24	No	0
Beans with pods (GB)	419	16	No	0
Bread (GB)	422	72	No	0

Carrot* (GB)	399	34	No	0
Cauliflower* (GB)	393	24	No	0
Cherry (GB)	420	35	No	0
Courgettes (GB)	394	24	No	0
Dried fruits (grapes) (GB)	421	24	No	0
Grapes* (GB)	423	40	No	0
Kiwi fruit* (GB)	397	36	No	0
Leeks (GB)	393	24	No	0
Liver* (GB)	123	24	Yes	22
Milk (GB)	118	60	No	0
Onions* (GB)	417	25	No	0
Oranges* (GB)	424	18	Yes	1
Parsnips (GB)	394	18	No	0
Pears* (GB)	427	19	Yes	0
Potatoes* (GB)	424	39	No	0
Poultry meat* (GB)	125	23	No	1

Rice* (GB)	426	17	Yes	0
Rice cakes (GB)	418	18	No	0
Rye flour* (GB)	426	12	No	0
Speciality fruit (GB)	420	18	Yes	5

Table 1b: Overview of the survey results for Q2 NI

Survey title (where samples collected)	Number of pesticides sought	Samples tested	Detailed risk assessment presented?	MRL exceedances (samples)
Beans (dried)* (NI)	401	12	No	0
Beans with pods (NI)	398	9	No	0
Carrot* (NI)	410	9	No	0
Cauliflower* (NI)	410	12	No	0
Cherry (NI)	406	10	No	1
Courgettes (NI)	398	9	No	0
Dried fruits (grapes) (NI)	398	12	No	0
Fish (sea) (NI)	40	12	No	0
Grapes* (NI)	398	9	No	0

Kiwi fruit* (NI)	406	18	Yes	2
Lamb (NI)	40	15	No	1
Leeks (NI)	397	10	No	0
Liver* (NI)	49	24	Yes	17
Onions* (NI)	410	9	No	0
Oranges* (NI)	406	15	Yes	0
Pears* (NI)	410	15	No	0
Potatoes* (NI)	410	18	No	0
Poultry meat* (NI)	49	36	No	1
Rice* (NI)	403	18	No	0
Rye flour* (NI)	410	18	No	0
Spring onions (NI)	409	12	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:

- One sample of UK parsnips that contained 1,4-Dimethylnaphthalene.
- One sample of UK spinach that contained cypermethrin (sum).

An update will be provided in the next quarter.

Follow-up from previous reports

HSE enforcement investigation has been completed for the possible unauthorised uses from Quarter 2 of 2026 and from Quarter 3 of 2025 in the following samples:

- 3140/2026 and 0589/2026 Leeks containing dimethomorph at levels of 0.02 and 0.01 (MRL = 1.5). HSE found no evidence of unauthorised use. HSE identified that potatoes were grown in a field directly neighbouring the leek crop. Given that ametoctradin was also detected in both samples, HSE concluded that the possible explanation for these residues is spray drift from an authorised use on the neighbouring field.
- 5730/2025 Lady Emma Strawberries containing ethirimol 0.02 mg per kg (MRL = 0.2 mg per kg). Ethirimol is a pesticide in its own right but also a metabolite of bupirimate which is authorised for use on strawberries. HSE concluded the result was not indicative of unauthorised use.
- 1373/2025 Sweetheart Cabbage containing propyzamide 0.01 mg per kg (MRL = 0.01*). HSE found no evidence of unauthorised use. HSE identified that there was an application on another crop of a product containing propyzamide two days before the same sprayer made an application to the cabbage field. Although the sprayer was cleaned in between applications HSE has concluded that propyzamide may have remained in the equipment.
- 1359/2025 British Plums containing flonicamid (sum) 0.01 mg per kg (MRL 0.3 mg per kg). HSE found no evidence of unauthorised use. A possible source of the residue was contamination from the plums being stored with raspberries. No other possible source was identified.

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:

- 2 samples of Spanish organic carrots (GB) contained a residue of chlorate
- one sample of Dutch organic rice cakes (GB) contained a residue of deltamethrin
- one sample of UK organic carrot (NI) contained a residue of chlorate

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:

- one sample of Dutch organic rice cakes (GB) contained a residue of pyrethrins

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, works 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 is responsible for determining whether food is compliant with the law, specifically, whether any pesticide residue found is within the MRL. If a sample is found to not be compliant, HSE will refer it to the relevant enforcement body for example; HSE CRD, FSA or VMD. HSE also 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 presents 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 concludes 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 uses 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 uses 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 presents 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 considers 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 Regulation 2025/854.

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* (GB)	Retail outlets and supply chain	Quarterly	Quarterly
Grapes* (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 (GB) *	Retail outlets	Quarterly	Quarterly
Liver (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* (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
Dried fruits (grapes) (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 Q2 Great Britain and Northern Ireland

The following section outlines a summary of Q2 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 Q2 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
Baby corn/corn on the cob (GB)	24	0	0	0	0	1	0
Beans with pods (GB)	16	8	0	0	2	1	0
Bread (GB)	72	67	0	0	29	1	0
Carrot (GB)	34	22	0	0	14	9	2
Cauliflower (GB)	24	4	0	0	0	3	0
Cherry (GB)	35	35	0	0	35	0	0
Courgettes (GB)	24	19	0	0	14	4	0
Dried fruits (grapes) (GB)	24	14	0	0	14	9	0
Grapes (GB)	40	39	0	0	37	1	0
Kiwi fruit (GB)	36	17	0	0	8	4	0

Leeks (GB)	24	6	0	0	1	3	0
Liver (GB)	24	2	22	0	5	0	0
Milk (GB)	60	0	0	0	0	16	0
Onions (GB)	25	14	0	0	8	9	0
Oranges (GB)	18	16	1	0	17	1	0
Parsnips (GB)	18	14	0	0	12	0	0
Pears (GB)	19	19	0	0	19	0	0
Potatoes (GB)	39	32	0	0	25	0	0
Poultry meat (GB)	23	0	1	0	1	5	0
Rice (GB)	17	8	0	0	7	5	0
Rice cakes (GB)	18	6	0	0	1	6	1
Rye flour (GB)	12	3	0	0	3	9	0
Speciality fruit (GB)	18	7	5	0	6	0	0

Table 3b: Summary of Results for Q2 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)	12	3	0	0	0	0	0

Beans with pods (NI)	9	1	0	0	1	0	0
Carrot (NI)	9	8	0	0	3	1	1
Cauliflower (NI)	12	0	0	0	0	2	0
Cherry (NI)	10	9	1	0	10	0	0
Courgettes (NI)	9	5	0	0	3	1	0
Dried fruits (grapes) (NI)	12	2	0	0	1	5	0
Fish (sea) (NI)	12	0	0	0	0	0	0
Grapes (NI)	9	9	0	0	8	0	0
Kiwi fruit (NI)	18	7	2	0	2	1	0
Lamb (NI)	15	0	1	0	1	1	0
Leeks (NI)	10	0	0	0	0	0	0
Liver (NI)	24	7	17	0	0	0	0
Onions (NI)	9	7	0	0	2	1	0
Oranges (NI)	15	15	0	0	15	0	0
Pears (NI)	15	12	0	0	11	3	0
Potatoes (NI)	18	8	0	0	4	2	0
Poultry meat (NI)	36	0	1	0	0	3	0

Rice (NI)	18	4	0	0	3	2	0
Rye flour (NI)	18	4	0	0	4	14	0
Spring onions (NI)	12	8	0	0	6	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 reliable or indicative processing factor is available, a default factor may be applied. Typically, a default factor of 1 is

applied, however for dried fruit (grapes) a default factor of 5 is 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. If a specific processing factor is not reported for an active substance which has been detected in the processed commodities listed in Table 4a to 4f below, it can be assumed that the default PF of 1 has been applied. Further information can be found at the links below.

In this report, HSE have mostly applied processing factors 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. Alternatively, if HSE have published an assessment which includes a more recently evaluated, reliable and relevant processing factor this can be applied.

Table 4a: Processing factors and MRLs used for bread (wholemeal) (GB)

Food	Pesticide	Processing factor	MRL for unprocessed wheat grain (mg per kg)	Wholemeal flour MRL (mg per kg)
Bread (wholemeal)	Chlormequat	1.1	7	7.7
Bread (wholemeal)	Deltamethrin	0.86	1	0.86
Bread (wholemeal)	Fosetyl aluminium (sum)	1.1	150	165
Bread (wholemeal)	Glyphosate	1.2	10	12
Bread (wholemeal)	Mepiquat	0.94	3	2.82
Bread (wholemeal)	Tebuconazole	0.90	0.3	0.27

Table 4b: Processing factors and MRLs used for bread (all other types) (GB)

Food	Pesticide	Processing factor	MRL for unprocessed wheat grain (mg per kg)	White flour MRL (mg per kg)
Bread	Chlormequat	0.3	7	2.1
Bread	Clopyralid	0.09	3	0.27
Bread	Deltamethrin	0.27	1	0.27
Bread	Flonicamid (sum)	0.67	2	1.34
Bread	Fosetyl aluminium (sum)	0.93	150	139.5
Bread	Glyphosate	0.12	10	1.2

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

Food	Pesticide	Processing factor	MRL for unprocessed grape (mg per kg)	Dried grape MRL (mg per kg)
Dried fruits (grapes)	Acetamiprid	1.3	0.5	0.65
Dried fruits (grapes)	Ametoctradin	3.3	6	19.8
Dried fruits (grapes)	Azoxystrobin	1.3	3	3.9
Dried fruits (grapes)	Boscalid	2.4	5	12
Dried fruits (grapes)	Chlorantraniliprole	3.5	1	3.5

Dried fruits (grapes)	Cyazofamid	0.53	2	1.06
Dried fruits (grapes)	Cyflufenamid	3.4	0.2	0.68
Dried fruits (grapes)	Cypermethrin (sum)	3.3	0.5	1.65
Dried fruits (grapes)	Cyprodinil	1.3	3	3.9
Dried fruits (grapes)	Deltamethrin	5	0.2	1
Dried fruits (grapes)	Difenoconazole	3.6	3	10.8
Dried fruits (grapes)	Dimethomorph	2.7	3	8.1
Dried fruits (grapes)	Ethirimol	5	0.5	2.5
Dried fruits (grapes)	Etofenprox	2	4	8
Dried fruits (grapes)	Fenhexamid	1.9	15	28.5
Dried fruits (grapes)	Fenvalerate	5	0.3	1.5
Dried fruits (grapes)	Flubendiamide	5	2	10
Dried fruits (grapes)	Fluopicolide	5	2	10
Dried fruits (grapes)	Fluopyram	2.9	1.5	4.35
Dried fruits (grapes)	Flupyradifurone	2.5	3	7.5
Dried fruits (grapes)	Flutriafol	5	0.8	4

Dried fruits (grapes)	Fluxapyroxad	4.3	3	12.9
Dried fruits (grapes)	Hexythiazox (any ratio of constituent isomers)	1.4	1	1.4
Dried fruits (grapes)	Imidacloprid	5	1	5
Dried fruits (grapes)	Indoxacarb (sum of indoxacarb and its R enantiomer)	2.7	2	5.4
Dried fruits (grapes)	Iprovalicarb	5	2	10
Dried fruits (grapes)	Lambda cyhalothrin	3	0.08	0.24
Dried fruits (grapes)	Mandipropamid	3	2	6
Dried fruits (grapes)	Mefentrifluconazole	3.7	0.9	3.3
Dried fruits (grapes)	Metalaxyl (sum)	2.8	2	5.6
Dried fruits (grapes)	Methoxyfenozide	2.3	1	2.3
Dried fruits (grapes)	Myclobutanil	5	1	5
Dried fruits (grapes)	Penconazole	1.2	0.5	0.6
Dried fruits (grapes)	Pyraclostrobin	2.9	1	2.9
Dried fruits (grapes)	Pyrimethanil	3.7	5	18.5
Dried fruits (grapes)	Spirotetramat (partial sum)	5	2	10
Dried fruits (grapes)	Spiroxamine	5	0.6	3

Dried fruits (grapes)	Sulfoxaflor	5	2	10
Dried fruits (grapes)	Tebuconazole	1.3	0.5	0.65
Dried fruits (grapes)	Tetraconazole	2.2	0.5	1.1
Dried fruits (grapes)	Trifloxystrobin	3.1	3	9.3
Dried fruits (grapes)	Zoxamide	1.7	5	8.5

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

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 and NI)

Food	Pesticide	Processing factor	MRL for unprocessed rye (mg per kg)	Wholemeal rye flour MRL (mg per kg)
Rye flour (wholemeal)	Azoxystrobin	0.17	0.5	0.09
Rye flour (wholemeal)	Glyphosate	1	10	10

Summary of MRL exceedances for Q2 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 LOD 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 Q2 GB

Table 5a: Liver (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
1869/2026	Calf liver	UK	BAC (sum)	0.2	0.1	No	Yes
1869/2026	Calf liver	UK	Copper	146	30	Yes	Yes
1993/2026	Calves liver	UK	Copper	220	30	Yes	Yes
1994/2026	Calves liver	UK	Copper	219	30	Yes	Yes

2205/2026	Calf's veal liver	the Netherlands	Copper	249	30	Yes	Yes
2215/2026	Veal liver calf’s	the Netherlands	Copper	161	30	Yes	Yes
2216/2026	Calf's veal liver	UK	Copper	243	30	Yes	Yes
2240/2026	Calves liver	UK	Copper	42	30	No	Yes
2246/2026	Calves liver	UK	Copper	164	30	Yes	Yes
2247/2026	Calves liver	UK	Copper	114	30	Yes	Yes
2318/2026	Calves liver	UK	Copper	213	30	Yes	Yes
1868/2026	Ox liver	UK	Copper	65	30	Yes	Yes
1995/2026	Ox liver	UK	Copper	79	30	Yes	Yes
2011/2026	Ox liver	UK	BAC (sum)	0.5	0.1	Yes	Yes
2011/2026	Ox liver	UK	Copper	78	30	Yes	Yes
2206/2026	Ox liver	UK	Copper	100	30	Yes	Yes
2207/2026	Ox liver	UK	Copper	133	30	Yes	Yes
2239/2026	Fresh ox liver	UK	Copper	70	30	Yes	Yes
2457/2026	Ox liver	UK	Copper	66	30	Yes	Yes

2463/2026	Ox liver	UK	Copper	79	30	Yes	Yes
2465/2026	Ox liver	UK	Copper	124	30	Yes	Yes
2466/2026	Ox liver	UK	Copper	83	30	Yes	Yes
2568/2026	Ox liver	UK	Copper	44	30	No	Yes
3012/2026	Ox liver	UK	Copper	31	30	No	Yes

Table 5b: 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
5124/2026	Oranges valencia	Egypt	Cyfluthrin (sum)	0.06	0.02*	Yes	No

Table 5c: Poultry meat (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
2323/2026	Stir fry British duck breast strips	UK	Chlorate	0.06	0.05	No	No

Table 5d: 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
5109/2026	Nashi pear	China	Chlorpyrifos	0.06	0.01*	Yes	Yes
5252/2026	Kumquats	Turkey	Acetamiprid	0.04	0.01*	Yes	No
5252/2026	Kumquats	Turkey	Tebuconazole	0.04	0.02*	No	No
5462/2026	Lychees	China	Bifenthrin	0.1	0.01*	Yes	Yes
5462/2026	Lychees	China	Buprofezin	0.02	0.01*	No	Yes
5462/2026	Lychees	China	Chlorantraniliprole	0.04	0.01*	Yes	Yes
5462/2026	Lychees	China	Chlorfenapyr	0.1	0.01*	Yes	Yes
5462/2026	Lychees	China	Clothianidin	0.04	0.01*	Yes	Yes
5462/2026	Lychees	China	Diflubenzuron	0.06	0.01*	Yes	Yes
5462/2026	Lychees	China	Lambda-cyhalothrin	0.04	0.01*	Yes	Yes
5462/2026	Lychees	China	Lufenuron	0.1	0.01*	Yes	Yes
5462/2026	Lychees	China	Pyraclostrobin	0.03	0.02*	No	Yes
5680/2026	Lychees	China	Bifenthrin	0.1	0.01*	Yes	Yes

5680/2026	Lychees	China	Buprofezin	0.02	0.01*	No	Yes
5680/2026	Lychees	China	Chlorantraniliprole	0.03	0.01*	Yes	Yes
5680/2026	Lychees	China	Chlorfenapyr	0.1	0.01*	Yes	Yes
5680/2026	Lychees	China	Clothianidin	0.05	0.01*	Yes	Yes
5680/2026	Lychees	China	Cyazofamid	0.04	0.01*	Yes	Yes
5680/2026	Lychees	China	Diflubenzuron	0.2	0.01*	Yes	Yes
5680/2026	Lychees	China	Dimethomorph	0.05	0.01*	Yes	Yes
5680/2026	Lychees	China	Dinotefuran	0.02	0.01*	No	Yes
5680/2026	Lychees	China	Flonicamid (sum)	0.1	0.03*	Yes	Yes
5680/2026	Lychees	China	Lambda-cyhalothrin	0.1	0.01*	Yes	Yes
5680/2026	Lychees	China	Lufenuron	0.05	0.01*	Yes	Yes
5680/2026	Lychees	China	Pyraclostrobin	0.1	0.02*	Yes	Yes
5698/2026	Sweet delight lychees	China	Bifenthrin	0.03	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	buprofezin	0.02	0.01*	No	Yes
5698/2026	Sweet delight lychees	China	Chlorantraniliprole	0.1	0.01*	Yes	Yes

5698/2026	Sweet delight lychees	China	Chlorfenapyr	0.07	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	Chlorfluazuron	0.03	0.01	Yes	Yes
5698/2026	Sweet delight lychees	China	Chlorpyrifos	0.03	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	Clothianidin	0.02	0.01*	No	Yes
5698/2026	Sweet delight lychees	China	Cyazofamid	0.05	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	Deltamethrin	0.06	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	Diflubenzuron	0.1	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	Dimethomorph	0.2	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	Dithiocarbamates	0.4	0.05*	Yes	Yes
5698/2026	Sweet delight lychees	China	Famoxadone	0.03	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	Lambda-cyhalothrin	0.07	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	Lufenuron	0.1	0.01*	Yes	Yes

5698/2026	Sweet delight lychees	China	Propamocarb (sum)	0.04	0.01*	Yes	Yes
5698/2026	Sweet delight lychees	China	Pyraclostrobin	0.08	0.02*	Yes	Yes

Summary of MRL exceedances for Q2 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
1947/2026	Royal tioga	Spain	Chlorate	0.1	0.05	Yes	No

Table 6b: Kiwi fruit (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
2986/2026	Hayward	Italy	Thiabendazole	0.016	0.01*	No	No
4332/2026	Hayward	Chile	Phosmet	0.27	0.01*	Yes	Yes

Table 6c: 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
2177/2026	Diced shoulder of lamb	UK	BAC (sum)	1.26	0.1	Yes	No
2177/2026	Diced shoulder of lamb	UK	DDAC (sum)	0.15	0.1	No	No

Table 6d: Liver (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
0522/2026	Ox liver	UK	Copper	41	30	No	Yes
0553/2026	Ox liver	UK	Copper	84	30	Yes	Yes
2135/2026	Ox liver	UK	Copper	47	30	No	Yes
2136/2026	Ox liver	UK	Copper	131	30	Yes	Yes
2137/2026	Ox liver	UK	Copper	139	30	Yes	Yes
2404/2026	Ox liver	UK	Copper	43	30	No	Yes
2872/2026	Ox liver	UK	Copper	67	30	Yes	Yes

2895/2026	Ox liver	UK	Copper	90	30	Yes	Yes
2896/2026	Calf liver	UK	Copper	55	30	No	Yes
2977/2026	Ox liver	UK	Copper	77	30	Yes	Yes
3014/2026	Ox liver	Ireland	Copper	45	30	No	Yes
3016/2026	Ox liver	UK	Copper	49	30	No	Yes
3043/2026	Ox liver	UK	Copper	41	30	No	Yes
3047/2026	Ox liver	UK	Copper	122	30	Yes	Yes
3056/2026	Ox liver	UK	Copper	47	30	No	Yes
3090/2026	Ox liver	UK	Copper	121	30	Yes	Yes
3099/2026	Ox liver	UK	Copper	121	30	Yes	Yes

Table 6e: Poultry meat (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
2388/2026	Duck breast fillets	Ireland	Copper	5.2	5	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.

When HSE contact a supplier, HSE may ask for the following information which should be made available on request. These may include a request for spray records, processing procedures, previous crops grown (crop rotation) and information regarding neighbouring crops or orchards. HSE may also request for further clarification on what plant protection products have been applied to a crop.

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

Supplier responses

A sample of organic lightly salted wholegrain rice cakes was collected on the 11 May 2026 from Morrisons. The sample collected was found to contain pesticide residues below the MRL. The supplier has submitted a statement for inclusion in this report.

Sample ID: 2089/2026

Country of origin: the Netherlands

Residues: deltamethrin 0.03 mg/kg (MRL = 2 mg/kg) and pyrethrins 0.01 mg/kg (MRL = 3 mg/kg)

The supplier response is as follows:

"Organic farming standards restrict the use of synthetic pesticides, but trace residues can occasionally be detected due to factors such as environmental contamination, drift from neighbouring farms, or historical presence in the wider environment.

We take the integrity of our organic products seriously and work closely with our suppliers and certification partners to ensure compliance with organic standards and applicable food safety requirements.

Alongside independent regulatory monitoring, we carry out our own internal testing programme and have had no pesticide detections this year. Based on all available

evidence, we are confident in the quality of our products, and the results pose no safety or health concerns."

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 supplier’s response states that they are working with their organic certifier (the Soil Association) to determine the root cause of the pesticide residues detected. Therefore, no further HSE 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, and
- 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 7: 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
Baby corn/corn on the cob (GB)	24	421	0	0	24	1	HSE has no comments as no residues were found.
Milk (GB)	60	118	59	1	0	16	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 with pods (GB)

Samples tested

16 samples were tested for up to 419 pesticide residues.

Fine beans

- 3 samples were imported from outside the EU

Green beans

- 9 samples were imported from outside the EU

Speciality beans

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

Pesticide residues detected of those sought

- 8 samples 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

2 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 HSE considers for combined risk assessment.

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

Bread (GB)

Samples tested

72 samples were tested for up to 422 pesticide residues.

Ordinary bread: brown

- 3 samples came from the UK

Ordinary bread: other

- 4 samples came from the UK

Ordinary bread: white

- 35 samples came from the UK

Ordinary bread: wholemeal

- 6 samples came from the UK

Speciality bread: bagels

- 6 samples came from the UK

Speciality bread: brioche

- one sample came from the EU

Speciality bread: croissants

- one sample came from the UK
- one sample came from the EU

Speciality bread: crumpets

- 8 samples came from the UK

Speciality bread: muffins

- 3 samples came from the UK

Speciality bread: pancakes

- 3 samples came from the UK

Speciality bread: waffles

- one sample came from the UK

The country of origin of samples may not be the same as the country where the bread was produced. It may be where the bread was processed, where it was 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
- 67 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. One of these samples contained residues that are from pesticides which belong to the same 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 considers combined risk assessments is in HSE risk assessment methodology.

Carrot (GB)

Samples tested

34 samples were tested for up to 399 pesticide residues.

Fresh

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

Pesticide residues detected of those sought

- 12 samples contained no residues of those sought
- 22 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 9 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. We do not expect these residues to have an effect on health, either separately or in combination. The pesticide residues found in each sample do not include more than one of the pesticides from the groups that HSE considers for combined risk assessment.

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

Cauliflower (GB)

Samples tested

24 samples were tested for up to 393 pesticide residues.

Fresh

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

Frozen

- one sample came from the UK
- one sample came from the EU

Pesticide residues detected of those sought

- 20 samples contained no residues of those sought
- 4 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.

Cherry (GB)

Samples tested

35 samples were tested for up to 420 pesticide residues.

Fresh

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

All samples contained residues of more than one pesticide. Some of these residues are from pesticides which belong to the same 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. We would not expect any of these combinations of pesticides in these samples to have an effect on health.

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

Courgettes (GB)

Samples tested

24 samples were tested for up to 394 pesticide residues.

- one sample was imported from outside the EU
- 23 samples came from the EU

Pesticide residues detected of those sought

- 5 samples contained no residues of those sought
- 19 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 HSE considers for combined risk assessment.

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

Dried fruits (grapes) (GB)

Samples tested

24 samples were tested for up to 421 pesticide residues.

Currants

- one sample was imported from outside the EU
- 2 samples came from the EU

Raisins

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

Sultanas

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

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

Pesticide residues detected of those sought

- 10 samples contained no residues of those sought
- 14 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 9 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 residues are from pesticides which belong to the same 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 considers combined risk assessments is in HSE risk assessment methodology.

Grapes (GB)

Samples tested

40 samples were tested for up to 423 pesticide residues.

- 39 samples were imported from outside the EU
- one sample came from the EU

Pesticide residues detected of those sought

- one sample contained no residues of those sought
- 39 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. Two of these samples contained residues that are from pesticides which belong to the same 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 considers combined risk assessments is in HSE risk assessment methodology.

Kiwi fruit (GB)

Samples tested

36 samples were tested for up to 397 pesticide residues.

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

Pesticide residues detected of those sought

- 19 samples contained no residues of those sought
- 17 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 HSE considers for combined risk assessment.

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

Leeks (GB)

Samples tested

24 samples were tested for up to 393 pesticide residues.

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

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

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 HSE considers for combined risk assessment.

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

Liver (GB)

Samples tested

24 samples were tested for up to 123 pesticide residues.

Calf

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

Ox

- 14 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 it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

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

Risk assessments

24 samples of liver contained a residue of copper at a level where HSE wanted to assess whether there would be an effect on health. The highest level detected was 249 mg per kg.

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, with all except two of the samples containing residues above the level of the MRL of 30 mg per kg. The median residue (across GB and NI liver samples in this report) is 81 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 10a 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 World Health Organisation (WHO), the UK Expert Committee on Vitamins and Minerals, and in the EU. For the latter, the European Food Safety Authority (EFSA) (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

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 HSE considers for combined risk assessment.

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

Residues measured above the MRL

The laboratory detected 24 residues above the MRL in liver. Details are available in Table 5a.

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, in co-operation with the FSA, have assessed the residues for risk to health and concluded that their adverse health effects would not be expected in the short or long term for people (including children) who consume liver with residues at the levels found.

Copper is an essential micronutrient for all life including humans and cattle. It is used as a regulated plant protection product (pesticide) in organic and conventional farming. HSE considers it unlikely that the copper residues detected were from pesticide use. The potential source of the copper is from the cattle's diet, where copper can be added to feed as a micronutrient. Copper has a range of other uses and be found naturally in the environment.

HSE recognises the need to review the existing GB MRL and will consider the appropriateness of this level considering the concentrations of copper likely to occur in this commodity.

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

Onions (GB)

Samples tested

25 samples were tested for up to 417 pesticide residues.

Fresh

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

Pesticide residues detected of those sought

- 11 samples contained no residues of those sought
- 14 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 9 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 HSE considers for combined risk assessment.

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

Oranges (GB)

Samples tested

18 samples were tested for up to 424 pesticide residues.

- 15 samples were imported from outside the EU
- 3 samples came from the EU

Pesticide residues detected of those sought

- one sample contained no residues of those sought
- 17 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

Following screening assessment there were two pesticides, imazalil and thiabendazole, found in oranges at levels within the respective MRLs, where the effect on health needed to be considered in more detail. The highest residues were 2.5 mg per kg (imazalil) and 1.5 mg per kg (thiabendazole).

HSE always undertakes assessments that considers 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

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 HSE considers for combined risk assessment.

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

Residues measured above the MRL

The laboratory detected one residue above the MRL in oranges. Details are available in Table 5b.

HSE comments

In the oranges survey, imazalil was detected in 16 samples and thiabendazole in 15 samples. The potential health effects of these residues were considered in more detail. HSE always undertakes short-term assessments for oranges that considers 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

18 samples were tested for up to 394 pesticide residues.

Fresh

- 18 samples came from the UK

Pesticide residues detected of those sought

- 4 samples contained no residues of those sought
- 14 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. One of these samples contained residues that are from pesticides which belong to the same 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 considers combined risk assessments is in HSE risk assessment methodology.

Pears (GB)

Samples tested

19 samples were tested for up to 427 pesticide residues.

- 2 samples came from the UK
- 6 samples were imported from outside the EU
- 11 samples came from 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

One sample of pears contained a residue of lambda-cyhalothrin. This was found at a level (0.05 mg per kg) where HSE wanted to assess whether there would be a short-term effect on health.

Residues of lambda-cyhalothrin are indistinguishable analytically from gamma-cyhalothrin using routine monitoring analytical methods, and the residue could have arisen from application of either gamma-cyhalothrin or lambda-cyhalothrin. As HSE do not know the source of the residue for this sample, HSE has presented 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 ARfDs for these substances.

HSE concludes that a short-term effect on health would not be expected if the source of the residue is lambda-cyhalothrin and a short-term effect on health is unlikely if the source of the residue is gamma cyhalothrin. Details of HSE's risk assessment for this sample are in the Risk Assessment - dietary intake assessments section.

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

Combined risk assessments

All samples contained residues of more than one pesticide. One of these samples contained residues that are from pesticides which belong to the same 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 considers combined risk assessments is in HSE risk assessment methodology.

HSE comments

One sample of pears contained a residue of lambda-cyhalothrin. HSE wrote to the supplier of the pear 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.

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

Potatoes (GB)

Samples tested

39 samples were tested for up to 424 pesticide residues.

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

Pesticide residues detected of those sought

- 7 samples contained no residues of those sought
- 32 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 HSE considers for combined risk assessment.

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

Poultry meat (GB)

Samples tested

23 samples were tested for up to 125 pesticide residues.

Chicken

- 21 samples came from the UK

Duck

- one sample came from the UK

Turkey

- one sample 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 it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

- 22 samples contained no residues of those sought
- one sample contained residues above the reporting limit
- one sample 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

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 HSE considers for combined risk assessment.

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

Residues measured above the MRL

The laboratory detected one residue above the MRL in poultry meat. Details are available in Table 5c.

Rice (GB)

Samples tested

17 samples were tested for up to 426 pesticide residues.

Brown

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

White

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

Wholegrain

- 2 samples were imported from outside the EU
- 2 samples 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 it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

- 9 samples contained no residues of those sought
- 8 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

Following screening assessment, HSE needed to assess whether there would be an effect on health for a sample containing chlorpyrifos at 0.008 mg per kg below the level of the MRL of 0.01* mg per kg.

Based on the HSE assessment for chlorpyrifos, HSE conclude a short-term effect on health is not expected. As outlined in the 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 level of chlorpyrifos in this 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 residues are from 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 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 considers combined risk assessments is in HSE risk assessment methodology.

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.

Rice cakes (GB)

Samples tested

18 samples were tested for up to 418 pesticide residues.

- 10 samples came from the UK
- 8 samples came from the EU

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

Pesticide residues detected of those sought

- 12 samples contained no residues of those sought
- 6 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 6 samples were labelled as organic - one 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 HSE considers for combined risk assessment.

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

Rye flour (GB)

Samples tested

12 samples were tested for up to 426 pesticide residues.

White

- 3 samples came from the UK

Wholemeal

- 8 samples came from the UK
- one sample 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 it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

- 9 samples contained no residues of those sought
- 3 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 9 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. Two of these samples contained residues that are from pesticides which belong to the same 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 considers combined risk assessments is in HSE risk assessment methodology.

Speciality fruit (GB)

Samples tested

18 samples were tested for up to 420 pesticide residues.

Asian pear

- 5 samples were imported from outside the EU

Cherimoya

- 2 samples came from the EU

Dragon fruit

- one sample was imported from outside the EU

Guava

- 2 samples were imported from outside the EU

Kumquat

- one sample was imported from outside the EU

Lychees

- 3 samples were imported from outside the EU

Passion fruit

- one sample was imported from outside the EU

Pomegranates

- 3 samples were imported from outside the EU

Pesticide residues detected of those sought

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

Risk assessments

2 samples of speciality fruit contained a residue of chlorpyrifos at a level where HSE wanted to assess whether there would be an effect on health. The samples were Asian (Nashi) pear and lychee containing residues of 0.06 mg per kg and 0.03 mg per kg respectively, above the MRLs of 0.01* mg per kg.

For the assessment of the Asian (Nashi) pear sample, HSE has used consumption data for pears, but conducted a tailored risk assessment to take account of the particularly large unit weight for this sample. This impacts the variability factor used as well as the unit weight applied in the assessment, and is more refined for this Nashi pear, whilst assuming that a consumer will eat the same amount as they would compared to a usual (peak amount) portion of pear.

As outlined in HSE's full risk assessment (see the Risk Assessment – dietary intake assessments), EFSA's 2019 statement on the human health assessment of chlorpyrifos indicated that no toxicological reference values could be determined for chlorpyrifos. For the assessment HSE has applied an HSE proposed indicative toxicological reference value for short term exposure. The calculated dietary intakes for consumers eating Nashi pear containing this residue exceed this value and the significant reduction in the safety factor is undesirable. Although it is not possible to conclude on the short-term assessment with certainty whether or not presence of food residues of chlorpyrifos at this level would have any effect on health after eating large portions (97.5th percentile consumption) of Nashi pear, HSE has stated a number of reasons why the detailed assessment they have performed is especially precautionary.

The EFSA 2019 statement on the human health assessment of chlorpyrifos also includes 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 (0.06 mg per kg) in the Nashi pear, HSE consider any risks of adverse health effects are low.

For the sample of lychee, the calculated dietary intakes of chlorpyrifos are far lower than for the Nashi pear assessed above and are based on consumption levels for cherries as the consumption data HSE hold for lychee specifically are limited. The assessment using cherries consumption data is considered worst case as HSE expects the level of the residue in lychee will be markedly reduced by removal of the peel before eating. Suitable peeling data to estimate the degree of reduction are not available. However, on the basis that the fruit and all of the peel is eaten with the flesh (and no reduction in residue level), the calculated dietary intakes remain within the HSE proposed indicative toxicological reference value for short term exposure. For lychee containing chlorpyrifos at this level of 0.03 mg per kg, HSE has concluded that a short-term effect on health is not expected.

However, due to the genotoxic risk 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 (0.03 mg per kg) in the lychee, and that consumers might remove much of the residue if removing the peel prior to eating the lychee flesh, HSE consider any risks of adverse health effects are low.

Other risk assessment screening work undertaken for the residues found in speciality fruits 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 HSE considers for combined risk assessment.

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

Residues measured above the MRL

The laboratory detected 42 residues above the MRL in speciality fruit. Details are available in Table 5d.

HSE have passed details of the 4 samples of lychees and nashi pear to FSA for further consideration. Further details are in Table 5d. For two of the lychees samples, FSA concluded no further action was required. FSA raised an International Food Safety Authority network (INFOSAN) notification for one lychees sample containing a residue of chlorpyrifos. For the nashi pear sample also containing a residue of chlorpyrifos, FSA advised that any remaining stock should be withdrawn from the market.

HSE comments

HSE have concluded any risk of adverse health effect from chlorpyrifos due to uncertainties regarding genotoxicity to be low as explained in the detailed assessment. There are also uncertainties in the potential short-term exposure assessment and effect of the chlorpyrifos residues for Nashi pear. Whilst the significant reduction of the safety factor in this case is undesirable, it is not possible to conclude on whether there might be any adverse short term health effects. HSE note that market approval for chlorpyrifos has been withdrawn in many jurisdictions. This is consistent with our view that any residue of chlorpyrifos is undesirable, due to uncertainty in the genotoxicity safety assessment.

HSE passed the details of the Nashi Pear sample to the FSA for further consideration of acute and genotoxic risk. Following their assessment, the supplier was required to withdraw any available stock.

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 8: 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
Cauliflower (NI)	12	410	9	3	0	2	HSE has no comments as no residues were found.
Fish (sea) (NI)	12	40	1	0	11	0	HSE has no comments as no residues were found.
Leeks (NI)	10	397	2	8	0	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

12 samples were tested for up to 401 pesticide residues.

Black Beans

- 2 samples were imported from outside the EU

Black Turtle Beans

- 5 samples were imported from outside the EU

Cannelli Beans

- one sample was imported from outside the EU

Kidney Beans

- one sample came from the UK

Pinto Beans

- 3 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

- 9 samples contained no residues of those sought
- 3 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.

Beans with pods (NI)

Samples tested

9 samples were tested for up to 398 pesticide residues.

Fine Beans

- 3 samples were imported from outside the EU

Green Beans

- 5 samples were imported from outside the EU

Runner Beans

- one sample was imported from outside the EU

Pesticide residues detected of those sought

- 8 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 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 HSE considers for combined risk assessment.

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

Carrot (NI)

Samples tested

9 samples were tested for up to 410 pesticide residues.

Fresh

- 7 samples came from the UK
- 2 samples came from 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 - one 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 HSE considers for combined risk assessment.

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

Cherry (NI)

Samples tested

10 samples were tested for up to 406 pesticide residues.

Fresh

- 10 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

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 HSE considers for combined risk assessment.

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

Residues measured above the MRL

The laboratory detected one residue above the MRL in cherries. Details are available in Table 6a.

Courgettes (NI)

Samples tested

9 samples were tested for up to 398 pesticide residues.

- one sample came from the UK
- 8 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
- 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 HSE considers for combined risk assessment.

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

Dried fruits (grapes) (NI)

Samples tested

12 samples were tested for up to 398 pesticide residues.

Currants

- one sample came from the EU

Raisins

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

Sultanas

- 2 samples came from the UK
- 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 fruits were produced. It may be where the dried fruits were processed, where they were packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

- 10 samples contained no residues of those sought
- 2 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

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 HSE considers for combined risk assessment.

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

Grapes (NI)

Samples tested

9 samples were tested for up to 398 pesticide residues.

9 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

Some samples contained residues of more than one pesticide. One of these samples contained residues that are from pesticides which belong to the same 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 considers combined risk assessments is in HSE risk assessment methodology.

Kiwi fruit (NI)

Samples tested

18 samples were tested for up to 406 pesticide residues.

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

Pesticide residues detected of those sought

- 9 samples contained no residues of those sought
- 9 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

One sample of kiwi fruit contained a residue of phosmet at a level (0.27 mg per kg above the MRL of 0.01* mg per kg) where HSE wanted to assess whether there would be a short-term effect on health.

Based on the HSE assessment of short-term risk for phosmet (read section 4: HSE assessment of risk in this report), HSE conclude an effect on health is not expected.

Combined risk assessments

2 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 HSE considers for combined risk assessment.

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

Residues measured above the MRL

The laboratory detected 2 residues above the MRL in kiwi fruit. Details are available in Table 6b.

HSE have passed details of the one sample of kiwi fruit to FSA Northern Ireland for further consideration. Further details are in Table 6b. FSA Northern Ireland concluded no further action was required.

HSE comments

The EU MRL for phosmet of 0.01* mg per kg was lowered to 0.05 mg per kg on 15 September 2023 (Regulation (EU) 2023/1029). In GB the MRL still remains at 0.05

mg per kg, however, this sample exceeds this MRL too. The EU toxicological reference values for phosmet were lowered in 2022 (ARfD of 0.001 mg per kg bw, EU, 2022). From the perspective of HSE the risk assessment considers the EU (2022) ARfD has been established on overly conservative assumptions and HSE concludes that an effect on health is not expected when considering the ARfD established by the JMPR in 2024 (0.03 mg/kg bw/day).

Lamb (NI)

Samples tested

15 samples were tested for up to 40 pesticide residues.

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

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

Pesticide residues detected of those sought

- 14 samples contained no residues of those sought
- one sample 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

One sample contained residues of more than one pesticide. This contained residues that are from pesticides which belong to the same 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 this sample. HSE would not expect this combination of pesticides in this sample to have an effect on health.

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

Residues measured above the MRL

The laboratory detected one residue above the MRL in lamb. Details are available in Table 6c.

Liver (NI)

Samples tested

24 samples were tested for up to 49 pesticide residues.

Calf

- 2 samples came from the UK

Ox

- 21 samples came from the UK
- one sample came from the EU

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 it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

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

Risk assessments

24 samples of liver contained a residue of copper at a level where HSE wanted to assess whether there would be an effect on health. The highest level detected was 139 mg per kg.

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, with all of the samples except from two of the samples contained residues above the level of the MRL of 30 mg per kg. This MRL applies to the majority of the samples in this period, since the EU MRL was increased from 30 mg per kg to 300 mg per kg from 5 May 2026. The median residue (across GB and NI liver samples in this report) is 81 mg per kg.

Please refer to Liver GB, where an outline of HSE's long term exposure risk assessment is provided for these GB and NI samples of liver containing copper.

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.

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 17 residues above the MRL in liver. Details are available in Table 6d.

HSE comments

The EU MRL was increased from 30 mg per kg to 300 mg per kg from 5 May 2026 based on the assessment by EFSA in 2025. The EU MRL is higher in bovine and lambs liver than other forms of liver, and the level reflects the expectation of various levels of copper in bovine liver up to the level of 300 mg per kg due to intake of animal feed, where copper is used as a supplement in the feed.

HSE, in co-operation with the FSA, have assessed the residues for risk to health and concluded that their adverse health effects would not be expected in the short or long term for people (including children) who consume liver with residues at the levels found.

Copper is an essential micronutrient for all life including humans and cattle. It is used as a regulated plant protection product (pesticide) in organic and conventional farming. HSE considers it unlikely that the copper residues detected were from pesticide use. The potential source of the copper is from the cattle's diet, where copper can be added to feed as a micronutrient. Copper has a range of other uses and be found naturally in the environment.

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

Onions (NI)

Samples tested

9 samples were tested for up to 410 pesticide residues.

Fresh

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

Pesticide residues detected of those sought

- 2 samples contained no residues of those sought
- 7 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

2 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 HSE considers for combined risk assessment.

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

Oranges (NI)

Samples tested

15 samples were tested for up to 406 pesticide residues.

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

Following screening assessment there were two pesticides, imazalil and thiabendazole, found in oranges at levels within the respective MRLs, where the effect on health needed to be considered in more detail. The highest residues were 2.2 mg per kg (imazalil) and 1.3 mg per kg (thiabendazole).

Please refer to Oranges GB, where an outline of HSE's short term risk assessment is provided for other orange samples containing slightly higher residues of imazalil and thiabendazole than these residues in the NI samples reported here. The HSE conclusion is the same for the NI and GB samples.

HSE always undertakes assessments that considers both when the peel is not eaten, and one where it is assumed that all of the peel is eaten. 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.

Other risk assessment screening work undertaken did not indicate any other expectation of effects on health.

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 HSE considers for combined risk assessment.

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

HSE comments

Please refer to Oranges GB.

Pears (NI)

Samples tested

15 samples were tested for up to 410 pesticide residues.

Pears

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

Pesticide residues detected of those sought

- 3 samples contained no residues of those sought
- 12 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 HSE considers for combined risk assessment.

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

Potatoes (NI)

Samples tested

18 samples were tested for up to 410 pesticide residues.

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

Pesticide residues detected of those sought

- 10 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

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 HSE considers for combined risk assessment.

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

Poultry meat (NI)

Samples tested

36 samples were tested for up to 49 pesticide residues.

Chicken

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

Duck

- 2 samples came from the EU

Turkey

- one sample 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 it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

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

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.

Residues measured above the MRL

The laboratory detected one residue above the MRL in poultry meat. Details are available in Table 6e.

Rice (NI)

Samples tested

18 samples were tested for up to 403 pesticide residues.

Basmati

- one sample was imported from outside the EU

Brown

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

White

- 3 samples came from the UK
- 4 samples were imported from outside the EU
- 3 samples 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 it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

- 14 samples contained no residues of those sought
- 4 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

Some samples contained residues of more than one pesticide. One of these samples contained residues that are from pesticides which belong to the same 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 considers combined risk assessments is in HSE risk assessment methodology.

Rye flour (NI)

Samples tested

18 samples were tested for up to 410 pesticide residues.

18 samples came from the UK.

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 it was packed for consumer purchase or the address of the brand owner.

Pesticide residues detected of those sought

- 14 samples contained no residues of those sought
- 4 samples contained residues above the reporting limit
- none of the samples contained residues above the MRL
- 13 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. 2 of these samples contained residues that are from pesticides which belong to the same 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 considers combined risk assessments is in HSE risk assessment methodology.

Spring onions (NI)

Samples tested

12 samples were tested for up to 409 pesticide residues.

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

Pesticide residues detected of those sought

- 4 samples contained no residues of those sought
- 8 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 HSE considers for combined risk assessment.

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

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 in the GB Toxicological Reference Value Database. 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 Q2 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:

- 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 bread were used for all types of bread, including speciality types
- data on dried grapes were used for all forms of dried grapes, including raisins, sultanas and currants
- data on peaches were used for guava
- data on cherries were used for kumquat and lychees
- data on meat (excluding poultry and offal) were used for lamb
- data on liver available for all forms of liver were used
- 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

- data on rice were used for rice and rice cakes
- data on pear were used for Asian pears. A variability factor of 5 and a specific unit weight were applied for a particularly large sample of Asian (Nashi) pear with unit weight of 857 g (see the short-term risk assessment for this sample containing chlorpyrifos in the tables below)

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

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

Table 9a: Kiwi (NI)

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
Phosmet	0.27	0.0021	0.0098 (toddlers) 0.0078 (4 to 6 year olds) 0.0048 (7 to 10 year olds) 0.0032 (11 to 14 year olds) 0.0029 (15 to 18 year olds) 0.0026 (vegetarian) 0.0021 (adults) 0.0020 (elderly own home)	0.001	EU, 2022

Comment on risk assessment

Phosmet has not been authorised for use in UK plant protection products in recent times (since the 1980s) and is no longer an approved substance in the EU.

Kiwi flesh after peeling

The dietary intakes calculated based on the peel being removed before consumption indicate that there are two exceedances of the EU ARfD of 0.001 mg per kg bw. These are toddler intake of 0.0018 mg per kg bw per day representing 177 percent of the ARfD, and 4 to 6 year olds intake of

0.0014 mg per kg bw per day representing 140 percent of the ARfD. These dietary intakes are 82 percent lower than presented in the above table, which are for intakes based on the residue level for the whole kiwi, including its peel, being consumed. This is because it has been reported in three processing studies that 1.6 to 18 percent of the phosmet residue remains in the flesh after peeling (JMPR, 2024). The individual peeling factors (PeF) were: apples study 1 PeF of 0.08 (8 percent remaining), apples study 2 PeF of 0.18 (18 percent remaining) and peaches study PeF of 0.016 (1.6 percent remaining). Data available on residues in citrus pulp after peeling were not used in this estimation to derive a peeling factor suitable for kiwi based on the different nature of citrus peel compared to kiwi. In the apple studies, apples were hand-peeled whereas peaches were peeled using an industrial process that is not reflective of a consumer peeling a kiwi in the home. Based on some uncertainty in extrapolating from apple to kiwi, HSE has used the highest value obtained for residues in the flesh of apples (JMPR, 2024) after peeling and applied this to kiwi in order to estimate the amount that will remain in the flesh after removing the skin of kiwi.

This approach of applying a refinement for peeling is in line with the risk assessment performed when MRLs are established for items where the peel is typically removed before eating the fruit. Whilst the dietary intakes for kiwi flesh after peeling are considerably lower than the dietary intakes for whole kiwi with its skin, the conclusion is the same as that drawn by HSE below (for the worst-case form of assessment for whole kiwi, including all of the peel) where HSE have concluded that an effect on health is not expected.

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

Whole kiwi, including all the peel

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. This is because it presumes the high residue found in the sample is being consumed by the most critical consumer, a particularly high residue in an individual fruit, peak consumption levels (97.5th percentile), and all peel from the fruit being consumed.

The intakes for toddlers, 4 to 6 year old children, 7 to 10 year old children, 11 to 14 year old children, 15 to 18 year old children, vegetarians, adults, and elderly living in their own homes exceeded the ARfD. The highest intake was for toddlers.

If toddlers ate or drank large portions of kiwi containing phosmet at 0.27 mg per kg, their intake of phosmet could be 980 percent of the EU ARfD of 0.001 mg per kg bw. This intake is 102 times lower than the dose (1 mg per kg bw) which caused no observed adverse effect in a 2-generation rat reproductive toxicity study. In this study, animals were dosed for 11 weeks (from 56 days prior to mating and up to 21-days post-birth). EFSA used this study, supported by short term rat and dog, and long-term rat studies, as the basis for the ARfD (EFSA, 2021).

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. However, an additional factor of 10 was applied for phosmet to cover uncertainties in the assessment due to the lack of a developmental neurotoxicity (DNT) study, giving an overall safety factor of 1000.

HSE has considered the basis of using this dose (the NOAEL) of 1 mg per kg bw to derive the ARfD. In the study, decreased body weight, decreased red blood cell acetylcholinesterase (RBC AChE) activity and lower fertility indexes were observed in parental animals from 4.2 mg per kg bw per day, the lowest observed adverse effect level (LOAEL) in the study. RBC AChE inhibition was only measured at study termination (or at least after one week post dosing in the supportive short and long-term studies), so this NOAEL and associated LOAEL do not reflect the short-term effects of phosmet on AChE inhibition after a single exposure. Studies included in the EU assessment report show that the effects of phosmet on AChE become more severe after repeated dosing compared to a single dose. In the available acute neurotoxicity studies, a more significant effect on AChE inhibition was observed in plasma, brain and RBCs in adult rats following single higher doses of phosmet compared to a lower level of repeated dosing. EFSA (2021) notes an acute neurotoxicity study of adults rats receiving single doses where effects seen at higher doses (decreased AChE activity (RBC, plasma and brain observed at 22.5 mg per kg bw)) were not observed at a dose of 4.5 mg per kg bw. This indicates that an ARfD based on the 2-generation study NOAEL of 1 mg per kg bw per day is likely overly protective with respect to the effects of phosmet on AChE following a short-term exposure.

There is a recent toxicological evaluation of phosmet undertaken by the JMPR (JMPR Report, 2024). JMPR established a new ARfD of 0.03 mg per kg bw based on RBC AChE inhibition seen after a single dose of phosmet in an acute rat neurotoxicity study. No observed adverse effects were observed in 11 day old rat pups at 2.5 mg per kg bw per day and a safety factor of 100 was applied to this NOAEL to derive the ARfD. This study also included dosing of adult rats, which were roughly 2 times less sensitive than juveniles. Whilst this demonstrates that juveniles were more sensitive than the adult rats, there was no indication that foetuses would be 10 times more sensitive than adults.

In EFSA, 2025 (Scientific support for preparing an EU position in the 56th Session of the Codex Committee on Pesticide Residues (CCPR)) an EU MS commented that both the JMPR and EFSA approaches reflect different approaches and both are justified from a toxicological point of view.

HSE considers that the single dose study leading to a NOAEL of 2.5 mg per kg bw for RBC AChE inhibition in 11-day old pups is the most robust dose to derive the ARfD. HSE also considers the use of the additional safety factor of 10 to address the lack of DNT data to be overly conservative, when studies on age sensitivity to AChE inhibition are available. Therefore, it appears that the most scientifically valid and up-to-date ARfD is the JMPR (2024) value of 0.03 mg per kg bw. The estimated dietary intakes do not exceed this value.

Overall, HSE considers that the EU (2022) ARfD has been established on overly conservative assumptions and HSE concludes that an effect on health is not expected when taking into account the ARfD established by the JMPR in 2024.

Table 9b: Oranges (GB and NI)

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

Pesticide	Highest residue	Adult intake	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source

	(mg per kg)	(mg per kg bw per day)			
Imazalil	2.5	0.057	0.33 (infants) 0.25 (toddlers) 0.18 (4 to 6 year olds) 0.13 (7 to 10 year olds) 0.091 (11 to 14 year olds) 0.077 (15 to 18 year olds) 0.064 (vegetarian) 0.057 (adult)	0.1 (General population) 0.05 (Pregnant and nursing female)	EFSA, 2007

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 considers 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 is 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, vegetarians and adults exceeded the ARfD of 0.05 mg per kg bw (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 2.5 mg per kg, their intake of imazalil could be 182 percent of the ARfD of 0.05 mg per kg bw per day. This intake is 55 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 considers the reduced factor of 55 still sufficient to account for the uncertainties associated with the use of animal data and possible differences in susceptibility between people. It is not possible because of the way data were reported, to attribute effects at higher doses to single or multiple treatments. Therefore, the ARfD is suitably protective when considering single day exposures and might be overprotective. Furthermore, it is expected that if dietary intake contribution from juice is removed from the assessment (as done in the assessment below under 'general population'), levels of exposure will be further reduced. Based on this assessment an effect on health is 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 (0.33 mg per kg bw). This initial assessment is based on a residue level of 2.5 mg per kg and 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, imazalil residues are mainly on the peel, peel is not included in juice, and residues of imazalil have only been found at low determinable levels (up to 0.1 mg per kg in all but one at 0.2 mg per kg) in orange juice from 39 out of 398 samples (2006, 2009, 2012, 2015, 2020, 2023 and 2026 surveys). Therefore, the intakes shown above will overestimate representative exposures.

When excluding the dietary contribution of orange juice, toddlers become the critical group and their intake could be 0.19 mg per kg bw. This intake is 52 times lower than a dose which caused no observed adverse effect 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). EFSA 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 considers the reduced factor of 52 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 9c: Oranges (GB and NI)

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

Pesticide	Highest residue	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ARfD (mg per kg bw)	Source

	(mg per kg)				
Thiabendazole	1.5	0.034	0.20 (infants) 0.15 (toddlers) 0.11 (4 to 6 year olds)	0.1	EU, 2017 and associated EU Review Report

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 considers 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 is 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 1.5 mg per kg, their intake of thiabendazole could be 199 percent of the ARfD. This intake is 50 times lower than a dose which caused no observed adverse effect in a developmental study in rats over 11 days. EFSA 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 considers the reduced factor of 50 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 9d: Pears (GB)

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

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	0.05	0.00088	0.0042 (toddlers) 0.0036 (infants) 0.0030 (4 to 6 year olds)	0.005 (lambda-cyhalothrin) 0.0025 (gamma-cyhalothrin)	EU, 2016 EU, 2014

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 do not know the source of the residue, a range covering a least worst case and a worst case form of assessment for this residue is presented below since these pesticides have different toxicological potencies, resulting in different ARfDs for these substances.

Least worst case: lambda-cyhalothrin

The intakes for all consumer groups are within the ARfD for lambda-cyhalothrin of 0.005 mg per kg bw, and an effect on health is not expected.

Worst case: gamma-cyhalothrin

The intakes for toddlers, infants and 4 to 6 year olds exceeded the ARfD for gamma-cyhalothrin of 0.0025 mg per kg bw. The highest intake was for toddlers.

If toddlers ate or drank large portions of pears containing gamma-cyhalothrin at 0.05 mg per kg their intake could be 170 percent of the ARfD. This intake is 118 times lower than a dose which caused no observed adverse effects in a 1-year oral toxicity study in dogs with lambda-cyhalothrin. EFSA 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 toxicity of gamma-cyhalothrin compared to lambda-cyhalothrin. HSE considers the reduced factor of 118 (from 200) still enough to make an effect on health unlikely.

Table 9e: Rice (GB)

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

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	0.008	0.000049	0.00010 (toddlers) 0.000089 (7 to 10 year olds) 0.000087 (4 to 6 year olds) 0.000068 (15 to 18 year olds) 0.000066 (11 to 14 year olds) 0.000060 (vegetarian) 0.000049 (adults) 0.000044 (infants) 0.000031 (elderly own home) 0.000014 (elderly residential)	No toxicological reference values established	EU, 2019

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. This factor is also applied to take into account the uncertainties caused by using animal data and possible differences in susceptibility between people. The HSE proposed indicative toxicological reference value is conservative as it uses the highest safety factor applied by toxicologists of 1000 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 9f: Speciality Fruit - Asian (Nashi) Pear (GB)

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

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	0.06	0.0013	0.0044 (toddlers) 0.0031 (4 to 6 year old children) 0.0031 (infants) 0.0021 (7 to 10 year old children) 0.0015 (11 to 14 year old children) 0.0014 (vegetarians) 0.0013 (adults) 0.0012 (15 to 18 year old children) 0.0012 (elderly in own home) 0.00078 (elderly in residential setting)	No toxicological reference values established	EU, 2019

Comment on risk assessment

An EFSA assessment from 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. This factor is applied also to take into account the uncertainties caused by using animal data and possible differences in susceptibility between people. The HSE proposed indicative toxicological reference value is conservative as it uses the highest safety factor applied by toxicologists of 1000 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.

The intakes for all of the consumer groups exceed this HSE proposed indicative toxicological reference value. The highest intake was for toddlers.

If toddlers ate large portions of Asian Nashi pear containing chlorpyrifos at 0.06 mg per kg their intake could be around 1,450 percent of the above mentioned HSE proposed indicative toxicological reference value for short term exposure. This intake is 68 times lower than the lowest intake in repeat-dose animal studies at which effects were observed in a developmental neurotoxicity study where pregnant rats were dosed from day 6 of pregnancy through until the pups were 11 days old.

HSE considers this significant reduction in the safety factor from 1000 to 68 undesirable. The developmental neurotoxicity study in which the effects on the brain measurements were observed reported no behavioural or developmental deficits, and there is an indication that the changes in brain measurement might be reversible. The interpretation of this study by regulatory assessors is uncertain, and, despite the precautionary nature of HSE's assessment, it is not possible to conclude on whether there might be any adverse short term health effects after eating large portions (97.5th percentile consumption) of Asian Nashi pear containing the level found in this report.

Refer to the section below on Substances that might be genotoxic in this report, for HSE's conclusions regarding potential genotoxicity.

Table 9g: Speciality Fruit - Lychee (GB)

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

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	0.03	0.000057	0.00016 (4 to 6 year olds) 0.00015 (11 to 14 year olds) 0.00013 (toddlers) 0.00011 (7 to 10 year olds) 0.000083 (infants) 0.000083 (15 to 18 year olds) 0.000072 (vegetarians) 0.000057 (adults) 0.000042 (elderly own home) 0.000007 (elderly residential)	No toxicological reference values established	EU, 2019

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. This factor is also applied to take into account the uncertainties caused by using animal data and possible differences in susceptibility between people. The HSE proposed indicative toxicological reference value is conservative as it uses the highest safety factor applied by toxicologists of 1000 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.

A refinement has not been made to account for any reduction of residue when the peel is removed before consuming the fruit, as no specific peeling residues data are available for lychee. Such a refinement can be applied, if relevant data are available, in risk assessments performed when MRLs are established for items where the peel is typically removed before eating the fruit, such as lychee. Based on peeling residues data available for chlorpyrifos for crops of citrus and banana where it has been reported that only 2 percent of the residue remains in the flesh after peeling

(EFSA, 2017), HSE expects the level of the residue in lychee will be markedly reduced by removal of the peel before eating.

The intakes have been estimated assuming all of the peel will be consumed with the fruit. 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 considers, and where a more detailed assessment was needed following screening:

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

None.

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

As noted in section 4 of this report 'dietary intake assessments' 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 this further and 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 10a: Liver (GB and NI)

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

Pesticide	Median residue (mg per kg)	Adult intake (mg per kg bw per day)	Critical group intake (mg per kg bw per day)	ADI (mg per kg bw per day)	Source
Copper	81	0.038	0.19 (toddlers) 0.18 (infants) 0.055 (elderly own home) 0.048 (11 to 14 year olds) 0.039 (elderly residential) 0.038 (adult) 0.035 (7 to 10 year olds) 0.028 (4 to 6 year olds) 0.024 (15 to 18 year olds) (no consumption reported for vegetarians)	0.15 0.07	EU, 2018 EU, 2023

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 residues found in all the liver samples. 44 out of 48 samples contained residues above the GB MRL of 30 mg per kg and 4 samples contained residues below the GB MRL. All residues found were below the EU MRL of 300 mg per kg. The highest residue found was 249 mg per kg and the median residue level was 81 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 in 2025, following the EFSA 2023 Scientific Committee Opinion on Health Based Guidance Values for copper.

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 (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 EU adopted ADI (EU, 2023) proposed by EFSA (2023) is about half the level of the previous health-based guidance values explained above. The new EU 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.

COT discussed the draft EFSA (2025) 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 higher for infants and toddlers compared to other consumers on a bodyweight basis, and intakes for toddlers and infants are the only consumer groups where there are exceedances of either the GB or EU ADI values. These dietary intakes (and how they compare to the GB ADI (EFSA, 2018) and EU ADI (EFSA, 2023) are represented below.

HSE model (total liver consumption): 259 percent of the ADI (of 0.07 mg per kg bw per day) in infants and 276 percent of the ADI (of 0.07 mg per kg bw per day) in toddlers, or 121 percent of the ADI (of 0.15 mg per kg bw per day) in infants and 129 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: 162 percent of the ADI (of 0.07 mg per kg bw per day) in infants and 84 percent of the ADI (of 0.07 mg per kg bw per day) in toddlers, or 75 percent of the ADI (of 0.15 mg per kg bw per day) in infants and 39 percent of the ADI (of 0.15 mg per kg bw per day) in toddlers.

HSE has deduced from the NDNS years 1-11 and DNSIYC data, that only two out of the 43 infants and none 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 and in these groups do not exceed either the GB or the EU ADI. 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 (Q2 2026) and conclusions:

Substances that might be genotoxic

Residues found in this report that have genotoxic potential (concluded from laboratory studies on animals): none

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

It is unclear whether chlorpyrifos can damage genetic material (is genotoxic).

There is some evidence from studies performed in vitro and, or in vivo that chlorpyrifos might be genotoxic. 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 chlorpyrifos 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 concludes that on a precautionary basis any residue finding of chlorpyrifos is undesirable due to the uncertainty regarding genotoxicity at low doses; however, HSE considers any risks of adverse health effects are low after eating large portions (97.5th percentile consumption) of the foods containing the relatively low levels of these pesticides found in this report (Asian (Nashi) pear (0.06 mg per kg), rice (0.008 mg per kg) and lychee (0.03 mg per kg)).

Issues arising in this report and plans for the quarter 3 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 is confident that the residues detected come from use of chlorine-based disinfectants used to maintain microbiological safety (control microorganisms that cause food poisoning). HSE is 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 is 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 our reports.

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 fertilisers 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 our 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 our findings were unusual, unexpected or of concern. HSE can tell from the chemical form detected whether the residues 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 DDT results are published to try to make it as clear 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 our considerations.

Quarter 3 2026 report

Samples collected in GB

In quarter 3 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 fruits (grapes)
- Grapes
- Infant formula
- Kiwi fruit
- Leeks
- Liver (bovine)
- Milk
- Onions (bulb)
- Oranges
- Orange juice
- Parsnips
- Pears
- Potatoes
- Poultry meat
- Rice
- Rye flour
- Speciality fruit
- Spring onions

Samples collected in NI

In quarter 3 of 2026 HSE will look at results from samples collected in NI for:

- Beans (dried)
- Beans with pods
- Bread
- Carrots
- Cauliflower
- Cherry
- Courgette
- Fish (sea)
- Grapes
- Grapes (dried)
- Infant formula
- 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 MRL – 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 LOD 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 LOD (LOD MRL)

See definition for LOD 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 per mg/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 determination (sometimes also referred to as the limit of quantification). The limit of determination 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 is looking for the pesticide below the LOD MRL because HSE is 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.