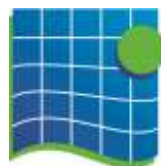


**Summary Report on 2021 Residue Monitoring of Irish Farmed Finfish
&
2021 Border Inspection Post Fishery Product Testing undertaken at the Marine Institute**



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**October 2022
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Foras na Mara
Marine Institute

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2021 Residue Monitoring of Irish Farmed Fish
&
2021 Border Inspection Post Fishery Product Testing undertaken
at the Marine Institute**

October 2022

CHEMREP 2022-001

Marine Institute

Rinville, Oranmore, County Galway



*The MI scope of
accreditation for
analysis in this report
is detailed in
Appendix 2*

MISSION STATEMENT

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'to undertake, to coordinate, to promote and to assist in marine research and development and to provide services related to marine research and development, that in the opinion of the Marine Institute will promote economic development and create employment and protect the environment'
Marine Institute Act 1991

OUR VISION

A thriving maritime economy in harmony with the ecosystem and supported by the delivery of excellence in our services.

AUTHORS

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PHOTOGRAPHY CREDITS

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Part A

Summary Report on 2021 Residue Monitoring of Farmed Finfish

Carried out

in accordance with Official Control Regulation (EU) 2017/625

&

Annexes of Council Directive 96/23 Council Directive 96/23/EC on measures to monitor certain substances and residues thereof in live animals and animal products.

1. 2021 OVERALL SUMMARY

In 2021, in excess of 632 tests and a total of 1,870 measurements were carried out on 120 samples of farmed finfish for a range of residues. Implementation of the Aquaculture 2021 Plan involves taking samples at both farm and processing plant:

- 80 target samples taken at harvest: 70 farmed salmon and 10 freshwater trout.
- 40 target samples were taken at other stages of production: 30 salmon smolts and 10 freshwater trout.

All 2021 samples were compliant. For target sampling of farmed fish, a summary table of the residue results from 2005 - 2021 is outlined in Table 1.

Overall, the outcome for aquaculture remains one of consistently low occurrence of residues in farmed finfish, with no non-compliant target residues results for the period 2006-2014, 0.11% and 0.10% non-compliant target residues results in 2015 and 2016 respectively and no non-compliant target results for the period 2017 to 2021.

Table 1: Summary Target Results for Residue Program 2005-2021

Year	No. of Target Samples¹	Total ^Group A²	Total ^^Group B²	No. of Results³ /non-compliant	Non-Compliant Results (%)
2005	164 (105, 59)	163/0	164/0	2251/2	0.09
2006	162 (104, 58)	162/0	162/0	2207/0	0
2007	161 (103, 58)	148/0	161/0	2219/0	0
2008	162 (103, 59)	144/0	162/0	2073/0	0
2009	146 (98, 48)	128/0	146/0	1750/0	0
2010	141 (92, 49)	109/0	141/0	1569/0	0
2011	140 (92, 48)	105/0	140/0	1566/0	0
2012	169 (112, 57)	101/0	169/0	1596/0	0
2013	137 (91, 48)	83/0	137/0	1494/0	0
2014	136 (91, 45)	83/0	136/0	1882/0	0
2015	124 (91, 33)	71/0	124/2	1841/2	0.11
2016	126 (92, 34)	65/0	126/2	1933/2	0.10
2017	141 (103, 38)	72/0	141/0	2250/0	0
2018	171 (123, 48)	108/0	171/0	2611/0	0
2019	176 (118, 58)	101/0	176/0	2601/0	0
2020	120 (80, 40)	61/0	120/0	1888/0	0
2021	120 (80, 40)	70/0	120/0	1870/0	0

[^]Group A substances are banned substances.

^{^^}Group B substances can be categorised into unauthorised substances, authorised substances and environmental contaminants

¹Target samples (sampled at harvest, sampled at other stages of production)

²No. of samples tested/No. of samples non-compliant

³Total no. of results as target samples taken for Group A and Group B substances are tested for multiple residue categories within each group/No. of non-compliant results

2. BACKGROUND

As with other farmed animals, farmed finfish can be subject to disease and infestation which can have animal welfare, environmental and commercial implications. Therefore, authorised veterinary medicines and treatments may be used, and sometimes must be used, to control disease and infestation as part of health control plans e.g. antibacterial and antiparasitic treatments. The National Residues Control Plan (NRCP) sets out the monitoring requirements for residues in animal products in accordance with Official Control Regulation 2017/625 and Annexes of Council Directive 96/23/EC of 29 April 1996 *on measures to monitor certain substances and residues thereof in animals and animal products*. Under EU legislation Article 19 of Official Control Regulation (EU) 2017/625, each member state is required to implement a residue monitoring plan and to submit their programmes annually to the European Commission for approval. Ireland's National Residue Control Programme (NRCP) for 2021 was approved by the European Commission. On behalf of the Department of Agriculture, Food and Marine (DAFM), the Marine Institute carries out monitoring of chemical residues for aquaculture. The main objectives of the NRCP for Aquaculture is to ensure farmed fish are fit for human consumption, to provide a body of data showing that Irish farmed fish is of high quality, to promote good practices in aquaculture and to comply with Official Control Regulation 2017/625 and Annexes of EU Directive 96/23/EC.

The Food Safety Authority of Ireland (FSAI) co-ordinates the activities of the various departments and agencies involved in delivering this programme. For the aquaculture sector, the Sea Fisheries Protection Authority (SFPA) with technical support from the Marine Institute is responsible for residue controls on farmed finfish to ensure compliance with the Official Control Regulation 2017/625 and Annexes of Residue Directive (96/23/EC). A summary of each department and agencies' role with respect to the NRCP is outlined in Table 2.

Table 2: Department and Agency Roles

Department of Agriculture Food and Marine (DAFM) - Implements the overall residues controls in Ireland
Food Safety Authority of Ireland (FSAI) - Coordinates the activities of the departments and agencies involved
Sea Fisheries Protection Authority (SFPA) - Ensures compliance with the Directive for finfish aquaculture
Marine Institute - Implements the surveillance monitoring programme for farmed fish and is the official laboratory for residue sampling and analysis. The MI is National Reference Laboratory (NRL) for a number of substances in aquaculture
DAFM Veterinary Inspectors - Carry out routine on-farm inspections to verify compliance with various regulations including fish health, animal remedies, feedstuffs, etc

2.1 National Residue Control Plan (NRCP)

Annually, the Marine Institute (MI) prepares the NRCP for Aquaculture, which is reviewed and finalised by SFPA, FSAI and DAFM. The NRCP once agreed is then submitted to the European Commission (EC) for approval, this sets out the monitoring plan, including species, sample numbers and target substances in line with the specific requirements of the Directive. The national legal basis for the Residue Monitoring Plan is provided for in the Animal Remedies Act, 1993 and other relevant legislation in particular, the Control of Animal Remedies and their Residues Regulations, 2009. Figure 1 illustrates the National Aquaculture Residue Control Cycle. The 2021 NRCP is available in Appendix 5.

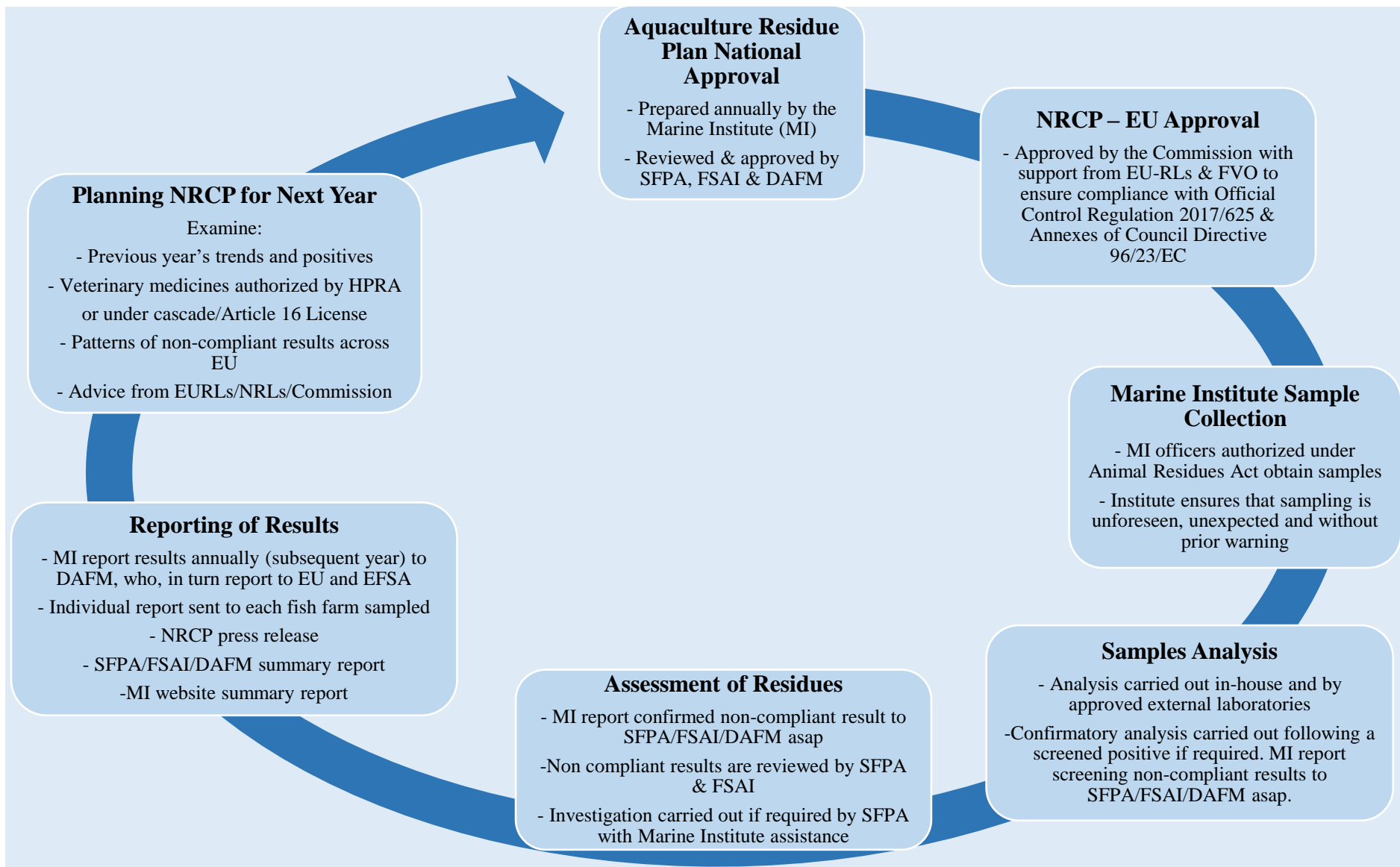


Figure 1: National Aquaculture Residue Annual Control Cycle

2.2 Scope of NRCP

Implementation of the NRCP involves taking farmed finfish samples at farm and primary processing/packing levels and analysing these samples at the Marine Institute and at other officially approved laboratories holding accreditation to the International Standard (ISO 17025). The scope of this testing under the NRCP is comprehensive covering the following broad categories outlined in Table 3.

Table 3: NRCP testing categories

Category	Details
Banned	These compounds should not be present as no safe limit can be set for their residue e.g. steroids, chloramphenicol, nitroimidazoles
Authorised	Authorised medicines which may be used in aquaculture and should be below statutory limit (i.e. Maximum Residue Limit – MRL*) e.g. Sea lice treatments- emamectin, deltamethrin
Unauthorised	These compounds should not be present as these treatments should not be used in aquaculture. e.g. malachite green
Environmental contaminants	Certain contaminants occur naturally in the environment but they may also be introduced inadvertently and may accumulate in fish e.g. polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), heavy metals

*MRL = maximum concentration allowable in the edible portion of the animal which should not be exceeded at the time of harvest.

These substances are classed into 2 categories: Group A and Group B. Details are given in Table 4.

Table 4: List of substances included in the NRCP for farmed finfish

Group A–Substances having an anabolic effect	
A3	Steroids
A6	Chloramphenicol, nitrofurans, nitroimidazoles
Group B- Veterinary drugs and contaminants	
B1	Antimicrobials (Antibacterial)
B2a	Anthelmintics (Antiparasitic)
B2c	Pyrethroids
B2f	Other pharmacologically active substances
B3a	Organochlorine compounds
B3c	Chemical elements
B3d	Mycotoxins
B3e	Dyes

Group A:

Group A substances are banned substances and should not be present in farmed finfish. These can be categorised as the following:

- A3 steroids, 17 β -oestradiol which can occur naturally but also could be used for growth promotion and methyltestosterone.
- A6 compounds, nitrofurans and nitroimidazole which are antibacterial drugs, and chloramphenicol a broad spectrum antibiotic.

Group B:

Group B substances can be categorised into unauthorised substances, authorised substances and environmental contaminants. Farmed finfish can be subject to disease and infestation, which can have animal welfare, environmental and commercial implications. Therefore, similar procedures are in place for farmed finfish as for other farmed animals which may involve treatment with approved veterinary medicines such as antibiotics or anthelmintics to prevent or treat disease or infestation e.g. antibacterial agents, antifungal agents, antiparasitic treatments. Farmed finfish can also accumulate trace metals and persistent organic pollutants from their feed or the environment; therefore, levels of these contaminants are also determined.

2.3 Reporting to the EC

Annually, the Marine Institute (MI) reports the NRCP results for Aquaculture (subsequent year) to DAFM who, in turn reported to the EC and European Food Safety Authority (EFSA) in the required EFSA format. The overall 2021 results were reported to DAFM in the EFSA format in May 2022. This reports examines the 2021 residue results for aquaculture in more detail.

3. SAMPLING

In 2021, samples were taken in accordance with Council Directive 96/23/EC by Marine Institute Authorised Sampling Officers (Authorised under the Animal Remedies Act 1993) and SFPA Sampling Officers due to COVID restrictions. The Institute ensures that sampling is unforeseen, unexpected and without prior warning in accordance with Official Control Regulation 2017/625 and Annexes of Council Directive 96/23/EC and a strict chain of custody is maintained. Samples are taken throughout the year in an effort to spread sampling across different sites and are taken in accordance with the NRCP i.e.

- One third of the samples are taken ‘on farm’ at the smolt stage which is aimed at detection of illegal treatment (prohibited substances Group A and unauthorised substances Group B3 (e) - Dyes).
- Two thirds of the samples are taken at harvest stage which is aimed at controlling the compliance with the Maximum Residue Limits (MRL) and for detection of illegal treatment (prohibited substances Group A and unauthorised substances-e.g. Group B3 (e) - Dyes). These harvest samples are taken primarily at processing plants for salmon and ‘on farm’ for freshwater trout.

In 2021, a total of 120 target (surveillance) samples were taken from fish farms and processing plants in accordance with the NRCP for Aquaculture 2021 (Appendix 5).

- 40 target samples were taken at other stages of production (OSOP); 30 salmon smolts and 10 freshwater trout (individual fish may be pooled to provide a sample dependent on weight) were collected from 8 farms for Group A substances and malachite green.
- 80 target samples were taken at harvest which comprised of 70 farmed salmon and 10 freshwater trout. These harvest samples were collected during 18 sampling events (samples collected from a given site at a given time) throughout the year. Salmon were collected on 14 occasions and freshwater trout on 4 occasions. In 2021 no sea reared trout samples were taken. Samples were collected from the same producers on a number of occasions due to the small number of active harvest sites in the given year.

Generally, 5 fish were taken from each producer during a sampling event and each individual fish was treated as a sample. However, where an individual fish was not large enough to provide sufficient test material, a number of fish were pooled to provide a sample. Samples were further subsampled as multiple tests were typically performed on individual samples.

4. RESULTS OF ANALYSIS

4.1 Interpretation of Results

Samples are tested for a broad range of substances using a variety of modern analytical techniques. The scope of testing under the Aquaculture Plan is comprehensive covering four broad categories: banned substances, unauthorised substances, authorised substances (approved substances i.e. veterinary substances) and environmental contaminants. Details of the methods and subcontract laboratories used are provided in Appendix 4.

Surveillance should be aimed particularly at controlling the compliance with MRLs for residues of veterinary medicinal products in accordance with Commission Regulation 37/2010, and prohibited or unauthorised reference Regulation 2019/1871, the maximum levels of pesticides fixed in Regulation (EC) No 396/2005, and monitoring the concentration of environmental contaminants.

Where a Maximum Residue Limit (MRL) has been set, samples are deemed non-compliant (i.e. positive) if concentrations of a given residue are confirmed to be in excess of the MRL.

Where no MRL is set, {e.g. for banned substances including steroids and compounds listed in Commission Regulation (EU) No 37/2010 (Table 4), prohibited or unauthorised substances reference Regulation 2019/1871}, a Decision Limit (action level) is used. Samples are deemed non-compliant if concentrations of a given residue are confirmed to be in excess of the Decision limit (action level).

Follow up action is taken on confirmed positive samples. The sources of MRLs and Decision Limits (action level) are specified in Appendix 1.

Organochlorine compounds including Polychlorinated Biphenyls (PCBs) are persistent environmental contaminants that accumulate in lipid-rich animal tissue. For PCBs, typically, a group of indicator congeners are measured “EFSA PCB 6” which is the sum of the following 6 CB congeners – PCB 28, 52, 101, 138, 153, 180 and the Commission have set a Maximum Level (ML) of 75 $\mu\text{g kg}^{-1}$ wet weight. For Organochlorine Pesticides (OCPs) there are no MRL/MLs; however, a number of OSPAR contracting countries have set levels that are presented in this report (Appendix 1).

Maximum levels for mercury in fisheries products are set out in Commission Regulation (EU) 2022/617 of 12th of April 2022 amending Regulation (EC) No 1881/2006 as regards maximum levels of mercury in fish. For salmon and trout, the levels specified is 0.5 mg kg⁻¹ for mercury. These are taken as the “action levels” for the following report.

A comprehensive quality assurance programme supports the monitoring programme and is detailed in Appendix 2 and 3.

4.2 Breakdown of 2021 Results

In 2021, in excess of 632 tests and a total of 1,870 measurements were carried out on 120 target samples of farmed finfish. **All 2021 samples were compliant.**

Table 5: Summary of 2021 residue monitoring results for target farmed fish samples (salmon and trout). All tests performed on muscle and skin.

RESIDUE	NUMBER TESTED	NON-COMPLIANT ¹	DETECTION LIMIT ² ($\mu\text{g kg}^{-1}$)
Group A3 – Steroids			
Methyltestosterone	45	0	1.5(screening)
17 β -oestradiol	7	0	1.5(screening)
Group A6 - Compounds included in Annex IV of Council Regulation 2377/90/EC			
Chloramphenicol	42	0	0.25(screening)
	5		0.04(confirmatory)
Nitrofurans	8	0	<i>See Appendix 5 for cc alphas</i>
Nitroimidazoles	8	0	<i>See Appendix 5 for cc alphas</i>
Group B1 - Antibacterial Substances			
Tetracyclines: Oxytetracycline	80	0	100(screening)
Tetracyclines	80	0	100(screening)
Quinolones: Oxolinic acid Flumequine	80	0	75(screening) 150(screening)
Florfenicol Florfenicol Anime	60	0	1086(confirmatory) 1115(confirmatory)
Sulphonamides: Sulphadiazine	80	0	50(screening)
Group B2a – Anthelmintics			
Emamectin B1a	80	0	9.0
Ivermectin	80	0	0.1
Doramectin	80	0	0.1
Group B2c – Pyrethroids			
Cypermethrin	80	0	5
Deltamethrin	80	0	2
Group B2f - Other pharmacologically active substances			
Corticosteroids	16	0	1.5
Teflubenzuron-MI	40	0	80
Teflubenzuron-CER	40	0	25
Diflubenzuron ⁶ - MI	40	*	86
Diflubenzuron-CER	40	0	0.5

Table 5 (continued): Summary of 2021 residue monitoring results for target farmed fish samples (salmon and trout). All tests performed on muscle and skin.

RESIDUE	NUMBER TESTED	NON-COMPLIANT ¹	DETECTION LIMIT ² ($\mu\text{g kg}^{-1}$)
Group B3a- Organochlorine Compounds			
EFSA sum of 6 CBs³	15	0	0.006
DDT and metabolites⁴	8	0	10
α-HCH	8	0	0.0025
β-HCH	8	0	0.0025
γ-HCH (lindane)	8	0	0.0025
Hexachlorobenzene	8	0	0.00125
Aldrin + dieldrin⁵	8	0	0.005
Endrin	8	0	0.0025
Oxychlordane	8	-	0.0025
<i>trans</i>-chlordane (γ- chlordane)	8	-	0.0025
<i>cis</i>-chlordane (α-chlordane)	8	-	0.0025
Group B3c – Chemical Elements⁶			
Mercury	8	0	2
Group B3e – Dyes			
Total Malachite Green⁷	64	0	1
Leuco Malachite Green	64	0	0.5
Crystal Violet	64	0	0.5
Leuco Crystal Violet	64	0	0.5
Victoria Blue	64	0	0.5
Brilliant Green	64	0	0.5

¹ Action limits to evaluate non-compliant results in Appendix 1.

² Limit of Detection (LOD) for organochlorine compounds are averages as LOD is sample dependent; aflatoxins detection limit is the LOQ for this method and Dyes detection limit is the Decision Limit for this method.

³ EFSA PCB 6: sum of the following 6 non dioxin like PCBs–PCB 28, 52, 101, 138, 153, 180. Commission Regulation No 1259/2011 (came into force 1st Jan 2012) amending Regulation No. 1881/2006 *setting maximum levels for dioxins, dioxin-like PCBs and non dioxin-like PCBs in foodstuffs*.

⁴ DDT and metabolites – sum of individual DDT metabolites (o,p’ DDT, p,p’ DDT, p,p’ DDE and p,p’ DDD) – sum of individual LODs also included.

⁵ Aldrin + dieldrin sum - sum of individual LODs also included.

⁶ The current method does not meet the reduced Diflubenzuron MRL and compliance cannot be evaluated reference ‘Appendix 1 note 9’.

⁷ Total Malachite Green is the sum of Malachite Green and Leuco Malachite Green.

4.2.1 Group A – Banned Substances

A total of 70 samples (other stage of production and harvest) were tested for at least one Group A compound.

Group A3: Steroids

52 individual samples were tested by the Irish Equine Centre (IEC) for Group A3 Steroids:

- **Methyltestosterone** – 45 samples were screened for methyltestosterone by Enzyme-Linked Immuno Sorbant Assay (ELISA) method.
- **17 β -oestradiol** – 8 samples were screened for 17 β -oestradiol by ELISA method. A further 5 were screened by LCMSMS method.

No non-compliant (i.e. no positive) results were reported for Group A3 compounds.

Although one sample from one farm gave a screening reading above the screening cut-off for 17 β -oestradiol (ELISA test), these samples were found to be **compliant** when further screening analysis by CER Groupe laboratory was carried out for 17 β -oestradiol by a more discriminatory LCMSMS method and no further action was required.

Group A6:

59 individual samples were tested for Group A6 Compounds.

- **Chloramphenicol** – 42 samples were screened for chloramphenicol by IEC laboratory using ELISA method. A further 5 were confirmatory tested by LCMSMS.
- **Nitrofurans** – 8 samples were analysed by CER Groupe Laboratory for the marker metabolites of the nitrofurans; furazolidone, furaltadone, nitrofurantoin and nitrofurazone using a quantitative (LCMSMS) method.
- **Nitroimidazole** – 8 samples analysed by CER Groupe Laboratory for nitroimidazole and its metabolites¹ by a quantitative (LCMSMS) method.

No non-compliant (i.e. no positive) results were reported for Group A6 compounds.

Although one sample from one farm gave a screening reading above the screening cut-off for Chloramphenicol, these samples were found to be **compliant** when further confirmatory testing by CER Groupe laboratory was carried out for Chloramphenicol by LCMSMS and no further action was required.

4.2.2 Group B – Veterinary Drugs and Contaminants

A total of 120 samples of farmed finfish were tested for Group B compounds which can be classed as authorised substances, unauthorised substances or environmental contaminants.

No non-compliant (i.e. no positive) results were reported for Group B compounds.

¹ The following nitroimidazole metabolites are listed on the NRCP-dimetridazol, ronidazol, metronidazol, hydroxyl-dimetridazol, hydroxyl-metronidazol

Group B1: Antibacterial Substances

- **Sulphonamides** – 80 samples were screened for sulphonamides by the Marine Institute using an Immunoassay method (Randox Evidence investigator).

No non-compliant (i.e. no positive) results were obtained for sulphonamides.

- **Quinolones, tetracyclines** - Samples were analysed by the Marine Institute for the following antibacterial substances: 80 for quinolones and 80 for tetracyclines using a qualitative screening method (modified two plate test).
- **Florfenicol** - 60 samples were analysed for florfenicol by CER Groupe Laboratory, Belgium by LCMSMS method. This method analysed for Florfenicol, Florfenicol amine, Thiamphenicol and Trimethoprim analysis.

No non-compliant (i.e. no positive) results were obtained for quinolones, tetracyclines or florfenicol.

Group B2: Other veterinary drugs

With the exception of corticosteroids, these are authorised and unauthorised substances that could be used in treating sea-lice infestation.

- **B2(a) Anthelmintics** (Ivermectin, emamectin B1a, doramectin) - 80 harvest samples were analysed for the above anthelmintics using UPLC-FLU in the Marine Institute **No non-compliant results were obtained.**
- **B2(c) Pyrethroids** (Cypermethrin, deltamethrin) – 80 harvest samples were analysed for the above pyrethroids using a GC-MS screening method in the Marine Institute. **No non-compliant results were obtained for cypermethrin and deltamethrin.**
- **B2(f) Other pharmacologically active substances**

Teflubenzuron, diflubenzuron – 80 harvest samples were analysed by the Marine Institute for teflubenzuron, diflubenzuron using UPLC-DAD. In January 2020, Commission Regulation (EU) 2019/1881 *amending Regulation (EU) No 37/2010 to classify the substance diflubenzuron as regards its maximum residue limit*. This regulation reduces the MRL from 1000 µg kg⁻¹ to 10 µg kg⁻¹. Therefore, the 40 samples analysed by Marine Institute in 2021 cannot be assessed for compliance as these samples were analysed against the 1000 µg kg⁻¹ (MRL). In light of the change in regulation, Marine Institute suspended in-house testing and the remaining 40 samples were analysed by CER Groupe Laboratory, Belgium by LCMSMS.

No non-compliant results were obtained for teflubenzuron and no non-compliant results were obtained for samples analysed by CER Groupe laboratory for diflubenzuron.

Corticosteroids (dexamethasone, flumethasone and betamethasone) – 16 samples (other stage of production and harvest) were screened by the IEC for the above corticosteroids using the ELISA method. **No non-compliant results were obtained for corticosteroids.**

Group B3a: Organochlorine Compounds

• Polychlorinated Biphenyls

Polychlorinated Biphenyls are a group of homologous man-made substances with a molecular structure comprising of a chlorinated biphenyl ring. PCBs are persistent environmental contaminants that accumulate in lipid and can be present at levels of concern in fish. PCBs can be divided into groups according to their toxicological properties e.g. dioxin-like PCBs, non-dioxin-like PCBs. As part of the NRCP, it is primarily the following six non dioxin-like PCBs (NDL-PCB) which are monitored; PCB 28, 52, 101, 138, 153 and 180 and analysed by the Marine Institute. These NDL-PCBs are routinely used as a monitoring indicator as they are generally presumed to be the most persistent in fish tissue and comprise about half of the amount of total PCB present in feed and food. European legislation (Commission Regulation (EU) No 1259/2011 amending Regulation (EC) 1881/2006) has fixed maximum levels for dioxins, dioxin-like PCBs and non-dioxin-like PCBs in foodstuffs. In the case of NDL-PCBs the maximum level of 75 $\mu\text{g kg}^{-1}$ wet weight has been set for the sum of these six congeners. The mean and maximum concentrations measured for the sum of 6 indicator PCBs [**‘EFSA sum of 6 CBs’**] was 6.47 and 10.48 $\mu\text{g kg}^{-1}$ wet weight respectively (Table 6).

None of the 15 harvest samples analysed exceeded the standard for the sum of 6 PCBs [‘EFSA sum of 6 CBs’]. Table 6 provides details of number of samples tested and the concentration range.

Organochlorine pesticides

Organochlorine pesticides are synthetic substances used for pest control that are persistent and widespread in the marine environment despite the fact that their use has largely been phased out over recent decades. A number of OCPs are included in residues testing including DDT and its breakdown products. Chlorinated pesticides behave similarly to PCBs in the environment and do not have maximum concentrations in fish set by the EC. Due to their chemical properties (fat solubility) these substances bio-accumulate in fish tissue and also bio-magnify through the marine food chain. A number of OSPAR contracting countries have set standards/guidance values for certain OCPs and Appendix 1 presents the strictest of these in so far as Marine Institute is aware.

All the harvest samples (8 samples) analysed by CER Groupe Laboratory for chlorinated pesticides were below these levels and were reported as compliant.

Group B3c: Chemical elements

Levels of mercury were very low and well below the relevant European maximum limits in all of the samples tested (Appendix 1) by the MI. Mercury has a maximum limit set in fish of 0.5 mg kg⁻¹ wet weight [Note: New COMMISSION REGULATION (EU) 2022/617 with lower limit of 0.30 mg kg⁻¹ shall apply to 2022 samples onwards]. The highest mercury concentration obtained for the 8 samples analysed was 0.04 mg kg⁻¹ wet weight. Table 6 provides a breakdown of the number of samples tested and the concentration range for the samples tested. **All 8 harvest samples were reported as compliant for mercury.**

Table 6: Trace metal (mg kg⁻¹) and PCB (µg kg⁻¹) concentrations and maximum limits (salmon and trout)

Parameter	Median / Mean	Range	EC Max Limit	Number Tested
Mercury	0.03/ 0.03	0.01 – 0.04	0.5	8
EFSA PCB 6 ¹	6.48/ 6.47	2.13 – 10.48	75	15

For values reported as “nd”, substances were not detected above the Limit of Detection (LOD is given in brackets)

¹EFSA PCB 6: sum of the following non-dioxin like PCBs-PCB 28, 52, 101, 138, 153, 180

Group B3e: Dyes

The following triphenylmethane dyes are analysed in the MI as part of Group B3e substances, malachite green and its metabolite leuco malachite green, brilliant green, crystal violet, leuco crystal violet, and victoria blue. These dyes could be used illegally in aquaculture as they exhibit antimicrobial and antiparasitic properties. Malachite green is a common commercial fabric dye which had been widely used both prophylactically and in the treatment of fungal infection of both fish and eggs for over 60 years. It is also effective against several protozoal infestations, including agents causing proliferative kidney disease (PKD) and ichthyophthiriosis (white dot disease). Malachite green was regularly detected in aquaculture samples during the early years of the residues monitoring but as a result of increased industry awareness of its status as an unauthorised substance, supported by monitoring and enforcement, the use of malachite green has ceased with no non-compliant results reported since 2004. Its use had been primarily associated with freshwater farms and hatcheries; therefore, freshwater sites are particularly targeted by the NRCP. Malachite green is possibly both carcinogenic and genotoxic (i.e. damaging to DNA).

A minimum required performance level (MRPL) has been set for the sum of malachite green and its metabolite leuco malachite green² at 2 µg kg⁻¹ and the MI has set a decision limit of 1.0 µg kg

² The MRPL of 2µg kg⁻¹ was reaffirmed by EFSA in 2016

<https://www.efsa.europa.eu/de/efsajournal/pub/4530> ; New RPA for Malachite green of 0.5 µg kg⁻¹ shall apply from 8th November 2022 reference Commission Regulation 2019/1871

⁻¹ for total malachite green and 0.5 µg kg⁻¹ leuco malachite green individually i.e. a sample is deemed non-compliant if detected above the decision limit. There has been no evidence of brilliant green, crystal violet, leuco crystal violet, victoria blue being used in aquaculture in Ireland; however, these dyes have the potential to be used to treat Saprolegnia (fungus) either when present on the fish or as a prophylactic treatment to protect fish eggs from infection. No MRPL has been set for brilliant green, crystal violet, leuco crystal violet, victoria blue. However as these dyes are unauthorised a decision limit of 0.5 µg kg⁻¹ has been set for all dyes.

All 64 target samples (i.e. 24 harvest and 40 other stage of production) tested for malachite green and its metabolite leuco malachite green, crystal violet and its metabolite leuco crystal violet, brilliant green, victoria blue were found to be compliant i.e. negative.

PART B

Summary Report on 2021 Border Control Posts Product Testing undertaken at the Marine Institute

Carried out under Commission Regulation 2019/2130 establishing detailed rules rules on the operations to be carried out during and after documentary checks, identity checks and physical checks on animals and goods subject to official controls at border control posts

&

Commission Regulation (EC) No 2017/625 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products

Third Countries (non-EU) wishing to export animal products to the EU are required to satisfy the European Commission that their residue surveillance measures provide equivalent guarantees for EU consumers similar to EU residue surveillance 96/23/EC. Therefore, food imports of animal origin from a Third country may only be brought into the European Community through a Border Control Post (BCP) that has been approved for importation. In Ireland, the responsibility for carrying out checks at the BCP (Dublin Port, Rosslare Port and Shannon Airport) is with the DAFM BCP Officers.

In 2021, BCP samples were collected by DAFM Sampling Officers and samples for testing of antibacterials (B1a), anthelmintics (B2a), heavy metals (B3d) and dyes (B3e) were sent to the Marine Institute for testing in accordance with 2021 BCP plan (Appendix 6). In total 12 random samples were sent to the Institute by the DAFM Sampling Officers at Dublin Port, Rosslare Port and Shannon Airport. The 2021 BCP results as tested at the Marine Institute are presented in Table 7. **All 12 random samples were reported as compliant.**

In addition, Safeguard samples analysed under Commission Implementing Decision 2016/1774/EC amending Decision 2010/381/EU ‘*on emergency measures applicable to consignments of aquaculture products imported from India and intended for human consumption*’ were received from DAFM, consisting of 23 shrimp samples for tetracycline analysis. This testing requires a rapid turnaround time as consignments are held pending the compliant result. Results are presented in Table 8. **All 23 safeguard samples were reported as compliant.**

Table 7: 2021 Border Control Posts results for seafood samples tested at Marine Institute

MI CODE	DAFM Sample code	BCP Office	Product type	Substances for Identification	Result
RESBCP2021/5005	DPP2021/0336	Dublin Port	Frozen raw shrimp	Dyes	Compliant
RESBCP2021/5008	DPP2021/0769	Dublin Port	Frozen Prawn	Dyes	Compliant
RESBCP2021/5009	DPP2021/0717	Dublin Port	Cooked Prawns	Avermectins	Compliant
RESBCP2021/5012	DPP2021/0599	Dublin Port	Formed cod portions	Cadmium	Compliant
RESBCP2021/5014	ROS12021/001	Rosslare Port	Frozen Pangasianodon hypothalamus catfish	Antibiotics ¹	Compliant
RESBCP2021/5015	ROS12021/002	Rosslare Port	Asian Seabass Lates calcarifer	Anthelmintics	Compliant
RESBCP2021/5016	ROS12021/003	Rosslare Port	Clarias garepinus catfish	Dyes	Compliant
RESBCP2021/5017	ROS12021/004	Rosslare Port	Squid 'Loligo opalescens'	Chemical elements (Heavy metals)	Compliant
RESBCP2021/5022	DPP2021/1453	Shannon Airport	Thunnus Albacares	Lead	Compliant
RESBCP2021/5029	DPP2021/1851	Dublin Port	Frozen Prawns	Malachite Green	Compliant
RESBCP2021/5030	DPP2021/1851	Dublin Port	Frozen Prawns	Avermectins	Compliant
RESBCP2021/5034	DPP2021/2042	Dublin Port	Frozen Prawns	Dyes	Compliant

¹ Antibacterials – MI Method LCMSMS not accredited

Table 8: 2021 Safeguard results for fishery products

MI CODE	DAFM Sample code	BCP Office	Product type	Substances for Identification	Result
RESBCP2021/5001	DPP2021/0179	Dublin Port	Frozen raw Shrimp	Tetracyclines ¹	Compliant
RESBCP2021/5002	DPP2021/0289	Dublin Port	Frozen Shrimp	Tetracyclines ¹	Compliant
RESBCP2021/5003	DPP2021/0429	Dublin Port	Frozen raw Shrimp	Tetracyclines ¹	Compliant
RESBCP2021/5004	ARA718786	Dublin Port	Frozen Raw Shrimp	Tetracyclines ¹	Compliant
RESBCP2021/5006	DPP2021/0554	Dublin Port	Frozen Prawns	Tetracyclines ¹	Compliant
RESBCP2021/5007	BIP003 DPP2021/0769	Dublin Port	Frozen Prawns	Tetracyclines ²	Compliant
RESBCP2021/5010	DPP2021/0774	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant
RESBCP2021/5011	DPP2021/0888	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant
RESBCP2021/5013	DPP2021/1036	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant
RESBCP2021/5018	DPP2021/1144	Dublin Port	Frozen Peeled Prawn	Tetracyclines ²	Compliant
RESBCP2021/5019	DPP2021/1152	Dublin Port	Frozen Peeled Shrimp	Tetracyclines ²	Compliant
RESBCP2021/5020	DPP2021/1265	Dublin Port	Frozen Prawns	Tetracyclines ²	Compliant
RESBCP2021/5021	DPP2021/1266	Dublin Port	Frozen Prawns	Tetracyclines ²	Compliant
RESBCP2021/5023	DPP2021/1516	Dublin Port	Frozen Prawns	Tetracyclines ²	Compliant
RESBCP2021/5024	DPP2021/1610	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant
RESBCP2021/5025	DPP2021/1650	Dublin Port	Frozen Prawns	Tetracyclines ²	Compliant
RESBCP2021/5026	DPP2021/1511	Dublin Port	Frozen Shrimp	Tetracyclines ²	Compliant
RESBCP2021/5027	DPP2021/1763	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant
RESBCP2021/5028	DPP2021/1822	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant

¹ Analysed by Eurofins Laboratory² Analysed by CER Groupe Laboratory

Table 8 (continued): 2021 Safeguard results for fishery products

MI CODE	DAFM Sample code	BCP Office	Product type	Substances for Identification	Result
RESBCP2021/5031	DPP2021/1967	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant
RESBCP2021/5032	DPP2021/2081	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant
RESBCP2021/5033	DPP2021/2042	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant
RESBCP2021/5035	DPP2021/2061	Dublin Port	Frozen Peeled Prawns	Tetracyclines ²	Compliant

¹ Analysed by Eurofins Laboratory

² Analysed by CER Groupe Laboratory

Appendix 1: Source of Maximum Residues Limits, Decision Limits and Guideline Values used for comparison with the results for 2021

Parameter	Maximum Level or Decision Limit ⁶	Source
Group A Compounds¹:		
Methyltestosterone, 17b-Oestradiol, Chloramphenicol, Nitrofurans & Nitroimidazoles		These are banned substances and should not be detected.
Ivermectin	1 µg kg ⁻¹	Decision Limit ³
Doramectin	1µg kg ⁻¹	Decision Limit ³
Emamectin B1a	100 µg kg ⁻¹	Maximum Residue Limit ²
Cypermethrin	50 µg kg ⁻¹	Maximum Residue Limit ²
Deltamethrin	10 µg kg ⁻¹	Maximum Residue Limit ²
Teflubenzuron	500 µg kg ⁻¹	Maximum Residue Limit ²
Diflubenzuron	10 µg kg ⁻¹	Maximum Residue Limit ^{2 9}
Antibacterial Substances		
• Sulphonamides	100 µg kg ⁻¹	Maximum Residue Limit ²
• Oxytetracycline (Tetracyclines)	100 µg kg ⁻¹	Maximum Residue Limit ²
• Oxolinic Acid (Quinolones)	100 µg kg ⁻¹	Maximum Residue Limit ²
• Flumequine (Quinolones)	600 µg kg ⁻¹	Maximum Residue Limit ²
• Sarafloxacin (Quinolones)	30 µg kg ⁻¹	Maximum Residue Limit ²
• Florfenicol	1000 µg kg ⁻¹	Maximum Residue Limit ²
EFSA PCB6 (inc. LOQ) ⁷	75 µg kg ⁻¹	EC Maximum Limit ⁸ ,
HCB	50 µg kg ⁻¹	Norway (G) ⁴
γ HCH	100 µg kg ⁻¹	Finland (S) ⁴
p,p’DDT and metabolites	500 µg kg ⁻¹	Finland (S) ⁴
Aldrin + Dieldrin	100 µg kg ⁻¹	Finland (S) ⁴
Endrin	50 µg kg ⁻¹	Finland (S) ⁴
Total Malachite Green	1 µg kg ⁻¹	Decision Limit ³
Leuco Malachite Green	0.5 µg kg ⁻¹	Decision Limit ³
Brilliant Green	0.5 µg kg ⁻¹	Decision Limit ³
Crystal Violet	0.5 µg kg ⁻¹	Decision Limit ³
Leuco Crystal Violet	0.5 µg kg ⁻¹	Decision Limit ³
Victoria Blue	0.5 µg kg ⁻¹	Decision Limit ³
Mercury	0.5 mg kg ⁻¹	EC Maximum Limit ⁵

Notes:

¹ Commission Regulation (EU) No. 37/2010 (Table 2) and Directive 2008/97/EC: *Substances banned and should not be detected.*

² Commission Regulation (EU) No. 37/2010 (Table 1) *on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin.*

³ These compounds are not authorised for use in finfish; concentrations above the analytical method decision limit are non-compliant.

⁴ Total Malachite Green is the sum of Malachite Green and Leuco Malachite Green

⁵ OSPAR: *A compilation of standards and guidance values for contaminants in fish, crustaceans and molluscs for the assessment of possible hazards to human health*, Update 1993, JMP 17/3/10-E. (S) standard; (G) guidance value.

⁶ COMMISSION REGULATION (EU) 2022/617 of 12 April 2022 amending Regulation (EC) No 1881/2006 as regards maximum levels of mercury in fish.

⁷ Maximum Residue Limits and Decision Limits concentrations are on a wet weight basis.

⁸ EFSA PCB6 (inc. LOQ): sum of the following 6 CB congeners -PCB 28, 52, 101, 138, 153, 180.

⁹ Commission Regulation (EC) No. 1259/2011 amending Regulation No. 1881/2006 *as regards maximum levels for dioxins, dioxin-like PCBs and non dioxin-like PCBs in foodstuffs.*

¹⁰ Commission Regulation (EU) 2019/1881 of 8 November 2019 amending Regulation (EU) No 37/2010 to classify the substance diflubenzuron as regards its maximum residue limit came into force on 10th January 2020. This regulation reduces the MRL from 1000 µg kg⁻¹ to 10 µg kg⁻¹. Samples analysed by the Marine Institute in 2021 were analysed against the 1000 µg kg⁻¹ (MRL) and consequently cannot be assessed for compliance. As of September 2021 samples were sent to CER subcontract laboratory.

Appendix 2: Accreditation to ISO 17025

The table below outlines the parameters as tested at the Marine Institute for which the Marine Institute is accredited by the Irish National Accreditation Board (INAB) to ISO 17025 as detailed in Scope Registration Number 130T (<https://www.inab.ie/inab-directory/laboratory-accreditation/testing-laboratories/marine-institute.html>).

Scope Registration Number 130T	
Test	SOP
Ivermectin, Emamectin B1a , Doramectin ¹	CHE-8
Mercury ²	CHE-32
Dyes¹ : Malachite Green, Crystal Violet, Victoria Blue, Leuco Crystal Violet, Leuco Malachite Green and Brilliant Green	CHE-167
Screening of Antibiotic Residues in Fish ¹	FHU-1
Screening of sulphadiazine ³	FHU-119
Moisture % ⁴	CHE-52
When collecting samples the laboratory complies with Council Directive 96/23/EC	CHE-6

¹ Accreditation is for finfish only

² Accreditation is for Marine Biota

³ Accreditation suspended for Florfenicol since July 2021

Appendix 3: Quality Control

To check the quality of the data produced during the 2021 National Surveillance Scheme for chemical residues in farmed fish, Quality Control (QC) samples in the form of either reagent blanks, spiked samples or Certified Reference Materials (CRMs) were analysed with each batch of samples tested by the Marine Institute. The quality assurance results were considered sufficient for the purpose of the monitoring programme. For CRMs, z-scores were calculated using the methodology of QUASIMEME (Quality Assurance of Marine Environment and Monitoring in Europe); A Z-score of between -2 and +2 is generally considered satisfactory for the purpose of environmental monitoring programmes. Where available the MI participate in Proficiency schemes such as FAPAS, QUASIMEME to verify our analytical methods independently. Quality Control information for tests carried out at the Marine Institute is available on request. Additional tests carried out by approved subcontract laboratories as listed in Appendix 4 are accredited to ISO 17025.

Appendix 4: Methods of Analysis

Analysis carried out at the Marine Institute laboratories unless otherwise stated

1.1 Sample Collection and Preparation (MI SOP CHE-6): MI Testing Laboratory

In accordance with the 2021 National Residues Control Plan for Aquaculture under Council Directive 96/23/EC, Staff authorised under the *Animal Remedies Act 1993*, collected samples at farms or at processing plants. All samples were transported to the laboratory under controlled conditions, while ensuring an unbroken chain of custody. Sub-samples were taken for both analytical and archive purposes and all sub-samples were stored frozen ($< -18^{\circ}\text{C}$).

Note: Due to COVID restrictions, samples in 2021 were collected by MI or SFPA authorised officers and worked up back at the Marine Institute laboratories.

1.2 Analysis of Ivermectin, Doramectin and Emamectin B1a by Ultra-Fast Liquid Chromatography (UFLC) with Fluorescence Detection (MI SOP CHE-8): MI Testing Laboratory

Approximately 5g of sample from each fish was homogenised and extracted with methanol. The extract was cleaned up by liquid/liquid partition and solid phase extraction techniques. The resultant residue was derivatised and analysed by liquid chromatography (UFLC) with fluorescence detection.

A sample is screened firstly by the semi-quantitative screening method and if a sample was screened at or above the screening detection limit (SDL) for that analyte, it would trigger a full quantitative test and result confirmed where applicable. The SDL for Emamectin is at half the MRL i.e. the SDL is $50 \mu\text{g kg}^{-1}$ and the SDL is at half the Decision Limit for Ivermectin and Doramectin i.e. the SDL is $0.5 \mu\text{g kg}^{-1}$ for both Ivermectin and Doramectin.

1.3 Analysis of Teflubenzuron and Diflubenzuron by Ultra-Fast Liquid Chromatography (UFLC) with Ultraviolet (UV) Detection (MI SOP CHE-42): MI Testing Laboratory & CER Groupe Laboratory

This method involves the extraction of approximately 3g of tissue with acetonitrile followed by clean up using liquid/liquid partition and silica SPE. Quantification was carried out by reverse phase UFLC using an acetonitrile/water mobile phase and UV detection. Confirmation and peak purity was evaluated using a photodiode array detector. A sample is screened firstly by the semi-quantitative screening method and if a sample was screened at or above the screening detection limit (SDL) for that analyte, it would trigger a full quantitative test and result confirmed where applicable. As of September 2021, testing suspended in the Marine Institute as Commission Regulation (EU) 2019/1881 of 8 November 2019 amending Regulation (EU) No 37/2010 to classify the substance diflubenzuron as regards its maximum residue limit came into force on 10th January 2020. This regulation reduces the MRL from $1000 \mu\text{g kg}^{-1}$ to $10 \mu\text{g kg}^{-1}$. Samples analysed by the Marine Institute in 2021 were analysed against the $1000 \mu\text{g kg}^{-1}$ (MRL) and consequently cannot be assessed for compliance. As of September 2021 samples were sent to CER subcontract laboratory (see below for details).

1.4 Analysis of Teflubenzuron and Diflubenzuron by LC-MS/MS: CER Groupe Laboratory

A sub-sample is extracted twice with ethyl acetate and analysed for teflubenzuron and diflubenzuron by Liquid Chromatography coupled to mass spectrometry (LC-MS/MS).

1.5 Analysis for Cypermethrin and Deltamethrin by Gas Chromatography-Mass Spectrometry (GC-MSMS) (MI SOP CHE-215): MI Testing Laboratory

Samples were extracted using a modified QUECHERS approach followed by dispersive solid phase extraction (DSPE) and a secondary clean up using florisil solid phase extraction. The extract was reconstituted in iso-octane and analysed by GC-MSMS. A sample is screened firstly by the semi-quantitative screening method and if a sample was screened at or above the screening detection limit (SDL) for that analyte it would trigger a full quantitative screening test. The SDL for Cypermethrin and Deltamethrin is at half the MRL i.e. the SDL is 25 µg kg⁻¹ and 5 µg kg⁻¹ respectively.

1.6 Analysis of Dyes by Ultra-Fast Liquid Chromatography (UFLC) with MS/MS (MI SOP CHE-167): MI Testing Laboratory

Samples were extracted for Dyes analysis with Acetonitrile by shaking in the presence of hydroxylamine and magnesium sulphate. The eluant is evaporated to dryness followed by reconstitution in a mixture of acetonitrile/water /ascorbic acid solution. This solution is centrifuged, filtered and analysed for brilliant green, crystal violet, leuco crystal violet, leuco malachite green, malachite green and victoria blue by Ultra-Fast Liquid Chromatography coupled to Mass Spectrometry (UFLC-MS/MS). A sample is screened firstly by the semi-quantitative screening method and if a sample was screened at or above the screening detection limit (SDL) for that analyte, it would trigger a full quantitative test and result confirmed where applicable. The SDL is at half the Decision Limit i.e. the SDL is 0.25 µg kg⁻¹ for all dyes

1.7 Screening for Antibacterial Substances (Quinolones, Tetracyclines) using modified Two Plate Test (MI SOP FHU-1): MI Testing Laboratory

Antimicrobial screening was carried by the Fish Health Unit (FHU) of the Marine Institute, using a modification of the Two Plate Test (TPT). The aim of this method is to reveal residues of substances with antibacterial activity by testing the fish tissue using agar plates that have been seeded with suitably sensitive bacterial cultures. This method is qualitative in nature and was used to detect residues of Quinolones and Tetracyclines.

1.8 Analysis of Antibacterial Substance (Florfenicol) by LC-MS/MS: CER Groupe Laboratory

Samples were extracted twice with ethyl acetate and analysed for Florfenicol, Florfenicol Anime and Thiamphenicol, Trimethoprim by Liquid Chromatography coupled to mass spectrometry (LC-MS/MS).

1.9 Screening for sulphonamides by Evidence Investigator (MI SOP FHU-119): MI Testing Laboratory; Confirmatory Testing Laboratory: CER Groupe Laboratory

Screening for sulphonamides was carried by the Fish Health Unit (FHU) of the Marine Institute using Immunoassay. This method is qualitative in nature and tested on the Evidence Investigator instrument. Where confirmatory analysis was required the samples were tested by CER Groupe Laboratory.

1.10 Screening for Group A3 Compounds by ELISA method IEC Testing Laboratory; Confirmatory Testing Laboratory: CER Groupe Laboratory

Screening for Group A3 compounds was carried out by the Irish Equine Centre (IEC) using the Enzyme-Linked Immuno Sorbant Assay (ELISA) method. This method is qualitative in nature and was used to detect residues of 17β-oestradiol and methyltestosterone. Where further quantitative screening or confirmatory analysis was required the samples were tested by CER Groupe Laboratory. In 2021, further screening was required by CER Groupe Laboratory for 17β-oestradiol for a select number of samples. Reference the footnote in the analytical results, if applicable.

1.11 Screening for Group A6 Compounds by ELISA method IEC Testing Laboratory and CER Groupe Laboratory

Screening for Group A6-chloramphenicol was carried out by the Irish Equine Centre (IEC) using the Enzyme-Linked Immuno Sorbant Assay (ELISA) method. This method is qualitative in nature and was used to detect residues of chloramphenicol. In 2021, further confirmatory testing was required for Chloramphenicol for a select number of samples. Reference the footnote in the analytical results, if applicable.

1.12 Screening for Group B - Corticosteroids by Elisa method IEC Testing Laboratory; Confirmatory Testing Laboratory: Wageningen

Screening for corticosteroids was carried out by the Irish Equine Centre (IEC) using the Enzyme-Linked Immuno Sorbant Assay (ELISA) method. Where further quantitative LCMSMS screening was required for corticosteroids the sample was tested by Wageningen.

1.13 Analysis of Nitrofurans by LC-MS/MS Eurofins Testing Laboratory and CER Groupe Laboratory

Analysis of nitrofurans was carried out by Eurofins from January to April 2021 and CER Groupe from May to December 2021. Samples are derivatised with 2-nitrobenzaldehyde followed by extraction with ethyl acetate and determined by Liquid Chromatography coupled to mass spectrometry (LC-MS/MS). Metabolites for furazolidone, furaltadone, nitrofurantoin and nitrofurazone are analysed. Reference the footnote in the analytical results to confirm which laboratory carried out this testing.

1.14 Analysis of Nitroimidazoles by LC-MS/MS Eurofins Testing Laboratory and CER Groupe Laboratory

Analysis of nitroimidazoles was carried out by Eurofins from January to April 2021 and CER Groupe from May to December 2021. After the addition of buffers and sodium chloride the samples are extracted with acetonitrile and determined by Liquid Chromatography coupled to mass spectrometry (LC-MS/MS) and analysed for the following nitroimidazoles: dimetridazole and its metabolite, ipronidazole and its metabolite, metronidazole and its metabolite and ronidazole. Reference the footnote in the analytical results to confirm which laboratory carried out this testing.

1.15 Analysis for Polychlorinated Biphenyls (PCBs) by GCMS (MI SOP CHE-170): MI Testing Laboratory

Lipid was extracted from the samples followed by clean-up of the lipid by column chromatography. The extract was analysed by GC-MS using a PLOT capillary column.

1.16 Analysis for Organochlorine Pesticides (OCPs) by GCMSMS CER Groupe Testing Laboratory

A sub-sample is extracted with acetonitrile, prior to QUECHER clean-up and subsequent determination using gas chromatography with mass spectrometric detection (GC-MS/MS).

1.17 Analysis of Mercury by Cold Vapour Atomic Fluorescence Spectroscopy CV-AFS (MI SOP CHE-32): MI Testing Laboratory

Concentrated nitric acid (4 ml) was added to approximately 0.2 g freeze-dried tissue, which was then digested in a laboratory microwave oven (CEM Mars Xpress). After cooling, potassium permanganate was added until the purple colour of the solution stabilized. Sufficient hydroxylamine sulphate/sodium chloride solution was added to neutralise the excess potassium permanganate and potassium dichromate was added as a preservative. The solution was diluted to 100mls using deionised water. Following reduction of the samples with tin (II) chloride, total mercury concentration was determined by Cold Vapour Atomic Fluorescence Spectroscopy (CV-AFS) using a PSA Merlin Analyser.

1.18 Determination of Moisture Content (MI SOP CHE-52): MI Testing Laboratory

The moisture content was determined by drying approximately 1g of tissue overnight in an oven at 104°C to constant weight.

Appendix 5: 2021 Plan for the Monitoring and Detection of Residues in Aquaculture products

1. National Legislation on use of substances listed in Annex I of Directive 96/23/EC

Animal Remedies Act, 1993 (No. 23 of 1993)
Animal Remedies Regulations, 2007 (SI No. 786 of 2007)
Control of Animal Remedies and their Residues Regulations 2009(SI No. 183 of 2009)

2. Relevant Departments and their infrastructure

- **Marine Institute (MI)** Rinvile, Oranmore, Co. Galway
- **Dept of Agriculture, Food & Marine (DAFM)**, Agriculture House, Kildare Street, Dublin 2
- **Sea-Fisheries Protection Authority (SFPA)**, Block B, Clogheen, Clonakilty, Co. Cork

3. Staff resources to carry out plan

- Authorised Officers will collect all samples.
- Analysis of Group A substances - performed by Irish Equine Centre and Wageningen GfA GmbH
- Analyses for Group B substances - performed within the Marine Institute with the exception of those indicated in the plan.

4. Approved laboratories

**Marine Institute
(MI)**
Rinvile,
Oranmore,
Co. Galway
H91 R673

Irish Equine Centre (IEC)
Johnstown,
Naas,
Co. Kildare
W91 RH93

Wageningen
Laboratory for
Residue analysis,
Akkermaalsbos 2,
6708 WB
Wageningen,
The Netherlands

CER Groupe
Rue du Point du jour
8,
B-6900 MARLOIE
(BELGIUM)

5. Additional Information

For Group A analysis more than half the samples are ‘on farm’ samples, taken at various stages of production, the remainder are samples taken at harvest.

**DIRECTIVE 96/23/EC ANNUAL PLAN FOR THE EXAMINATION FOR RESIDUES
IN FARMED FINFISH FOR THE YEAR 2021**

Sampling levels and frequency:

Minimum number of fish from which samples must be taken.

Finfish.

Total Tonnes Produced 2019^(a)	Minimum no. to be tested^(a)	Minimum No. Group A	Minimum No. Group B
11,941	Production (tonnes)/100 = 120	1/3 Total Tested = 40	2/3 Total Tested = 80

^(a) min no. to be tested will be based on 2019 finfish production figures as 2021 figures are not available

1	2	3	4	5	6	7	8	9
Group of Substances	Compounds	Matrix	Lab Method	CCbeta (Screening) Detection Capability	CCalpha (Confirmatory) Decision Limit	Level of action	Sample No.	Laboratory
Group A								
A 3 Steroids	Methyltestosterone	Muscle & Skin	(1) ELISA (2) GCMSMS	1)0.9 µg kg ⁻¹	2)0.05 µg kg ⁻¹	Presence	40 ^(b)	(1) IEC (2) EURL-Wageningen
	17β-Oestradiol	Muscle & Skin	(1) ELISA (2) GCMSMS	1)1.5 µg kg ⁻¹	2)0.17 µg kg ⁻¹	Presence	8 ^(b)	(1) IEC (2) EURL-Wageningen
A 6 Compounds	Chloramphenicol	Muscle & Skin	(1) ELISA (2) UHPLC-MS/MS	0.25 µg kg ⁻¹	^(e)	Presence	40 ^(b)	(1) IEC (2) Wageningen
	Nitrofurans AHD AMOX AOZ DNSH SEM	Muscle & Skin	UHPLC-MSMS	0.5 µg kg ⁻¹ 0.1 µg kg ⁻¹ 0.1 µg kg ⁻¹ 0.1 µg kg ⁻¹ 0.1 µg kg ⁻¹	0.43 µg kg ⁻¹ 0.09 µg kg ⁻¹ 0.09 µg kg ⁻¹ 0.09 µg kg ⁻¹ 0.09 µg kg ⁻¹	Presence	8 ^(b)	2)CER Group
	Nitroimidazoles Dimetridazole Metronidazole Ronidazole Carnidazole HMMNI Hydroxymetronidazole Ipronidazole IPZOH (Hydroxyipronidazole) Ornidazole Secnidazole Ternidazole Tinidazole	Muscle & Skin	UHPLC-MSMS	0.5 µg kg ⁻¹ 0.1 µg kg ⁻¹ 1 µg kg ⁻¹ 0.1 µg kg ⁻¹ 1 µg kg ⁻¹ 1 µg kg ⁻¹ 0.1 µg kg ⁻¹ 0.1 µg kg ⁻¹ 0.1 µg kg ⁻¹ 0.1 µg kg ⁻¹ 0.1 µg kg ⁻¹ 0.1 µg kg ⁻¹ 0.1 µg kg ⁻¹	0.45 µg kg ⁻¹ 0.09 µg kg ⁻¹ 0.85 µg kg ⁻¹ 0.08 µg kg ⁻¹ 0.81 µg kg ⁻¹ 0.86 µg kg ⁻¹ 0.09 µg kg ⁻¹ 0.08 µg kg ⁻¹ 0.08 µg kg ⁻¹ 0.08 µg kg ⁻¹ 0.08 µg kg ⁻¹ 0.08 µg kg ⁻¹	Presence	8 ^(b)	2) CER Group

Column 4: (1) Screening Method, (2) Confirmatory Method

^(b) At least 50% of Group A are “on farm” samples

1	2	3	4	5	6	7	8	9
Group of Substances	Compounds	Tissue	Lab Method	CCbeta (Screening) Detection Capability	CCalpha (Confirmatory) Decision Limit	Level of action	Sample No.	Laboratory
B 1 Antibacterial substances	Microbiological screening: <u>Quinolones</u> : ^(c) -Oxolinic acid -Flumequine	Muscle & Skin	Modified EC 2-plate method	75 µg kg ⁻¹ 150 µg kg ⁻¹	N/A	(c)	80	1)MI
	Microbiological screening: <u>Tetracyclines</u> ^(c) -oxytetracycline	Muscle & Skin	Modified EC 2-plate method	100 µg kg ⁻¹	N/A	(c)	60	1)MI ^(d)
	Screening: <u>Sulphonamides</u> -Sulphadiazine	Muscle & Skin	Immunoassay	50 µg kg ⁻¹	N/A	(c)	80	1)MI
	<u>Florfenicol</u> Florfenicol amine Thiamphenicol		2) LCMSMS		1086 µg kg ⁻¹ 1115 µg kg ⁻¹ 58 µg kg ⁻¹	1086 µg kg ⁻¹ 1115 µg kg ⁻¹ 58 µg kg ⁻¹	60	2) CER Groupe
	<u>Tetracycline</u> Chlortetracycline Demeclocycline Doxycycline epi-chlortetracycline epi-oytetracycline epi-tetracycline Oxytetracycline Tetracycline	Muscle & Skin	2) UHPLC-MS/MS		112 µg kg ⁻¹ 127 µg kg ⁻¹ 117 µg kg ⁻¹ 120 µg kg ⁻¹ 122 µg kg ⁻¹ 117 µg kg ⁻¹ 121 µg kg ⁻¹ 119 µg kg ⁻¹	112 µg kg ⁻¹ 127 µg kg ⁻¹ 117 µg kg ⁻¹ 120 µg kg ⁻¹ 122 µg kg ⁻¹ 117 µg kg ⁻¹ 121 µg kg ⁻¹ 119 µg kg ⁻¹	Confirmation and post screening identification of positive Microbiological Samples/ Bioassay	2) CER Groupe
	<u>Quinolones</u> Cinoxacin Ciprofloxacin Danofloxacin Difloxacin Enoxacin Enrofloxacin Flumequine Marbofloxacin Nalidixic acid Norfloxacin Ofloxacin Oxolinic acid Sarafloxacin		2) UPLC/MS-MS		1.9 µg kg ⁻¹ 108 µg kg ⁻¹ 118 µg kg ⁻¹ 316 µg kg ⁻¹ 3.9 µg kg ⁻¹ 108 µg kg ⁻¹ 637 µg kg ⁻¹ 1.9 µg kg ⁻¹ 2.2 µg kg ⁻¹ 1.9 µg kg ⁻¹ 2.2 µg kg ⁻¹ 113 µg kg ⁻¹ 33.3 µg kg ⁻¹	1.9 µg kg ⁻¹ 108 µg kg ⁻¹ 118 µg kg ⁻¹ 316 µg kg ⁻¹ 3.9 µg kg ⁻¹ 108 µg kg ⁻¹ 637 µg kg ⁻¹ 1.9 µg kg ⁻¹ 2.2 µg kg ⁻¹ 1.9 µg kg ⁻¹ 2.2 µg kg ⁻¹ 113 µg kg ⁻¹ 33.3 µg kg ⁻¹		2) CER Groupe ^(e)

Column 4: (1) Screening Method, (2) Confirmatory Method

^(c)For screened positive samples i.e. above CC_{beta} for tetracyclines, quinolones, florfenicol and sulphonamides using MI in-house methods, these samples will be sent to subcontract laboratory for confirmatory (LCMSMS) testing.

^(d) MI may require for a temporary period to subcontract this testing to a validated and accredited laboratory for screening by LCMSMS. This transition period will facilitate the verification task following 2020 sourcing & training of staff on production of B.cereus spores for tetracycline and florfenicol as stock of commercially available spores becomes depleted. Note: MI LCMSMS antibiotic (tetracyclines, quinolones, sulphonamides) method is validated and INAB audit scheduled January 2022- this method may require to be used for screening if delays in verification- clients will be notified prior to use.

^(e) Can provide confirmation under accreditation scope. CCalpha will be calculated at that point and level of action updated.

1	2	3	4	5	6	7	8	9
Group of Substances	Compounds	Tissue	Lab Method	CCbeta (Screening) Detection Capability	CCalpha (Confirmatory) Decision Limit	Level of action	Sample No.	Laboratory
B 1 Antibacterial substances	<u>Sulphonamides</u> Trimethoprim Dapsone (A6) Sulfachloropyridazine Sulfadiazine Sulfadimethoxine Sulfadimidine (Sulfamethazine) Sulfadoxine Sulfamerazine Sulfameter (sulfamethoxydiazine)	Muscle & Skin	2) UPLC/MS-MS		51 µg kg ⁻¹ 0.58 µg kg ⁻¹ 116 µg kg ⁻¹ 105 µg kg ⁻¹ 111 µg kg ⁻¹ 105 µg kg ⁻¹ 115 µg kg ⁻¹ 111 µg kg ⁻¹ 111 µg kg ⁻¹	51 µg kg ⁻¹ 0.58 µg kg ⁻¹ 116 µg kg ⁻¹ 105 µg kg ⁻¹ 111 µg kg ⁻¹ 105 µg kg ⁻¹ 115 µg kg ⁻¹ 111 µg kg ⁻¹ 111 µg kg ⁻¹	Confirmation and post screening identification of positive Microbiological Samples/ Bioassay	2) CER Groupe
B2 Other veterinary drugs								
B2 (a) Anthelmintics	Ivermectin Emamectin B1a Doramectin	Muscle & Skin	UFLLC-Flu	- - -	1.0 µg kg ⁻¹ 115 µg kg ⁻¹ 1.0 µg kg ⁻¹	1.0 µg kg ⁻¹ 115 µg kg ⁻¹ 1.0 µg kg ⁻¹	80	MI
B2 (c) Carbamates / Pyrethroids	Cypermethrin Deltamethrin	Muscle & Skin	1)GCMSMS 2) UHPLC-MS/MS	1)47 µg kg ⁻¹ 1)9 µg kg ⁻¹	(e) (e)	(e) (e)	80	1) MI 2) WAG
B2 (f) Other Pharmacologically active substances	Teflubenzuron** Diflubenzuron** Teflubenzuron** Diflubenzuron** Corticosteroids Betamethasone Dexamethasone Flumethasone	Muscle & Skin Muscle & Skin Muscle & Skin	UFLLC-DAD UHPLC-MS/MS (1) ELISA (2) LCMSMS	- - 1) 1.5 µg kg ⁻¹ 1) 1.5 µg kg ⁻¹ 1) 1.5 µg kg ⁻¹	573 µg kg ⁻¹ 1161 µg kg ⁻¹ (e) (e) (e)	573 µg kg ⁻¹ 1161 µg kg ⁻¹ (e) (e) (e)	80	MI CER Group (1) IEC (2) EURL-Wageningen

Column 4: (1) Screening Method, (2) Confirmatory Method

(e) Can provide confirmation under accreditation scope. CCalpha will be calculated at that point and level of action updated.

(f) At least 50% are "on farm" samples

**September 2021 MI suspend testing and testing will be carried out by CER group

1	2	3	4	5	7	8	9
Group of Substances	Compounds	Tissue	Lab Method	Detection limit	Level of action	No. samples	Laboratory
B3 Other substances and environmental contaminants							
B3(a) Organochlorine compounds including PCBs	PCBs Sum of 6 PCBs [PCB28, 52, 101, 138, 153, 180]	Muscle & Skin	GCHRMS	^(g) 0.07 µg kg ⁻¹ per individual congener	^(h) 75 µg kg ⁻¹	16	MI
	Chlorinated Pesticides ⁽ⁱ⁾ γ-HCH DDT and metabolites ^(k) HCB Endrin Aldrin Dieldrin		GCMSMS	^(g) 2.5 µg kg ⁻¹ ^(g) 2.5 µg kg ⁻¹ ^(g) 1.25 µg kg ⁻¹ ^(g) 2.5 µg kg ⁻¹ ^(g) 2.5 mg kg ⁻¹ ^(g) 2.5 mg kg ⁻¹	Excess of Guidance value ⁽ⁱ⁾ 100 µg kg ⁻¹ 500 µg kg ⁻¹ 50 µg kg ⁻¹ 50 µg kg ⁻¹ 100 µg kg ⁻¹ aldrin & dieldrin	8	CER Group
B3(c) Chemical elements	Lead		ICP-MS	7 µg kg ⁻¹	^(h) 300 µg kg ⁻¹	8	MI
	Cadmium		ICP-MS	1 µg kg ⁻¹	^(h) 50 µg kg ⁻¹	8	
	Mercury	CVAFS	2 µg kg ⁻¹	^(h) 500 µg kg ⁻¹	8		
B3(d) Mycotoxins	Aflatoxin B1	Muscle & Skin	HPLC-FLD	0.01 µg kg ⁻¹	-	8	*Not testing due to no suitable laboratory
	Aflatoxin B2			0.01 µg kg ⁻¹			
	Aflatoxin G1			0.01 µg kg ⁻¹			
	Aflatoxin G2			0.01 µg kg ⁻¹			

Commission Regulation No. 1881/2006 as amended setting maximum levels for certain contaminants in foodstuffs; matrix: muscle & skin as skin eaten

^(g) Detection limit is at limit of detection for PCBs and OCPs

⁽ⁱ⁾ There are no national or European maximum limits for organochlorine pesticides in fish. The guidance values used represent the strictest national limits applied by contracting parties to the OSPAR convention and as compiled by OSPAR (1992), in so far as they are known. These values have no statutory basis and are used in the absence of other criteria.

^(j) Additional chlorinated pesticides are also included in routine testing but no action level or guidance values are available

^(k) DDT and metabolites: sum of DDT-o,p', DDT-p,p', DDD-o,p', DDD-p,p', DDE-o,p', DDE-p,p'

1	2	3	4	5	6	7	8	9
Group of Substances	Compounds	Tissue	Lab Method	CCbeta (screening) Detection capability	CCalpha (confirmatory) decision limit	Level of action	No. samples	Laboratory
B3(e) Dyes	Malachite Green (MG) Leuco Malachite Green (LMG) Brilliant Green (BG) Crystal Violet (CV) Leuco Crystal Violet (LCV) Victoria Blue (VB)	Muscle & Skin	UFLCMSMS	- -	0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹	0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹ 0.5 µg kg ⁻¹	64 ^(m) 14 x salmon/sea trout 10 x freshwater trout (harvest) 10 x freshwater trout (osop) 30 x salmon smolts	MI

^(m) 50 of the 64 samples for dyes are “on farm” samples.

Appendix 6: Annual Plan for Sampling Fishery Products and Other Seafood at Border Control Posts - Dublin Port 2021

Group	Test	TRACES sampling list	Samples to be taken	Laboratory
Microbiological	<p>Microbiological testing against Microbiological Criteria stipulated in Regulation 2073/2005</p> <ul style="list-style-type: none"> • <i>Listeria monocytogenes</i> enumeration in <u>Ready-to-eat (RTE)</u> food (Food Safety Criteria) (see note 1 below) • <i>Salmonella</i> detection in <u>cooked</u> crustaceans and molluscan shellfish (Food Safety Criterion) 	1037, 1040, 1042, 1045, 1074, 1076, 1079	<p>3∞ samples, each of $n = 5$ units. Targeting Fishery Products and other seafood for which Microbiological Criteria are stipulated in Regulation 2073/2005 and using the sampling plans (n values) outlined there in (See Note 1 below).</p> <p>∞Sample number subject to change</p>	<p>If sample requires L. Mono enumeration only then please submit for the attention of: Head of Food Microbiology Division, Backweston Laboratory Complex.</p> <p>If sample requires Salmonella and L.mono enumeration then please submit for the attention of : Executive Analytical Chemist (Microbiology). H.S.E. Community Healthcare East. Public Analyst's Laboratory. Sir Patrick Dun's, Lower Grand Canal Street, Dublin 2. D02P667</p>

Group	Test	TRACES sampling list	Samples to be taken	Laboratory
	Histamine	Histamine	<p>4∞ samples of each of <i>n</i> units. Targeting fishery products derived from species associated with high amounts of histidine or fish sauce produced by fermentation of fishery products (See Note 2 below).</p> <p>∞Sample number subject to change</p>	Executive Chemist, Public Analyst's Laboratory, Seamus Quirke Road, Galway. H91 Y952
A.6	Nitrofurans metabolites	Nitrofurazone, Nitrofurantoin, Furazolidone, Furaltadone	<p>10 ∞ aquaculture samples (shellfish & finfish relative to consignment numbers)</p> <p>∞Sample number subject to change</p>	<p>Quality Manager Residue Laboratory Teagasc Food Research Centre, Ashtown Dublin 15</p> <p>Food Safety Department, Ashtown Food Research Centre, Teagasc, Ashtown, Dublin 15.</p>
A.6	Chloramphenicol	Chloramphenicol	<p>2∞ aquaculture samples (shellfish & finfish relative to consignment numbers)</p> <p>∞Sample number subject to change</p>	Irish Equine Centre, Johnstown, Naas, Co. Kildare

Group	Test	TRACES sampling list	Samples to be taken	Laboratory
B.1	Antibacterial substances General 2 plate test &Immuno assay	Antibacterial substances	3[∞] aquaculture samples (See Note 3) (shellfish & finfish relative to consignment numbers) ∞ Sample number subject to change	Residues Coordinator Marine Institute Rinville Oranmore Galway H91 R673 Website: www.marine.ie
B.2.a	Anthelmintics (Avermectins)	Emamectin, Ivermectin Doramectin	2[∞] aquaculture samples (See Note 3) (shellfish & finfish relative to consignment numbers) ∞ Sample number subject to change	
B.3.e	Dyes	Malachite Green (MG) Leuco Malachite Green (LMG) Brilliant Green (BG) Crystal Violet (CV) Leuco Crystal Violet (LCV) Victoria Blue (VB)	4[∞] aquaculture samples (See Note 3) (shellfish & finfish relative to consignment numbers) ∞ Sample number subject to change	
B.3.d	Chemical - Heavy Metals (Specify Pb, Cd, orHg)	Pb Lead Hg Mercury Cd Cadmium	2[∞] fish samples (See Note 3) ∞ Sample number subject to change	

Group	Test	TRACES sampling list	Samples to be taken	Laboratory
	Sulphur Dioxide and 4-Hexylresorcinol		<p>2* ∞ prawn /shrimp samples (1kg approx. per sample)</p> <p>∞ Sample number subject to change</p>	Executive Analytical Chemists, Public Analyst Laboratory, Cork.

Group	Test	TRACES sampling list	Samples to be taken	Laboratory
	Fish speciation		2 ∞ samples ∞ Sample number subject to change	Public Analyst's Laboratory St. Finbarr's Hospital Douglas Road Cork

Appendix 7: Annual Plan for Sampling Fishery Products and Other Seafood at Border Control Posts - Shannon Airport 2021

Group	Test	TRACES residue sampling list No.	Samples to be taken	Laboratory
Microbiological	Microbiological testing against Microbiological Criteria stipulated in Regulation 2073/2005	1037, 1040, 1042, 1045, 1074, 1076, 1079	<p>1∞ samples, each of <i>n</i> units. Targeting Fishery Products and other seafood for which Microbiological Criteria are stipulated in Regulation 2073/2005 and using the sampling plans (<i>n</i> values) outlined there in (See Note 1 below).</p> <p>∞ Sample number subject to change</p>	<p>Public Health Laboratory Limerick</p> <p>Chief Medical Scientist / Technical Manager Public Health Laboratory, HSE West, Ballycummin Ave., Raheen Business Park, Limerick V94 D1W9</p>
B.3.d	Chemical - Heavy Metals (Specify Pb, Cd, or Hg)	Pb Lead Hg Mercury Cd Cadmium	<p>1∞ fish or crustacean samples For live lobster samples can BCP officers please freeze the sample before sending to MI for heavy metal analysis. (See Note 3)</p> <p>∞ Sample number subject to change</p>	<p>Residues Coordinator Marine Institute Rinville Oranmore Galway H91 R673</p> <p>Website: www.marine.ie</p>

Appendix 8: Annual Plan for Sampling Fishery Products and Other Seafood at Border Control Posts - Rosslare Port 2021

Group	Test	TRACES sampling list	Samples to be taken	Laboratory
Microbiological	<p>Microbiological testing against Microbiological Criteria stipulated in Regulation 2073/2005</p> <p><i>Listeria monocytogenes</i> enumeration in <u>Ready-to-eat (RTE)</u> food (Food Safety Criteria) (see note 1 below)</p> <p style="text-align: center;"><i>Salmonella</i> detection in <u>cooked</u> crustaceans and molluscan shellfish (Food Safety Criterion)</p>	1037, 1040, 1042, 1045, 1074, 1076, 1079	<p>1∞ samples, each of $n = 5$ units. Targeting Fishery Products and other seafood for which Microbiological Criteria are stipulated in Regulation 2073/2005 and using the sampling plans (n values) outlined there in (See Note 1 below).</p> <p>∞ Sample number subject to change</p>	<p>If sample requires L. Mono enumeration only then please submit for the attention of: Head of Food Microbiology Division, Backweston Laboratory Complex.</p> <p>If sample requires Salmonella and L. mono enumeration then please submit for the attention of : Executive Analytical Chemist (Microbiology). H.S.E. Community Healthcare East. Public Analyst's Laboratory. Sir Patrick Dun's, Lower Grand Canal Street, Dublin 2. D02P667</p>

				Laboratory
			<p>1x9∞ samples of each of <i>n</i> units. Targeting fishery products derived from species associated with high amounts of histidine or fish sauce produced by fermentation of fishery products (See Note 2 below).</p> <p>∞Sample number subject to change</p>	<p>Executive Chemist, Public Analyst's Laboratory, Seamus Quirke Road, Galway. H91 Y952</p>

Group	Test	TRACES sampling list	Samples to be taken	Laboratory
B.1	Antibacterial substances General 2 plate test &Immuno assay	Antibacterial substances	1∞ aquaculture samples (See Note 3) (shellfish & finfish relative to consignment numbers) ∞ Sample number subject to change	Residues Coordinator Marine Institute Rinville Oranmore Galway H91 R673 Website: www.marine.ie
B.2.a	Anthelmintics (Avermectins)	Emamectin, Ivermectin Doramectin	1∞ aquaculture samples (See Note 3) (shellfish & finfish relative to consignment numbers) ∞ Sample number subject to change	
B.3.e	Dyes	Malachite Green (MG) Leuco Malachite Green (LMG) Brilliant Green (BG) Crystal Violet (CV) Leuco Crystal Violet (LCV) Victoria Blue (VB)	1∞ aquaculture samples (See Note 3) (shellfish & finfish relative to consignment numbers) ∞ Sample number subject to change	
B.3.d	Chemical - Heavy Metals (Specify Pb, Cd, orHg)	Pb Lead Hg Mercury Cd Cadmium	1∞ fish samples (See Note 3) ∞ Sample number subject to change	

Group	Test	TRACES sampling list	Samples to be taken	Laboratory
	Sulphur Dioxide and 4-Hexylresorcinol		<p>1 ∞ samples</p> <p>∞ Sample number subject to change</p>	Executive Analytical Chemists,Public Analyst Laboratory, Cork.
	Fish speciation		<p>1 ∞ samples</p> <p>∞ Sample number subject to change</p>	Public Analyst's Laboratory St. Finbarr's Hospital Douglas Road Cork