NIFES
NASJONALT INSTITUTT FOR ERNÆRINGS- OG SJØMATFORSKNING

Rapport

2016

MONITORING PROGRAMME FOR VETERINARY CONTROL ON SEAFOOD PRODUCTS IMPORTED TO NORWAY FROM THIRD COUNTRIES

In accordance with Commission Regulation (EC) No 136/2004, Annex II, Part 1.

RESULTS FROM 2015

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On behalf of

The Norwegian Food Safety Authority

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This report presents a summary of results from the seafood part of a veterinary border control programme. The National Institute of Nutrition and Seafood Research (NIFES) carried out this work on behalf of the Norwegian Food Safety Authority (NFSA), in cooperation with the personnel at the Norwegian Border Inspection Posts (BIP). We want to thank NFSA for very good cooperation during the conduct of this monitoring programme.

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1. Summary

This report summarizes the ongoing monitoring programme for veterinary border control on seafood products imported to Norway from countries outside the European Economic Zone. The sampling plans and the analytical activities were based on a risk assessment for different groups of imported products. The current trend of hazards as reported in the RASFF notification system, the compositional nature of the products, as well as the annual import quantity of related products, were all used as the basis for the risk assessment.

During 2015, 110 samples were selected at the border inspection posts (BIPs), to be assayed for chemical, biological and/or microbiological undesirables, and sent to NIFES for analysis. Selection criteria was based on potential hazards associated with each product type and their country of origin. The analytical results are listed in Annex 1.

Microbiological analysis were carried out on 106 of the samples. The results for microbiological quality parameters and indicator organisms for faecal contamination generally showed low bacterial counts, with some exceptions. Coliforms bacteria in a concentration of 1270/g was found in a sample of Giant tiger prawn (*Penaeus monodon*) from Bangladesh and thermotolerant coliform bacteria in a concentration of 790/g were found in a seafood snack products based on *Stolephorus* sp. imported from Thailand. A shipment of Norwegian Atlantic salmon were exported to and rejected in Taiwan due to high number of bacteria. This Salmon were re-imported to Norway and showed a high general number of bacteria ($2.3x10^7$), but no indicator organisms or pathogens were detected.

Listeria monocytogenes were detected qualitatively in a sample of Blue grenadier (*Macruronus novaezelandiae*) from Malaysia and in a sample of Tuna (*Thunnus albacares*) from Thailand. In both samples the concentration were under 10 *L. monocytogenes* pr gram.

Pathogens in the genera *Salmonella* and *Vibrio* were not detected in any of the samples examined during 2015.

Parasitological examinations were carried out on 21 fish samples, and nematodes were found in three samples (14 %). The nematodes were dead and thus not infective at the time of analysis. The highest numbers of nematodes were found in a sample of Greenland halibut imported from Russia, with 92 detected nematodes.

Thirteen samples originating from of aquaculture were analysed for residues of illegal pharmaceuticals. The programme included the dye compounds crystal violet, leuco crystal violet, malachite green, leuco malachite green and brilliant green, and also the antibacterial agents chloramphenicol and nitrofurane metabolites. No residues of dyes were detected. In one

sample of *Pangasius* imported from Vietnam, the semicarbazide (SEM) marker metabolite of nitrofurazone were detected in a concentration of 0.2 µg/kg. This detection was done after washing of the sample, strengthening the assumption of illegal nitrofurazone application.

Forty eight samples were examined for one or more of the indicators for rancidity and spoilage. Five samples were found non-compliant. The highest concentration of histamine (100 mg/kg w.w.) was found in a sample of Bigeye Tuna from Sri Lanka. The highest values TBARS value was 310 nmol/g w.w. found in a sample of shortbodied mackerel from Thailand. Sixteen samples had concentrations of TVB-N over 25 mg/100g, wich is the general limit according to Commission Regulation 2074/2005. It should be noted that this regulation specify that TVB-N analysis should be combined with organoleptic evaluation befor a rejecteion can be done.

Seven oil samples were assayed for authentication of their labelled content. The data were in agreement with the labelling.

For the monitoring of environmental pollutants, 84 samples were analysed with respect to the heavy metals cadmium, mercury, lead and arsenic. Two of these samples were non-compliant with regard to elemental Cd concentration: an Argentine shortfin squid sample (*Illex argentines*), from Argentine (2.7 mg/kg w.w.) and a processed seafood product with southern velvet shrimp (*Metepenaeus palmensis*) from Thailand (0.68 mg/kg w.w.). The POPs concentrations of the compound classes dioxins, PCBs, PBDEs and chlorinated pesticides were examined in 34 samples. No sample was classified as non-compliant. Of the eight samples analysed for the PAH class of compounds, one was non-compliant. A marine oil sample from Peru was measured to 2.7 µg/kg w.w for benzo(a)pyrene and 16 µg/kg w.w. for the sum of four PAHs.

2. Introduction

As a member of the European Economic Area (EEA), Norway is obliged to monitor the conformity of products imported to the EEA area. A part of this activity is the analytical examination of seafood with respect to microorganisms, parasites and the presence of undesirable substances. The Norwegian Food Safety Authority (NFSA) is the competent authority regarding veterinary border control in Norway. On behalf of NFSA, NIFES have carried out the analytical examination of the seafood samples in this monitoring programme and elaborated this report.

3. Materials and methods

3.1. The planning and scope of the work

The plans and procedures for the sampling and the selected spectrum of analyses were based on a risk assessment. Sampling was carried out by NFSA and the analytical examinations and the writing of this report was conducted by NIFES. The plans target the most potent potential hazards associated with each different kind of imported product. The risk assessment was based on the compositional nature of the products, on the results from previous monitoring, knowledge on the geographical origin of the samples, and on the information available in the RASFF (Rapid Alert System for Food and Feed). This report concerns samples imported in 2015.

3.2. Sampling and transport

The staff of NFSA at the Border Inspection Posts (BIPs) selected samples according to a predefined sampling plan. The samples were stored frozen in the BIPs until shipped frozen to NIFES for analysis.

3.3. Sample reception, registration and pre-analytical sample handling

Upon arrival, samples were registered at the NIFES sample reception unit. Each sample was photographed, and relevant information registered in a Laboratory Information Management System (LIMS). Differentiated LIMS user privileges, ensured that sample identifying information was not available to the lab-staff carrying out the analytical determinations. A microbiological assay was carried out prior to other sample handling. The sample was then further prepared for analyses and split in sub-samples (aliquots) for the different assays and analytical methods.

3.4. Selection of tissue, analytical parameter and assessment of conformity

In general, the edible part of food samples, usually the muscle, was selected for analyses. For species where a legal maximum level of an undesirable substance was defined in Commission regulation 1881/2006 of 19th December 2006, the tissue specified in this regulation was applied.

3.5. Methods

The analytical methods and procedures used were accredited according to the ISO 17025 standard for the matrix examined, unless otherwise specified. A summary of the chemical analytical methods, accreditation status and their performance data are listed in Annex 2. If further information regarding the methods is required, please contact NIFES.

3.6 Analytical sub-contractors

Some of the pesticide, PAH and drug residue determinations were done by Eurofins (www.eurofins.no).

3.7 Flexible versus a fixed value for Limit of quantification (LOQ)

In analytical chemistry, a fixed value of LOQ is most common. However, for the environmental pollutants covered in this report, sample-specific LOQ values was used rather than a fixed value.

4. Results and discussion

A total of 110 samples were selected according to the sampling plan of NFSA, Border Control Posts, and sent to NIFES to be analysed for parasites, microbes and undesirable chemical compounds.

4.1. Microbiology

The detailed results from the microbiological examinations are listed in Annex 1, Table 1. A total of 106 samples were examined for microorganisms by a range of assays.

Four samples of marine bivalves were examined by the Donovan method specified by EU for examination of *E. coli* in bivalves. These samples were Greenshell mussel (*Perna viridis*) from New Zealand, a Pectinidae from Japan, scallop (*Placopecten magellanicus*) from Canada and Queen scallop (*Aequipecten opercularis*) from Vietnam. All samples had numbers of *E. coli* by the Donovan MPN method of < 20 bacteria/100 gram sample material (result not shown in Table 1).

Fifty-one samples were analysed for coliforms and seven samples had numbers of 10 cfu/g or more. The highest count, 1270 coliforms/g was found in a sample of Giant tiger prawn (*Penaeus monodon*) from Bangladesh.

Most results for determination of thermotolerant coliform bacteria (TCB) in 77 samples examined by agar plate assay were under the limit of detection of 10 cfu/g. However, five

samples had higher concentrations and the maximum number of 790 TCB/g were found in a seafood snack products based on *Stolephorus* sp. imported from Thailand.

Sixty-one samples were analysed for *L. monocytogenes* during 2015, and the bacterium were detected qualitatively in a sample of Blue grenadier (*Macruronus novaezelandiae*) from Malaysia and in a sample of Tuna (*Thunnus albacares*) from Thailand. In both samples the concentration were under 10 *L. monocytogenes*/gram.

Pathogens in the genera *Salmonella* (83 samples) and *Vibrio* (18 samples) was not detected in any of the samples analysed during 2015.

4.2. Parasites

Parasitological examinations were carried out on 21 fish samples (Annex 1, Table 2), and nematodes were found in three samples (14 %). The nematodes were dead and not infective at the time of analysis. The highest numbers of nematodes were found in a sample of Greenland halibut imported from Russia with 92 detected nematodes.

4.3. Drug residues and dyes

Thirteen samples originating from of aquaculture were analysed for residues of illegal pharmaceuticals. The programme included the dye compounds crystal violet, leuco crystal violet, malachite green, leuco malachite green and brilliant green, and also the antibacterial agents chloramphenicol and nitrofurane metabolites. No residue of dyes was detected (Table 3). In one sample of Pangasius imported from Vietnam, the semicarbazide (SEM) marker metabolite of nitrofurazone was detected in a concentration of 0.2 µg/kg after washing of the sample strengthening the assumption of illegal nitrofurazone application. Details are found in Table 4. Two sample of aquacultured prawns from Bangladesh and Thailand showed inhibition zones when using the microbiological assay, indicating presence of antibacterial agents. These samples were examined by chemical methods for a total of 83 relevant substances by methods with an LOD in the range between 0.3 and 10 µg/kg. No detections were made (Table 4).

4.4. Chemical spoilage and rancidity indicators

Chemical spoilage parameters were examined in 48 samples (Table 5). The data include histamine (27 samples), TBARS (Thiobarbituric reactive substance) (22 samples) and total volatile basic nitrogen (TVB-N) (47 samples). The highest concentration of histamine (100 mg/kg w.w.) was found in a sample of Bigeye Tuna from Sri Lanka. The highest values TBARS value was 310 nmol/g w.w. found in a sample of shortbodied mackerel from Thailand. Sixteen samples had concentrations of TVB-N over 25 mg/100g, wich is the general limit according to Commission Regulation 2074/2005. It should be noted that this regulation specify that TVB-N analysis should be combined with organoleptic evaluation befor a rejecteion can be done.

4.5. Oil authentication

Seven oil samples were assayed for authentication of their labelled content. The assessment was based on fatty acid and sterol composition, as well as on the organoleptic appearance of the

oils. The fatty acids compositions are listed in Table 6a, and the sterol compositions are listed in Table 6b. An expert evaluation found the data from each of these samples in agreement with the labelled content, within the range of natural variability.

4.6. Heavy metals

The elemental concentrations of arsenic, cadmium, lead and mercury were examined in 84 samples (Table 7). In accordance with the legal limits in Annex 3, these heavy metals were measured in terms of their total elemental concentration, giving no analytical details about the speciation. The limits assumes naturally moist samples: The scale is mg/kg (w.w.). Some of the analysed samples were imported in a dried state. According to the legislation, for dried samples, the analytical result were adjusted to compensate for the loss of water.

4.6.1. Arsenic (As)

In seafood, arsenic is mainly present in chemical species of low toxicity, such as arsenobetaine. This character of marine foods differs from foods of terrestrial origin. In terrestrial food, toxic inorganic arsenic species give a significant contribution to the elemental arsenic concentration. The highest measured concentration of elemental arsenic was 45 mg/kg w.w. found in snow crabs (*Chionoecetes opilio*), imported from Vietnam. Given the low toxicity of organo-bound arsenic molecular species, this value gives no reason for concern. There is no EU or Norwegian national legal limit for arsenic in fish and fishery products.

4.6.2. Cadmium (Cd)

Of the 84 samples, 15 (18%) were below the LOQ. Two samples were found non-compliant: The highest elemental concentration (2.7 mg/kg w.w.) was found in a sample of Argentine shortfin squid (*Illex argentines*), imported from Argentine and analysed with skin on. A processed seafood product from Thailand containing southern velvet shrimp (*Metepenaeus palmensis),* was measured to 0.68 mg/kg w.w.

Sample 2015-860/1 of Indian Anchovy (*Stolephorus indicus*) and sample 2015-892/1 Greasy Back shrimp (*Metapenaeus ensis*), both from Thailand had concentrations of 0.72 mg/kg and 1.4 mg/kg respectively, on a d.w. basis. Both samples were taken from dried products, and the original moisture content were not available. Thus, a calculation of a reliable w.w. concentration for compliance assessment were not possible. The three samples of Pacific saury (*Cololabis saira*), from Taiwan (0.14-0.16 mg/kg w.w.) were not intended for human consumption and the maximum limit does not apply.

4.6.3. Mercury (Hg)

Of the analysed samples, no mercury concentration above the regulatory maximum limit was found. The two highest values, 0.70 and 0.47 mg/kg w.w. were found in tuna samples imported from Sri Lanka.

4.6.4. Lead (Pb)

No sample had a Pb concentration above its maximum limit. Of the 84 analysed samples, 57 (67%) were below the measurable range. The highest concentration was found in the sample of tinned crab paste from Thailand (0.42 mg/kg w.w.), mentioned above in the section on spoilage parameters.

4.7. Persistent organic pollutants (POPs)

Samples were analysed for dioxins (PCDDs), furans (PCDFs), dioxin-like PCBs (DLPCBs), non-dioxin-like PCBs (PCB_6 or "indicator" PCBs), polybrominated flame-retardants (PBDEs), chlorinated pesticides and PAHs. Relevant maximum limits are listed in Appendix 3. Since POPs compounds exhibit a lipophilic character, their highest levels are found in lipid rich tissues including fillets of fat-rich fish. The maximum limits are set for levels in the fillet. Examined samples were limited to fat-rich fish, giving a lower number compared to heavy metals. Thirty four samples were analysed for POPs. Note that the dioxins and dioxins-like PCBs are measured in the scale pg/g TEQ (WHO-2005). The TEQ approach include a combination of observed concentration multiplied by a toxicity factor. Note also that the maximum limits are defined on sum parameters and not on individual compound values (See Appendix 3).

4.6.1. The dioxins; PCDDs, PCDFs and DL-PCBs

The sum parameters for the analysed 34 samples are listed in Table 8. The table summarises 986 individual analytical measurements. All sum values are given as TEQ values (toxic equivalent value, WHO 2005) in pg/g scale. The sums were calculated by an "upper bound sum" (UB-sum) formula, according to the EU commission regulation 1881/2006. No sample was classified as non-compliant. Like previous years, the DLPCB congeners, and in particular the mono-orto congeners were the major contributors to the total congener sum of TEQ. The contribution from the more toxic PCDD and PCDF congeners were generally low in the analysed samples.

4.6.2. The non-dioxin like PCBs

Regulatory maximum limits are also in force for the congener group of the non-dioxin like PCBs. (Annex 3). The same 34 samples were analysed for these PCB congeners. The analytical data are listed in Table 9. None of the analysed samples exceeded its associated maximum limit. The highest value, 121 µg/kg w.w., was found in a crude oil imported from USA, labelled "not for human consumption". The value was, despite the label, below the strict maximum limit for oils intended for human consumption.

4.6.3. Polybrominated diphenyl ethers (PBDE)

The data for individual PBDE congeners and their UB sums for the same 34 samples are listed in Table 10. There are currently no EU or Norwegian national limits for PBDEs in marine oil or fishery products intended for human consumption. EFSA did a risk assessment of PBDEs in 2011 in which benchmark dose (BMD) values for some congeners were established. Furthermore, EU has requested more data on PBDEs in foods in general. Like in most seafood, the PBDE-47 congener was the main contributor to the PBDE sum in most of the samples. This congener has a low estimated human toxicity. Of the analyzed congeners, PBDE-99 has the lowest BMD value of 12 µg per kg body weight while PBDE-47 was given as 309 µg per kg body weight. In the BDE-99 data from these years monitoring, a sample of oil for human consumption from Peru had a value of 0.21 µg/kg. Taking into account a realistic daily intake of fish oil, the analytical value found and the BMD value, this oil would not represent a health hazard.

4.6.4. Organochlorine pesticides

There are currently no EU or Norwegian national limits for pesticides in marine oil or fishery products intended for human consumption. However, organochlorine pesticides have a persistent and accumulating character that makes them relevant for food safety monitoring in seafood.

A high number of organochlorine pesticide compounds are included in this program. Table 11 give a summary of data for sample groups rather than individual samples. Please note that a considerable number of samples were below the limit of quantification (LOQ). Table 11 also lists the LOQ values associated with each pesticide and the number of samples with levels below this. Of the 1054 individual measurements, only 205 gave values above its associated LOQ. The measured levels are low or very low in most of the analysed pesticides.

The compounds in highest quantity were pp-DDE, pp-DDD and dieldrin, with 71, 39 and 27 µg/kg w.w. respectively. These values were measured in the previously mentioned oil from USA (sample 2015-1295/1). One other sample of oil, from Peru, have noticeable levels in two pesticides: 17 µg/kg w.w. for hexachlorbenzene, and 9.5 µg/kg w.w. for pp-DDE. In contrast to the American oil, the Peruean oil was intended for human consumption.

4.6.5. Polyaromatic hydrocarbons, PAH

The PAHs is a class of chemical substances with many, diverse compounds. A few of them are carcinogenic. There are maximum limits (ML) in force for the compound benzo(a)pyrene separately and for the sum of four PAHs (PAH4), in fresh bivalves, in oils intended for human consumption and in smoked products (Annex 3). The sum-PAH4 was, in accordance with the regulation, calculated in terms of the LB sum: Only measureable values contribute to the sum. Eight samples were analysed for PAHs (Table 12). The Peruean oil sample mentioned above was non-compliant with regard to both these limits, with a value of 2.7 µg/kg w.w. for benzo(a)pyrene and 16 µg/kg w.w. for the sum of four PAHs.

5. Conclusion

In total 110 samples, collected by the official staff at the Norwegian Border Inspection Posts of the Norwegian Food Safety Authority, were examined for selected chemical, microbiological and/or parasitological undesirables. The sampling targeted risk rather than a random selection.

The results for microbiological quality parameters and indicator organisms for faecal contamination generally showed low numbers in the 106 examined samples. Two samples harboured *L. monocytogenes* in concentrations less than 10 cells/g, but no samples had pathogens in the genera *Salmonella* or *Vibrio*.

Parasitological examinations were carried out on 21 fish samples, and nematodes were found in three samples (14 %). The nematodes were dead and not infective at the time of analysis.

Products originating from aquaculture were examined for residues of selected pharmaceuticals. The programme included the dye compounds crystal violet, leuco crystal violet, malachite green, leuco malachite green and brilliant green, and also the antibacterial agents chloramphenicol and nitrofurane metabolites. No residues of dyes were detected. In one sample of Pangasius imported from Vietnam, the semicarbazide (SEM) marker metabolite of nitrofurazone were detected in a concentration of 0.2 µg/kg indicating illegal application of nitrofurazone.

Seven oil samples were assayed for a verification of the authenticity of their labelled content. The data were in agreement with their labelled content. The environmental pollutants monitoring includes heavy metals and these POPs classes: dioxins, brominated flame-retardants, pesticides and PAH compounds. Two samples were found non-compliant with regard to the concentration of elemental Cd. One sample was non-compliant with regard to the PAH regulation.

ANNEX 1: DATA TABLES

Table 1. Microbiological examination, n=106.

Abbreviations: n.d.: not detected; **D**: detected; **n.a.**: not available; **TNC**: Too numerous to count (>10^8); **CFU**: Colony forming units; **H_2SPB**: H_2S producing bacteria; **PC**: Plate count, **Ent.**: Enterobacteriaceae.

						Aerobe PC (cfu/g) agar method			Indicator organisms (cfu/g) by agar method			Fecal indicator organisms (cfu/g) by agar method			Specific pathogens		
						30°C	20°C										
						Aerobes	PC	H_2SPB	*Enterococcus*	*Coag. pos. Staphylococcus*	Sulph.-red. bact.	Ent.	Coliforms	Thermotolerant coliforms	*Listeria monocytogenes*	*Salmonella*	*Vibrio*
Journal No.	**Origin**	**Product**	**Scientific name**	**Sample material**	**Incubation test**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/25 g**	**/25 g**	**/20 g**
2015-16/1	Philippines	Yellowfin tuna	*Thunnus albacares*	Muscle			>2.0x10^7	22000	< 100				< 10	< 10	n.d.	n.d.	
2015-18/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	Sterile		< 10	< 10									
2015-24/1	Canada	American lobster	*Homarus americanus*	Round			6000	< 1000	< 100				< 10	< 10	n.d.	n.d.	n.d.
2015-25/1	Japan	Red seabream	*Pagrus major*	Muscle			< 1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-26/1	Japan	Yellowtail	*Seriola* sp.	Round			< 1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-27/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Muscle			1000	1000	< 100				< 10	< 10	n.d.	n.d.	
2015-28/1	Australia	Yellowtail	*Seriola* sp.	Muscle			< 1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-29/1	Japan	Yellowtail	*Seriola sp.*	Muscle			< 1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-51/1	Maldives	Yellowfin tuna	*Thunnus albacares*	Muscle			90000	< 1000	< 100				20	< 10	n.d.	n.d.	
2015-87/1	Japan	Yellowtail	*Seriola* sp.	Muscle			8000	1000	< 100				< 10	< 10	n.d.	n.d.	
2015-89/1	Japan	Yellowtail	*Seriola* sp.	Muscle			< 1000	< 1000	< 100				10	< 10	n.d.	n.d.	
2015-93/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Muscle			7000	1000	< 100				< 10	< 10	n.d.	n.d.	

Table 1. Microbiological examination, n=106.

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						Aerobes	PC	H_2SPB	*Enterococcus*	*Coag. pos. Staphylococcus*	Sulph.-red. bact.	Ent.	Coliforms	Thermotolerant coliforms	*Listeria monocytogenes*	*Salmonella*	*Vibrio*
Journal No.	**Origin**	**Product**	**Scientific name**	**Sample material**	**Incubation test**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/25 g**	**/25 g**	**/20 g**
2015-173/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Muscle			$8.5x10^7$	20000	< 100				< 10	< 10	n.d.	n.d.	
2015-174/1	Sri Lanka	Bigeye Tuna	*Thunnus obesus*	Muscle			$4.2x10^6$	254000	< 100				< 10	< 10	n.d.	n.d.	
2015-253/1	Russia	Saithe	*Pollachius virens*	Fillet			66000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-254/1	USA	American lobster	*Homarus americanus*	Round			$2.8x10^6$	8000	< 100				< 10	< 10	n.d.	n.d.	n.d.
2015-351/1	Russia	Atlantic Cod	*Gadus morhua*	Fillet			48000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-395/1	Japan	Flour	n.a.	Flour			< 1000					< 10		< 10		n.d.	
2015-423/1	Russia	Atlantic Cod	*Gadus morhua*	Muscle			17000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-431/1	Thailand	Mixed	*Nemipterus sp. Priacanthus sp.*	Crabsticks		< 1000				< 100		< 10				n.d.	
2015-536/1	Russia	Atlantic Cod	*Gadus morhua*	Muscle			147000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-860/1	Thailand	Indian anchovy	*Stolephorus indicus*	Round		114000			< 100		< 100		< 10	< 10		n.d.	
2015-876/1	New Zealand	Greenshell mussel	*Perna canalicula*	Muscle			< 1000	< 1000	< 100						n.d.	n.d.	n.d.
2015-879/1	Thailand	Pacific Cod	*Gadus macrocephalus*	Muscle		84000			< 100		< 100			< 10	n.d.	n.d.	
2015-879/2	Thailand	Pacific Cod	*Gadus macrocephalus*	Muscle		4000			< 100		< 100			< 10	n.d.	n.d.	

Table 1. Microbiological examination, n=106.

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Journal No.	**Origin**	**Product**	**Scientific name**	**Sample material**	**Incubation test**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/25 g**	**/25 g**	**/20 g**
2015-879/3	Thailand	Pacific cod	*Gadus macrocephalus*	Muscle		69000			< 100		< 100			< 10	n.d.	n.d.	
2015-880/1	Thailand	Pacific cod	*Gadus macrocephalus*	Muscle			1000	< 1000	< 100				20	< 10	n.d.	n.d.	
2015-882/1	Vietnam	Pangasius	*Pangasius hypothalmus*	Muscle			$1.5x10^6$	36000		200			20	< 10		n.d.	
2015-885/1	Bangladesh	Giant tiger prawns	*Penaeus monodon*	Round			33000	< 1000	< 100				< 10	< 10	n.d.	n.d.	n.d.
2015-891/1	Vietnam	Prawn	*Seriola* sp.	Tempprawn			< 1000	< 1000		< 100	< 100			< 10		n.d.	n.d.
2015-892/1	Thailand	Greasyback shrimp	*Metapenaeus ensis*	Peeled		134000						< 10		< 10		n.d.	
2015-898/1	Thailand	Short bodied mackerel	*Rastrelliger brachysoma*	Round		6000				< 100			< 10	< 10	n.d.	n.d.	
2015-927/1	Russia	Haddock	*Melanogrammus aeglefinus*	Fillet			1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-1094/1	Thailand	Anchovies	*Stolephorus* sp.	Muscle		6000			< 100	< 100	< 100			< 10	n.d.	n.d.	
2015-1094/2	Thailand	Anchovies	*Stolephorus* sp.	Muscle		12000			< 100	< 100	< 100			790	n.d.	n.d.	
2015-1094/3	Thailand	Anchovies	*Stolephorus* sp.	Muscle		1000			< 100	< 100	< 100			< 10	n.d.	n.d.	
2015-1095/1	Thailand	Prawn	*Metapenaeus palmensis*	Muscle			< 1000	< 1000				< 10		< 10		n.d.	

Table 1. Microbiological examination, n=106.

Abbreviations: n.d.: not detected; **D**: detected; **n.a.**: not available; **TNC**: Too numerous to count (>10^8); **CFU**: Colony forming units; **H_2SPB**: H_2S producing bacteria; **PC**: Plate count, **Ent.**: Enterobacteriaceae.

						Aerobe PC (cfu/g) agar method			Indicator organisms (cfu/g) by agar method			Fecal indicator organisms (cfu/g) by agar method			Specific pathogens		
						30°C	20°C										
						Aerobes	PC	H_2SPB	*Enterococcus*	*Coag. pos. Staphylococcus*	Sulph.-red. bact.	Ent.	Coliforms	Thermotolerant coliforms	*Listeria monocytogenes*	*Salmonella*	*Vibrio*
Journal No.	**Origin**	**Product**	**Scientific name**	**Sample material**	**Incubation test**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/25 g**	**/25 g**	**/20 g**
2015-1096/1	Thailand	Barracuda	*Sphyraena obtusata*	Muscle		50000			2200	< 100	< 100			210		n.d.	
2015-1096/2	Thailand	Barracuda	*Sphyraena obtusata*	Muscle		2000			< 100	< 100	< 100			280	n.d.	n.d.	
2015-1098/1	Thailand	Prawn	*Penaeus vannamei*	Paste	Sterile		< 10	< 10									
2015-1101/1	Thailand	Crab	*Portunus pelagicus*	Dressed meat	Sterile		< 10	< 10									
2015-1103/1	Thailand	Tuna	*Katsuwonus pelomis*	Meat	Sterile		< 10	< 10									
2015-1103/2	Thailand	Tuna	*Katsuwonus pelomis*	Meat	Sterile		< 10	< 10									
2015-1103/3	Thailand	Tuna	*Katsuwonus pelomis*	Meat	Sterile		< 10	< 10									
2015-1104/1	Thailand	Tuna	*Katsuwonus pelomis*	Meat	Sterile		< 10	< 10									
2015-1105/1	Thailand	Crab	*Somanniathelphusa* sp.	Paste	Sterile		< 10	< 10									
2015-1107/1	Thailand	Mixed	*Trichogaster* sp., *Stolephorus* sp.	Meat	Sterile	500											
2015-1186/1	Russia	Rose fish	*Sebastes norvegicus*	Fillet			82000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-1187/1	Russia	Atlantic cod	*Gadus morhua*	Fillet			3000	< 1000	< 100				< 10	< 10	n.d.	n.d.	

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Abbreviations: n.d.: not detected; **D**: detected; **n.a.**: not available; **TNC**: Too numerous to count (>10^8); **CFU**: Colony forming units; **H_2SPB**: H_2S producing bacteria; **PC**: Plate count, **Ent.**: Enterobacteriaceae.

						Aerobe PC (cfu/g) agar method			Indicator organisms (cfu/g) by agar method			Fecal indicator organisms (cfu/g) by agar method			Specific pathogens		
						30°C	20°C										
						Aerobes	PC	H_2SPB	*Enterococcus*	*Coag. pos. Staphylococcus*	Sulph.-red. bact.	Ent.	Coliforms	Thermotolerant coliforms	*Listeria monocytogenes*	*Salmonella*	*Vibrio*
Journal No.	**Origin**	**Product**	**Scientific name**	**Sample material**	**Incubation test**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/25 g**	**/25 g**	**/20 g**
2015-1188/1	Russia	Atlantic cod	*Gadus morhua*	Roe		80000			< 100	< 100	< 100			< 10	n.d.	n.d.	
2015-1278/1	Thailand	Mixed	*Trichogaster* sp., *Stolephorus* sp.	Meat	Sterile	500											
2015-1279/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	Sterile		< 10	< 10									
2015-1280/1	Morocco	Sardine	*Sardina pilchardus*	Meat	Sterile		< 10	< 10									
2015-1281/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	Sterile		< 10	< 10									
2015-1295/1	USA	Oil	*Brevoortia patronus*	Oil			< 1000	< 1000			< 100			< 10		n.d.	
2015-1296/1	Vietnam	Tuna	*Katsuwonus pelamis*	Meat	Sterile		< 10	< 10									
2015-1297/1	Philipines	Sardin	*Sardina pilchardus*	Meat	Sterile		< 10	< 10									
2015-1298/1	China	Atlantic cod	*Gadus morhua*	Fillet			30000			< 100			< 10	< 10	n.d.	n.d.	
2015-1299/1	Japan	Scallops	*Pectinidae*	Muscle			< 1000	< 1000	< 100						n.d.	n.d.	n.d.
2015-1322/1	Russia	Atlantic cod	*Gadus morhua*	Fillet			14000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-1323/1	Russia	Atlantic cod	*Gadus morhua*	Fillet			23000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-1324/1	Russia	Northern wolffish	*Anarhichas denticulatus*	Muscle			< 1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-1325/1	Russia	Greenland halibut	*Reinhardtius hippoglossoides*	Fillet			122000	< 1000	< 100				< 10	< 10	n.d.	n.d.	

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						Aerobe PC (cfu/g) agar method			Indicator organisms (cfu/g) by agar method			Fecal indicator organisms (cfu/g) by agar method			Specific pathogens		
						30°C	20°C										
						Aerobes	PC	H_2SPB	*Enterococcus*	*Coag. pos. Staphylococcus*	Sulph.-red. bact.	Ent.	Coliforms	Thermotolerant coliforms	*Listeria monocytogenes*	*Salmonella*	*Vibrio*
Journal No.	**Origin**	**Product**	**Scientific name**	**Sample material**	**Incubation test**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/25 g**	**/25 g**	**/20 g**
2015-1583/1	Peru	Oil	n.a.	Oil			< 1000	< 1000			< 100			< 10		n.d.	
2015-1587/1	Peru	Oil	n.a.	Oil		1000					< 100			< 10		n.d.	
2015-1589/1	Peru	Oil	n.a.	Oil		3000					< 100			< 10		n.d.	
2015-1590/1	Peru	Oil	n.a.	Oil			< 1000	< 1000			< 100			< 10		n.d.	
2015-1710/1	Thailand	Pacific cod	*Gadus macrocephalus*	Muscle			< 1000	< 1000	< 100	< 100				< 10	n.d.	n.d.	
2015-1711/1	China	Atlantic cod	*Gadus morhua*	Muscle			23000	< 1000	< 100				10	< 10	n.d.	n.d.	
2015-1712/1	India	Scampi	*Litopenaeus vannamei*	Peeled			210000	< 1000	600				< 10	< 10	n.d.	n.d.	n.d.
2015-1713/1	Thailand	Processed product	n.a.	Crabsticks		1000				< 100		< 10				n.d.	
2015-1714/1	Canada	Scallops	*Placopecten magellanicus*	Muscle			4000	< 1000	< 100						n.d.	n.d.	n.d.
2015-1715/1	Vietnam	Brown crab	*Cancer pagurus*	Claw			< 1000	< 1000		< 100				< 10		n.d.	n.d.
2015-1716/1	Canada	American lobster	*Homarus americanus*	White meat			< 1000	< 1000		< 100				< 10		n.d.	n.d.
2015-1749/1	Myanmar	Striped snakehead	*Channa striata*	Fillet			53000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-1750/1	Myanmar	Giant river prawn	*Macrobrachium rosenbergii*	Peeled			146000	< 1000	16600				520	260	n.d.	n.d.	n.d.

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						Aerobe PC (cfu/g) agar method			Indicator organisms (cfu/g) by agar method			Fecal indicator organisms (cfu/g) by agar method			Specific pathogens		
						30°C	20°C										
						Aerobes	PC	H_2SPB	*Enterococcus*	*Coag. pos. Staphylococcus*	Sulph.-red. bact.	Ent.	Coliforms	Thermotolerant coliforms	*Listeria monocytogenes*	*Salmonella*	*Vibrio*
Journal No.	**Origin**	**Product**	**Scientific name**	**Sample material**	**Incubation test**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/25 g**	**/25 g**	**/20 g**
2015-1751/1	India	Mixed	*Metapnaeus dobsoni, Parapheraeopsis stylifera*	Mixed		4000				< 100				< 10		n.d.	n.d.
2015-1864/1	China	Anglerfish	*Kathetostoma giganteum*	Muscle			8000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-1866/1	China	Atlantic cod	*Gadus morhua*	Muscle			6000		< 100	< 100			< 10	< 10		n.d.	
2015-1869/1	Malaysia	Blue grenadier	*Macruronus novaezelandiae*	Fillet			11000	< 1000	< 100				< 10	< 10	D <10	n.d.	
2015-1870/1	China	Pacific halibut	*Hippoglossus stenolepis*	Muscle			< 1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-1873/1	Thailand	Oil	*Thunnus albacares, Katsuwonus pelamis*	Oil			< 1000	< 1000						< 10		n.d.	
2015-1874/1	China	Atlantic cod	*Gadus morhua*	Muscle			< 10	< 10	< 100	< 100			< 10	< 10		n.d.	
2015-1875/1	Russia	Red king crab	*Paralithodes camtschaticus*	White meat			< 10	< 1000	< 100				< 10	< 10	n.d.	n.d.	n.d.
2015-1910/1	Vietnam	Queen scallop	*Aequipecten opercularis*	Muscle			< 10	< 1000	< 100						n.d.	n.d.	n.d.
2015-1911/1	Argentina	Argentine shortfin squid	*Illex argentinus*	Muscle			< 10	< 1000	< 100				< 10	< 10	n.d.	n.d.	n.d.
2015-1939/1	USA	Oil	*Brevoortia patronus*	Oil			< 10	< 1000						< 10		n.d.	

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Abbreviations: n.d.: not detected; **D**: detected; **n.a.**: not available; **TNC**: Too numerous to count (>10^8); **CFU**: Colony forming units; **H_2SPB**: H_2S producing bacteria; **PC**: Plate count, **Ent.**: Enterobacteriaceae.

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						30°C	20°C										
						Aerobes	PC	H_2SPB	*Enterococcus*	*Coag. pos. Staphylococcus*	Sulph.-red. bact.	Ent.	Coliforms	Thermotolerant coliforms	*Listeria monocytogenes*	*Salmonella*	*Vibrio*
Journal No.	**Origin**	**Product**	**Scientific name**	**Sample material**	**Incubation test**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/25 g**	**/25 g**	**/20 g**
2015-2131/1	Vietnam	Snow crab	*Chionoecetes opilio*	Claw			< 10	< 1000	< 100				< 10	< 10	n.d.	n.d.	n.d.
2015-2132/2	Bangladesh	Giant tiger prawns	*Penaeus monodon*	Peeled			$1.6x10^7$	2000	2000				1270	270	n.d.	n.d.	n.d.
2015-2133/1	Thailand	Mackerel	*Scombromorus* sp.	Muscle			< 10	< 10	< 100	< 100			< 10	< 10		n.d.	
2015-2135/1	Thailand	Indian mackerel	*Rastrelliger kanagurta*	Muscle			< 1000	< 1000	< 100	< 100				< 10	n.d.	n.d.	
2015-2136/1	Thailand	Tuna	*Katsuwonus pelamis*	Muscle	Sterile		< 10	< 10									
2015-2137/1	Thailand	Crab	*Portunus pelagicus*	Dressed meat	Sterile		< 10	< 10									
2015-2138/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	Sterile		< 10	< 10									
2015-2140/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	Sterile		< 10	< 10									
2015-2141/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	Sterile		< 10	< 10									
2015-2142/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	Sterile		< 10	< 10									

Table 1. Microbiological examination, n=106.

Abbreviations: n.d.: not detected; **D**: detected; **n.a.**: not available; **TNC**: Too numerous to count (>10^8); **CFU**: Colony forming units; **H_2SPB**: H_2S producing bacteria; **PC**: Plate count, **Ent.**: Enterobacteriaceae.

						Aerobe PC (cfu/g) agar method			Indicator organisms (cfu/g) by agar method			Fecal indicator organisms (cfu/g) by agar method			Specific pathogens		
						30°C	20°C										
						Aerobes	PC	H_2SPB	*Enterococcus*	*Coag. pos. Staphylococcus*	Sulph.-red. bact.	Ent.	Coliforms	Thermotolerant coliforms	*Listeria monocytogenes*	*Salmonella*	*Vibrio*
Journal No.	**Origin**	**Product**	**Scientific name**	**Sample material**	**Incubation test**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/g**	**/25 g**	**/25 g**	**/20 g**
2015-2143/1	Thailand	Tuna	*Katsuwonus pelamis*	Muscle	Sterile		< 10	< 10									
2015-2144/1	Philippines	Tuna	*Katsuwonus pelamis*	Meat	Sterile		< 10	< 10									
2015-2145/1	Thailand	Prawn	*Panaeus vannamei*	Soup			< 1000	< 1000	< 100	< 100				< 10	n.d.	n.d.	
2015-2151/1	Thailand	Tuna	*Thunnus albacares*	Muscle			< 1000	< 1000	< 100				< 10	< 10	D <10	n.d.	
2015-2154/1	Taiwan	Pacific saury	*Cololabis saira*	Round			< 1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-2155/1	Taiwan	Pacific saury	*Cololabis saira*	Round			< 1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-2156/1	Taiwan	Pacific saury	*Cololabis saira*	Round			4000	< 1000	< 100				< 10	< 10	n.d.	n.d.	
2015-2157/1	Argentina	Argentine shortfin squid	*Illex argentinus*	Muscle			< 1000	< 1000	< 100				< 10	< 10	n.d.	n.d.	n.d.
2015-2158/1	Taiwan	Atlantic salmon	*Salmo salar*	Muscle			$2.3x10^7$	10000	< 100				< 10	< 10	n.d.	n.d.	

Table 2. Nematodes, n=21.						
Journal No.	**Imported from**	**Product group**	**Species**	**Scientific name**	**Tissue**	**# Nematodes**
2015-1749/1	Myanmar	Marine fish	Striped snakehead	*Channa striata*	Fillet	0
2015-2154/1	Taiwan	Marine fish	Pacific saury	*Cololabis saira*	Fillet	1
2015-2155/1	Taiwan	Marine fish	Pacific saury	*Cololabis saira*	Fillet	1
2015-2156/1	Taiwan	Marine fish	Pacific saury	*Cololabis saira*	Fillet	0
2015-880/1	Thailand	Marine fish	Pacific cod	*Gadus macrocephalus*	Fillet	0
2015-1864/1	China	Marine fish	Anglerfish	*Kathetostoma giganteum*	Fillet	0
2015-1869/1	Malaysia	Marine fish	Blue grenadier	*Macruronus novaezelandiae*	Fillet	0
2015-25/1	Japan	Marine fish	Red seabream	*Pagrus major*	Fillet	0
2015-898/1	Thailand	Marine fish	Shortbodied mackerel	*Rastrelliger brachysoma*	Fillet	0
2015-1325/1	Russia	Marine fish	Greenland halibut	*Reinhardtius hippoglossoides*	fillet	92
2015-26/1	Japan	Marine fish	Yellowtail	*Seriola* sp.	Fillet	0
2015-28/1	Australia	Marine fish	Yellowtail	*Seriola* sp.	Fillet	0
2015-29/1	Japan	Marine fish	Yellowtail	*Seriola* sp.	Fillet	0
2015-89/1	Japan	Marine fish	Yellowtail	*Seriola* sp.	Fillet	0
2015-16/1	Philippines	Marine fish	Yellowfin tuna	*Thunnus albacares*	Fillet	0
2015-27/1	Sri Lanka	Marine fish	Yellowfin tuna	*Thunnus albacares*	Fillet	0
2015-51/1	Maldives	Marine fish	Yellowfin tuna	*Thunnus albacares*	Fillet	0
2015-93/1	Sri Lanka	Marine fish	Yellowfin tuna	*Thunnus albacares*	Fillet	0
2015-173/1	Sri Lanka	Marine fish	Yellowfin tuna	*Thunnus albacares*	Fillet	0
2015-2151/1	Thailand	Marine fish	Yellowfin tuna	*Thunnus albacares*	Fillet	0
2015-174/1	Sri Lanka	Marine fish	Bigeye tuna	*Thunnus obesus*	Fillet	0

Table 3. Residues of prohibited veterinary medicines: Dyes, n=13.

n.d.: not detected, **CV**: crystal violet, **LCV**: leuco crystal violet, **MG**: malachite green **LMG**: leuco malachite green, **BG**: brilliant green

Journal No.	Imported from	Group	Species/ Presentation	Scientific name	Tissue	CV LOD: 0.3 µg/kg	LCV LOD: 0.15 µg/kg	MG LOD: 0.15 µg/kg	LMG LOD: 0.15 µg/kg	BG LOD: 0.15 µg/kg
2015-25/1	Japan	Aquaculture	Red seabream	*Pagrus major*	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-26/1	Japan	Aquaculture	Yellowtail	*Seriola* sp.	Round	n.d.	n.d.	n.d.	n.d.	n.d.
2015-28/1	Australia	Aquaculture	Yellowtail	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-29/1	Japan	Aquaculture	Yellowtail	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-87/1	Japan	Aquaculture	Yellowtail	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-89/1	Japan	Aquaculture	Yellowtail	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-882/1	Vietnam	Aquaculture	Processed seafood product	*Pangasius hypothalmus*	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-885/1	Bangladesh	Aquaculture	Giant tiger prawns	*Penaeus monodon*	Round	n.d.	n.d.	n.d.	n.d.	n.d.
2015-891/1	Vietnam	Aquaculture	Processed seafood product	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-1098/1	Thailand	Aquaculture	Processed seafood product	*Penaeus vannamei*	Mixed	n.d.	n.d.	n.d.	n.d.	n.d.
2015-1712/1	India	Aquaculture	Scampi	*Litopenaeus vannamei*	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-2132/2	Bangladesh	Aquaculture	Giant tiger prawns	*Penaeus monodon*	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-2145/1	Thailand	Aquaculture	Processed seafood product	*Panaeus vannamei*	Mixed	n.d.	n.d.	n.d.	n.d.	n.d.

Table 4. Residues of prohibited veterinary medicines: Chloramphenicol and nitrofuran metabolites, n=13.

CAM: chloramphenicol, **AOZ**: 3-amino-2-oxazolidinone, **AMOZ**: 3-amino-5-morpholinomethyl-2-oxazolidinone, **AHD**: 1-amino-hydantoin, **SEM**: semicarbazide

Journal No.	Imported from	Group	Product/ Presentation	Scientific name	Tissue	CAM LOD: 0.25 µg/kg	AHD LOD: 0.6 µg/kg	AMOZ LOD: 0.4 µg/kg	AOZ LOD: 0.5 µg/kg	SEM LOD: 0.2 µg/kg
2015-25/1	Japan	Aquaculture	Red seabream	*Pagrus major*	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-26/1	Japan	Aquaculture	Yellowtail	*Seriola* sp.	Round	n.d.	n.d.	n.d.	n.d.	n.d.
2015-28/1	Australia	Aquaculture	Yellowtail	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-29/1	Japan	Aquaculture	Yellowtail	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-87/1	Japan	Aquaculture	Yellowtail	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-89/1	Japan	Aquaculture	Yellowtail	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-882/1	Vietnam	Aquaculture	Processed product	*Pangasius hypothalmus*	Muscle	n.d.	n.d.	n.d.	n.d.	0.2
2015-885/1	Bangladesh	Aquaculture	Giant tiger prawns	*Penaeus monodon*	Round	n.d.	n.d.	n.d.	n.d.	n.d.
2015-891/1	Vietnam	Aquaculture	Processed product	*Seriola* sp.	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-1098/1	Thailand	Aquaculture	Scampi	*Penaeus vannamei*	Mixed	n.d.	n.d.	n.d.	n.d.	n.d.
2015-1712/1	India	Aquaculture	Scampi	*Litopenaeus vannamei*	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-2132/2	Bangladesh	Aquaculture	Giant tiger prawns	*Penaeus monodon*	Muscle	n.d.	n.d.	n.d.	n.d.	n.d.
2015-2145/1	Thailand	Aquaculture	Scampi	*Panaeus vannamei*	Mixed	n.d.	n.d.	n.d.	n.d.	n.d.

Table 5. Rancidity and spoilage parameters, n=48.

TBARS: Thiobarbituric acid reactive substances, **TVB-N**: Total volatile basic nitrogen

Journal No.	Imported from	Species/Product	Scient. name	Tissue/Presentation	Histamine mg/kg w.w.	TBARS nmol/g w.w.	TVB-N mg/100g w.w.
2015-16/1	Philippines	Yellowfin tuna	*Thunnus albacares*	Muscle	48	5.5	22
2015-18/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	5.8	-	37
2015-25/1	Japan	Red seabream	*Pagrus major*	Muscle	< 5	-	18
2015-26/1	Japan	Yellowtail	*Seriola* sp.	Round	< 5	-	17
2015-27/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Muscle	< 5	-	22
2015-28/1	Australia	Yellowtail	*Seriola* sp.	Muscle	< 5	-	-
2015-29/1	Japan	Yellowtail	*Seriola sp.*	Muscle	< 5	-	15
2015-51/1	Maldives	Yellowfin tuna	*Thunnus albacares*	Muscle	< 5	< 4	24
2015-87/1	Japan	Yellowtail	*Seriola* sp.	Muscle	< 5	4.6	16
2015-89/1	Japan	Yellowtail	*Seriola* sp.	Muscle	< 5	5.6	15
2015-93/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Muscle	< 5	< 4	23
2015-173/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Muscle	< 5	< 4	24
2015-174/1	Sri Lanka	Bigeye tuna	*Thunnus obesus*	Muscle	100	< 4	23
2015-431/1	Thailand	Processed product	*Nemipterus sp./Priacanthus* sp.	Crabsticks	8	-	2.8
2015-860/1	Thailand	Indian anchovy	*Stolephorus indicus*	Round	-	310	69
2015-891/1	Vietnam	Yellowtail	*Seriola* sp.	Tempprawn	-	-	1.6
2015-892/1	Thailand	Greasyback shrimp	*Metapenaeus ensis*	Peeled	-	-	28
2015-898/1	Thailand	Shortbodied mackerel	*Rastrelliger brachysoma*	Round	< 5	220	20
2015-1094/1	Thailand	Anchovy	*Stolephorus* sp.	Muscle	14	28	39
2015-1094/2	Thailand	Anchovy	*Stolephorus* sp.	Muscle	< 5	27	28
2015-1094/3	Thailand	Anchovy	*Stolephorus* sp.	Muscle	11	16	32
2015-1095/1	Thailand	Scampi	*Metepenaeus palmensis*	Muscle	-	-	27

Table 5. Rancidity and spoilage parameters, n=48.

TBARS: Thiobarbituric acid reactive substances, **TVB-N**: Total volatile basic nitrogen

Journal No.	Imported from	Species/Product	Scient. name	Tissue/Presentation	Histamine mg/kg w.w.	TBARS nmol/g w.w.	TVB-N mg/100g w.w.
2015-1096/1	Thailand	Seafood snacks products	*Sphyraena obtusata*	Muscle	-	-	18
2015-1096/2	Thailand	Seafood snacks products	*Sphyraena obtusata*	Muscle	-	-	13
2015-1098/1	Thailand	Processed product	*Penaeus vannamei*	Paste	-	-	28
2015-1101/1	Thailand	Processed seafood product	*Portunus pelagicus*	Dressed meat	-	-	18
2015-1103/1	Thailand	Tuna	*Katsuwonus pelomis*	Canned	< 5	9.8	21
2015-1103/2	Thailand	Tuna	*Katsuwonus pelomis*	Canned	< 5	6.3	29
2015-1103/3	Thailand	Tuna	*Katsuwonus pelomis*	Canned	< 5	16	19
2015-1104/1	Thailand	Tuna	*Katsuwonus pelomis*	TunaSoygin	5	11	38
2015-1105/1	Thailand	Processed seafood product	*Somanniathelphusa* sp.	Paste	-	-	250
2015-1279/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	6.5	4.3	34
2015-1280/1	Morocco	Processed seafood product	*Sardina pilchardus*	Meat	< 5	5.3	44
2015-1281/1	Thailand	Tuna	*Katsuwonus pelamis*	Meat	< 5	< 4	35
2015-1296/1	Vietnam	Tuna	*Katsuwonus pelamis*	Meat	< 5	< 4	31
2015-1297/1	Philipines	Processed seafood product	*Sardina pilchardus*	Meat	< 5	5.7	36
2015-1710/1	Thailand	Pacific cod	*Gadus macrocephalus*	Muscle	-	-	12
2015-1712/1	India	Scampi	*Litopenaeus vannamei*	Peeled	-	-	7.6
2015-1713/1	Thailand	Processed seafood product	n.a.	Crabsticks	-	-	3.3
2015-1749/1	Myanmar	Striped snakehead	*Channa striata*	Fillet	-	-	15
2015-1750/1	Myanmar	Giant river prawn	*Macrobrachium rosenbergii*	Peeled	-	-	20

Table 5. Rancidity and spoilage parameters, n=48.

TBARS: Thiobarbituric acid reactive substances, **TVB-N**: Total volatile basic nitrogen

Journal No.	Imported from	Species/Product	Scient. name	Tissue/Presentation	Histamine mg/kg w.w.	TBARS nmol/g w.w.	TVB-N mg/100g w.w.
2015-1751/1	India	Seafood mixture	*Metapnaeus dobsoni, Parapheraeopsis stylifera*	Mixed	-	-	4.6
2015-1864/1	China	Anglerfish	*Kathetostoma giganteum*	Muscle	-	-	8
2015-1866/1	China	Atlantic cod	*Gadus morhua*	Muscle	-	-	10
2015-1869/1	Malaysia	Blue grenadier	*Macruronus novaezelandiae*	Fillet	-	-	9.7
2015-1870/1	China	Pacific halibut	*Hippoglossus stenolepis*	Muscle	-	4.3	10
2015-1874/1	China	Atlantic cod	*Gadus morhua*	Muscle	-	-	9.1
2015-1911/1	Argentina	Argentine shortfin squid	*Illex argentinus*	Muscle	-	-	32
				Samples analysed	27	22	47
				Maximum value	100	310	250

Table 6a. Oil fatt acid composition. Percentage data.							
Sample	2015-1939/1	2015-1295/1	2015-1583/1	2015-1587/1	2015-1589/1	2015-1590/1	2015-1873/1
Declared type	Gulf menhaden oil	Gulf menhaden oil	Marine Oil	Marine Oil	Marine Oil	Marine Oil	Tuna, mixed, oil
FA	%	%	%	%	%	%	%
06:00	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
08:00	< 0.1	0.07	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
10:00	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
12:00	0.15	0.12	0.12	0.14	0.10	0.13	< 0.1
14:00	8.9	9.6	7.9	7.8	7.6	7.8	3.3
14:1n-9	< 0.1	0.05	0.06	< 0.1	0.06	0.05	< 0.1
15:00	0.84	0.68	0.56	0.59	0.48	0.57	1.1
16:00	20	20.	18	18	18	17	21
16:1n-7	12	12	7.7	7.9	8.2	8.5	4.2
16:1n-9	0.41	0.37	0.38	0.40	0.38	0.42	0.46
16:2n-4	1.9	0.54	1.2	1.1	1.3	1.1	0.88
16:3n-3	3.4	3.5	3.8	3.7	3.4	3.6	5.9
16:4n-3	< 0.1	0.21	2.1	1.9	2.0	1.8	< 0.1
17:00	1.2	0.66	0.70	0.76	0.57	0.74	1.5
18:00	3.4	3.5	3.8	3.7	3.4	3.6	5.9
18:1n-11	< 0.1	< 0.1	0.13	< 0.1	0.20	< 0.1	< 0.1
18:1n-7	2.8	2.9	2.8	2.9	2.8	3.0	2.0

Table 6a. Oil fatt acid composition. Percentage data.							
Sample	2015-1939/1	2015-1295/1	2015-1583/1	2015-1587/1	2015-1589/1	2015-1590/1	2015-1873/1
Declared type	Gulf menhaden oil	Gulf menhaden oil	Marine Oil	Marine Oil	Marine Oil	Marine Oil	Tuna, mixed, oil
FA	%	%	%	%	%	%	%
18:1n-9	4.5	6.5	8.4	7.8	10	7.6	12
18:2n-6	1.4	1.1	1.2	1.1	1.0	1.1	1.2
18:3n-3	1.6	1.0	0.7	0.7	0.6	0.6	0.4
18:3n-6	0.3	0.3	0.2	0.3	0.2	0.3	0.1
18:4n-3	2.7	2.0	2.4	2.8	2.0	2.7	0.8
20:00	0.5	0.2	0.2	0.3	0.2	0.3	0.4
20:1n-11	< 0.1	0.07	< 0.1	< 0.1	0.2	< 0.1	0.2
20:1n-7	0.2	0.2	0.3	0.4	0.3	0.4	< 0.1
20:1n-9	0.6	0.9	1.0	0.9	1.2	0.7	0.7
20:2n-6	0.2	0.1	< 0.1	< 0.1	< 0.1	0.1	0.2
20:3n-3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
20:3n-6	0.2	0.2	0.2	0.1	0.1	0.2	0.1
20:3n-9	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2
20:4n-3	1.3	1.2	0.7	0.8	0.7	0.7	0.4
20:4n-6	-	1.3	1.2	1.2	1.5	1.3	-
20:5n-3 EPA	-	14	17	16	17	16	-
21:5n-3	0.6	0.7	0.8	0.8	0.8	0.7	0.2

Table 6a. Oil fatt acid composition. Percentage data.							
Sample	2015-1939/1	2015-1295/1	2015-1583/1	2015-1587/1	2015-1589/1	2015-1590/1	2015-1873/1
Declared type	Gulf menhaden oil	Gulf menhaden oil	Marine Oil	Marine Oil	Marine Oil	Marine Oil	Tuna, mixed, oil
FA	%	%	%	%	%	%	%
22:00	0.2	0.2	0.2	0.2	0.1	0.2	0.3
22:1n-11	< 0.1	< 0.1	1.0	0.2	1.9	0.2	0.4
22:1n-9	0.2	0.07	0.2	0.1	0.2	0.1	0.2
22:4n-6	0.2	0.2	0.09	0.07	0.1	0.08	0.2
22:5n-3	-	2.7	2.1	1.8	2.1	1.8	-
22:5n-6	0.5	0.08	0.4	0.4	0.4	0.3	2.0
22:6n-3 DHA	-	8.0	11	13	9.7	14	-
24:00:00	0.1	0.06	< 0.1	0.05	< 0.1	0.05	0.3
24:1n-9	0.3	0.2	0.4	0.4	0.4	0.3	0.6
24:5n-3	< 0.1	0.07	0.07	< 0.1	0.08	< 0.1	< 0.1
24:6n-3	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
n-3/n-6	7.4	9.0	11	12	11	12	6.1
Sum 16:1	12	12	8.1	8.3	8.5	8.9	4.6
Sum 18:1	7.3	9.4	11	11	13	11	114
Sum 20:1	0.8	1.2	1.3	1.2	1.8	1.1	0.9
Sum 22:1	0.2	0.07	1.2	0.3	2.1	0.3	0.5
Sum mono-unsaturated	21	23	22	21	25	21	20

Table 6a. Oil fatt acid composition. Percentage data.							
Sample	2015-1939/1	2015-1295/1	2015-1583/1	2015-1587/1	2015-1589/1	2015-1590/1	2015-1873/1
Declared type	Gulf menhaden oil	Gulf menhaden oil	Marine Oil	Marine Oil	Marine Oil	Marine Oil	Tuna, mixed, oil
FA	%	%	%	%	%	%	%
Sum EPA + DHA	22	22	28	30	27	30	32
Sum All FA	100	100	100	100	100	100	100
Sum poly-unsaturated	37	34	41	43	40	43	41
Sum identified FA	94	92	95	95	95	95	96
Sum saturated FA	36	35	32	31	30	31	34
Sum n-3	31	30	37	39	35	39	35
Sum n-6	4.2	3.4	3.2	3.2	3.2	3.3	5.7
Sum un-identified	6.3	7.7	4.8	4.9	4.9	5.1	4.4

Table 6b. Oil sterol composition. Percentage data.							
Sample	Gulf menhaden 2015-1939/1 %	Gulf menhaden 2015-1295/1 %	Marine Oil 2015-1583/1 %	Marine Oil 2015-1587/1 %	Marine Oil 2015-1589/1 %	Marine Oil 2015-1590/1 %	Tuna, mixed 2015-1873/1 %
Cholesterol	96.1	97.1	99.2	99.3	99.3	99.4	99.5
Brassicasterol	0.4	0.3	0.3	0.2	0.3	0.1	0.1
Campesterol	2.5	2.2	0.3	0.3	0.4	0.3	0.1
Campestanol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Stigmasterol	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Sitosterol	0.2	0.2	<0.1	0.1	<0.1	0.1	<0.1
Sitostanol	0.1	0.1	0.2	0.1	0.1	0.1	<0.1
Stigmasta-dienol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Stigmast-enol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
d-7-avenasterol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum phytosterols	3.9	2.9	0.8	0.7	0.7	0.6	0.5
Sum Cholesterols	96.1	97.1	99.2	99.3	99.3	99.4	99.5
Sum total	100	100	100	100	100	100	100

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Table 7. Heavy metal composition, n=84.

n.a.: Data not available.

Sample					As	Cd	Hg	Pb
Journal No.	Imported from	Species	Scient. name	Tissue/product	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.
2015-1910/1	Vietnam	Queen scallop	*Aequipecten opercularis*	Fillet	0.24	0.98	0.007	0.03
2015-1299/1	USA via Japan	Scallops	*Pectinidae*	Fillet	0.38	0.033	0.006	0.004
2015-876/1	New Zealand	Greenshell mussel	*Perna canalicula*	Edible parts	2.5	0.14	0.01	0.13
2015-1911/1	Argentina	Argentine shortfin squid	*Illex argentinus*	Fillet+skin	0.75	0.83	0.006	< .007
2015-2157/1	Argentina	Argentine shortfin squid	*Illex argentinus*	Fillet+skin	0.69	2.70	0.005	< .006
2015-1715/1	Vietnam, re-import	Brown crab	*Cancer pagurus*	White meat	15	0.025	0.064	< .006
2015-2131/1	Vietnam	Snow crab	*Chionoecetes opilio*	White meat	45	0.025	0.059	0.01
2015-1712/1	India	Scampi	*Litopenaeus vannamei*	White meat	0.14	< .0007	0.005	< .004
2015-1750/1	Myanmar	Giant river prawn	*Macrobrachium rosenbergii*	White meat	0.22	0.019	0.006	0.01

Table 7. Heavy metal composition, n=84.

n.a.: Data not available.

Sample					As	Cd	Hg	Pb
Journal No.	Imported from	Species	Scient. name	Tissue/product	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.
2015-892/1	Thailand	Greasyback shrimp	*Metapenaeus ensis*	White meat	6.0	1.4[1]	0.03	0.10
2015-1875/1	Russia	Red king crab	*Paralithodes camtschaticus*	Claw meat	7.2	0.021	0.061	< .006
2015-885/1	Bangladesh	Giant tiger prawns	*Penaeus monodon*	White meat	0.11	0.002	0.01	0.01
2015-2132/2	Bangladesh	Giant tiger prawns	*Penaeus monodon*	White meat	1.6	0.002	0.009	< .005
2015-1749/1	Myanmar	Striped snakehead	*Channa striata*	fillet	0.04	< .001	0.25	< .006
2015-2154/1	Taiwan	Pacific saury	*Cololabis Saira*	Fillet	2.2	0.16	0.039	< .01
2015-2155/1	Taiwan	Pacific saury	*Cololabis Saira*	Fillet	2.1	0.15	0.034	< .01
2015-2156/1	Taiwan	Pacific saury	*Cololabis Saira*	Fillet	1.7	0.14	0.035	< .01
2015-880/1	Thailand	Pacific Cod	*Gadus macrocephalus*	Fillet	8.3	< .0009	0.052	< .005
2015-1710/1	Thailand	Pacific Cod	*Gadus macrocephalus*	Fillet	1.9	0.003	0.038	< .01
2015-1870/1	China	Pacific halibut	*Hippoglossus stenolepis*	Fillet	1.0	< .001	0.062	< .006

[1] The sample was probably dried. This is then a d.w. value.

Table 7. Heavy metal composition, n=84.

n.a.: Data not available.

Sample					As	Cd	Hg	Pb
Journal No.	Imported from	Species	Scient. name	Tissue/product	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.
2015-1864/1	China	Anglerfish	*Kathetostoma giganteum*	Fillet	2.8	0.002	0.084	< .004
2015-1869/1	Malaysia	blue grenadier	*Macruronus novaezelandiae*	fillet	0.65	0.003	0.038	< .01
2015-25/1	Japan	Red seabream	*Pagrus major*	Fillet	1.5	0.007	0.096	0.02
2015-898/1	Thailand	shortbodied mackerel	*Rastrelliger brachysoma*	Fillet	0.96	0.040	0.003	0.02
2015-1325/1	Russia	Greenland halibut	*Reinhardtius hippoglossoides*	fillet	6.6	0.001	0.046	< .006
2015-26/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.92	< .002	0.16	< .01
2015-28/1	Australia	Yellowtail	*Seriola* sp.	Fillet	0.28	< .001	0.096	< .009
2015-29/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.92	< .002	0.14	< .01
2015-87/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.75	0.003	0.16	< .01
2015-89/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.57	0.002	0.16	< .01
2015-860/1	Thailand	Indian anchovy	*Stolephorus indicus*	whole	2.3	0.72[2]	0.02	0.24
2015-16/1	Philippines	Yellowfin tuna	*Thunnus albacares*	Fillet	1.0	0.007	0.16	< .008
2015-27/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	1.9	0.014	0.47	< .008

[2] The sample was probably dried. This is then a d.w. based value.

Table 7. Heavy metal composition, n=84.

n.a.: Data not available.

Sample					As	Cd	Hg	Pb
Journal No.	Imported from	Species	Scient. name	Tissue/product	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.
2015-51/1	Maldives	Yellowfin tuna	*Thunnus albacares*	Fillet	0.50	0.009	0.29	< .008
2015-93/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	0.85	0.005	0.28	< .008
2015-173/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	1.6	0.008	0.25	< .008
2015-2151/1	Thailand	Yellowfin tuna	*Thunnus albacares*	Fillet	1.3	0.011	0.43	< .008
2015-174/1	Sri Lanka	Bigeye Tuna	*Thunnus obesus*	Fillet	3.1	0.039	0.70	< .007
2015-1939/1	USA	Gulf menhaden	*Brevoortia patronus*	Oil	12	< .002	< .002	< .01
2015-1295/1	USA	Gulf menhaden	*Brevoortia patronus*	Oil	15	< .004	< .004	< .03
2015-1583/1	Peru	Oil	*n.a.*	Oil	3.5	< .005	0.01	< .03
2015-1587/1	Peru	Oil	*n.a.*	Oil	8.8	< .005	< .005	< .03
2015-1589/1	Peru	Oil	*n.a.*	Oil	8.8	< .005	< .005	< .03
2015-1590/1	Peru	Oil	*n.a.*	Oil	7.2	< .005	< .005	< .03
2015-1873/1	Thailand	Tuna, mixed	*Thunnus albacares, Katsuwonus pelamis*	Oil	1.7	< .002	< .002	< .01

Table 7. Heavy metal composition, n=84.

n.a.: Data not available.

Sample					As	Cd	Hg	Pb
Journal No.	Imported from	Species	Scient. name	Tissue/product	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.
2015-1098/1	Thailand	Processed seafood product	*Penaeus vannamei*	Prawn paste	0.43	0.019	0.003	0.095
2015-879/2	Thailand	Processed seafood product	*Gadus macrocephalus*	Fillet in mixed product	1.0	0.002	0.03	< .009
2015-879/1	Thailand	Processed seafood product	*Gadus macrocephalus*	Fillet in mixed product	1.1	0.001	0.03	< .008
2015-879/3	Thailand	Processed seafood product	*Gadus macrocephalus*	Fillet in mixed product	1.4	0.002	0.042	< .008
2015-1281/1	Thailand	Processed tuna	*Katsuwonus pelamis*	Fillet in mixed product	0.88	0.022	0.086	< .01
2015-2138/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in mixed product	0.59	0.020	0.11	< .01
2015-2143/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in mixed product	0.92	0.018	0.02	0.059
2015-18/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in mixed product	0.79	0.014	0.028	< .007
2015-2136/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in mixed product	0.81	0.022	0.047	< .01
2015-2142/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in oil	0.65	0.010	0.14	< .01
2015-2144/1	Philippines	Processed seafood product	*Katsuwonus pelamis*	Fillet in oil	0.74	0.022	0.033	< .02

Table 7. Heavy metal composition, n=84.

n.a.: Data not available.

Sample					As	Cd	Hg	Pb
Journal No.	Imported from	Species	Scient. name	Tissue/product	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.
2015-2140/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in oil	0.78	0.030	0.11	< .01
2015-1279/1	Thailand	Processed tuna	*Katsuwonus pelamis*	Fillet in water	0.81	0.024	0.10	< .007
2015-1296/1	Vietnam	Processed tuna	*Katsuwonus pelamis*	Fillet in water	0.71	0.016	0.035	< .006
2015-2141/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in water	0.81	0.009	0.086	< .007
2015-1103/2	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	0.99	0.018	0.032	0.019
2015-1103/1	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	0.47	0.011	0.01	< .008
2015-1103/3	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	0.34	0.008	0.02	< .006
2015-1104/1	Thailand	Processed seafood product	*Katsuwonus pelomis*	Fillet in mixed product	0.77	0.011	0.02	< .007
2015-891/1	Vietnam	Prawns in seafood product	*Litopenaeus vannamei*	Tempura prawns	0.08	0.003	0.005	< .02
2015-1751/1	India	Seafood mixture	*Metapnaeus dobsoni, Parapheraeopsis stylifera*	n.a.	0.27	0.008	0.004	0.01

Table 7. Heavy metal composition, n=84.

n.a.: Data not available.

Sample					As	Cd	Hg	Pb
Journal No.	Imported from	Species	Scient. name	Tissue/product	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.	mg/kg w.w.
2015-1095/1	Thailand	Processed seafood product	*Metepenaeus palmensis*	n.a.	5.0	0.684	0.03	0.042
2015-1713/1	Thailand	Processed seafood product	*n.a.*	Crabsticks	0.11	0.004	0.016	< .008
2015-431/1	Thailand	Processed seafood product	*Nemipterus* sp. *Priacanthus* sp.	Crabsticks	0.12	0.005	0.03	< .007
2015-2145/1	Thailand	Processed seafood product	*Panaeus vannamei*	Prawn Soup	0.14	0.006	0.004	0.01
2015-882/1	Vietnam	Processed seafood product	*Pangasius hypothalmus*	Fillet in mixed product	0.02	0.004	0.002	< .01
2015-2137/1	Thailand	Processed seafood product	*Portunus pelagicus*	Crabmeat in brine	0.43	0.061	0.03	0.038
2015-1101/1	Thailand	Processed seafood product	*Portunus pelagicus*	n.a.	0.34	0.055	0.02	0.057
2015-2135/2	Thailand	Processed seafood product	*Rastrelliger kanagurta*	Fillet, steamed.	0.95	0.010	0.006	< .009
2015-1280/1	Morocco	Processed seafood product	*Sardina pilchardus*	Headed in oil	1.4	0.159	0.02	0.02
2015-1297/1	Philippines	Processed seafood product	*Sardina pilchardus*	Headed in oil	1.9	0.079	0.01	0.02
2015-2133/1	Thailand	Processed seafood product	*Scombromorus* sp.	Mackerel in oil	3.0	0.005	0.071	0.02

Table 7. Heavy metal composition, n=84.

n.a.: Data not available.

Sample					As	Cd	Hg	Pb
Journal No.	**Imported from**	**Species**	**Scient. name**	**Tissue/product**	**mg/kg w.w.**	**mg/kg w.w.**	**mg/kg w.w.**	**mg/kg w.w.**
2015-1105/1	Thailand	Processed seafood product	*Somanniathelphusa* sp.	Crab-paste	1.2	0.108	0.037	0.42
2015-1096/1	Thailand	Seafood snacks products	*Sphyraena obtusata*	n.a.	1.2	0.022	0.068	< .03
2015-1096/2	Thailand	Seafood snacks products	*Sphyraena obtusata*	n.a.	1.0	0.031	0.060	0.040
2015-1094/3	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	1.4	0.031	0.01	0.095
2015-1094/1	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	1.4	0.032	0.018	0.11
2015-1094/2	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	1.4	0.025	0.01	0.084
2015-1107/1	Thailand	Processed seafood product	*Trichogaster* sp. *Stolephorus* sp.	Fillet in mixed product	0.11	< 0.003	0.004	0.15
				Max value	45	2.7	0.70	0.42
				Next Highest	15	1.4	0.47	0.24

Table 8. Dioxins and dioxin like PCBs, n=34.

MO: mono orto, **NO**: non-orto, **TEQ**: Toxic equivalents. All sums calculated as upper bound sums[3].

Journal No.	Imported from	Species	Scientific name	Tissue	Sum MO-PCB	Sum NO-PCB	Sum DL-PCBs	Sum dioxins: PCDD/DF	Sum Total TE	Non-compliant
					pg/g TEQ w.w.	pg/g TEQ w.w.	pg/g TEQ w.w.	pg/g TEQ w.w.	pg/g TEQ w.w.	NC
2015-1911/1	Argentina	Argentine shortfin squid	*Illex argentinus*	Fillet+skin	0.001	0.008	0.01	0.08	0.09	-
2015-898/1	Thailand	shortbodied mackerel	*Rastrelliger brachysoma*	Fillet	0.002	0.02	0.02	0.09	0.12	-
2015-1325/1	Russia	Greenland halibut	*Reinhardtius hippoglossoides*	fillet	0.03	0.37	0.41	0.25	0.66	-
2015-26/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.07	1.3	1.4	0.50	1.9	-
2015-28/1	Australia	Yellowtail	*Seriola* sp.	Fillet	0.008	0.21	0.21	0.08	0.30	-
2015-29/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.12	2.1	2.2	0.67	2.9	-
2015-87/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.05	0.82	0.87	0.36	1.2	-
2015-89/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.03	0.52	0.55	0.29	0.84	-
2015-860/1	Thailand	Indian anchovy	*Stolephorus indicus*	Whole	0.005	0.07	0.07	0.14	0.21	-
2015-16/1	Philippines	Yellowfin tuna	*Thunnus albacares*	Fillet	0.001	0.03	0.03	0.09	0.12	-
2015-27/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	0.001	0.06	0.06	0.18	0.24	-
2015-51/1	Maldives	Yellowfin tuna	*Thunnus albacares*	Fillet	0.002	0.01	0.01	0.05	0.06	-

[3] According to the EU regulation 1881/2006

Table 8. Dioxins and dioxin like PCBs, n=34.

MO: mono orto, **NO**: non-orto, **TEQ**: Toxic equivalents. All sums calculated as upper bound sums[3].

Journal No.	Imported from	Species	Scientific name	Tissue	Sum MO-PCB	Sum NO-PCB	Sum DL-PCBs	Sum dioxins: PCDD/DF	Sum Total TE	Non-compliant
					pg/g TEQ w.w.	pg/g TEQ w.w.	pg/g TEQ w.w.	pg/g TEQ w.w.	pg/g TEQ w.w.	NC
2015-93/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	0.001	0.007	0.01	0.03	0.03	-
2015-173/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	0.001	0.008	0.01	0.04	0.05	-
2015-174/1	Sri Lanka	Bigeye Tuna	*Thunnus obesus*	Fillet	0.001	0.008	0.01	0.03	0.04	-
2015-1295/1	USA	Gulf menhaden	*Brevoortia patronus*	Oil	0.51	2.3	2.8	0.73	3.5	-
2015-1583/1	Peru	Oil	*n.a.*	Oil	0.05	1.0	1.1	0.22	1.3	-
2015-1587/1	Peru	Oil	*n.a.*	Oil	0.05	1.1	1.1	0.22	1.4	-
2015-1589/1	Peru	Oil	*n.a.*	Oil	0.04	0.87	0.91	0.45	1.4	-
2015-1590/1	Peru	Oil	*n.a.*	Oil	0.08	1.4	1.5	0.25	1.8	-
2015-1873/1	Thailand	Tuna, mixed	*Thunnus albacares, Katsuwonus pelamis*	Oil	0.04	3.9	3.9	0.78	4.7	-
2015-1281/1	Thailand	Processed tuna	*Katsuwonus pelamis*	Fillet in mixed product	0.002	0.008	0.01	0.07	0.08	-
2015-18/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in mixed product	0.001	0.01	0.01	0.04	0.05	-
2015-1279/1	Thailand	Processed tuna	*Katsuwonus pelamis*	Fillet in water	0.001	0.008	0.01	0.04	0.05	-
2015-1296/1	Vietnam	Processed tuna	*Katsuwonus pelamis*	Fillet in water	0.001	0.02	0.02	0.06	0.09	-
2015-1103/2	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	0.001	0.01	0.01	0.04	0.06	-
2015-1103/1	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	0.001	0.005	0.01	0.06	0.07	-

Table 8. Dioxins and dioxin like PCBs, n=34.

MO: mono orto, **NO**: non-orto, **TEQ**: Toxic equivalents. All sums calculated as upper bound sums[3].

Journal No.	Imported from	Species	Scientific name	Tissue	Sum MO-PCB	Sum NO-PCB	Sum DL-PCBs	Sum dioxins: PCDD/DF	Sum Total TE	Non-compliant
					pg/g TEQ w.w.	pg/g TEQ w.w.	pg/g TEQ w.w.	pg/g TEQ w.w.	pg/g TEQ w.w.	NC
2015-1103/3	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	0.001	0.003	0.00	0.04	0.05	-
2015-1104/1	Thailand	Processed seafood product	*Katsuwonus pelomis*	Fillet in mixed product	0.001	0.006	0.01	0.04	0.04	-
2015-1280/1	Morocco	Processed seafood product	*Sardina pilchardus*	Headed in oil	0.003	0.03	0.03	0.09	0.13	-
2015-1297/1	Philippines	Processed seafood product	*Sardina pilchardus*	Headed in oil	0.001	0.018	0.02	0.09	0.11	-
2015-1094/3	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	0.005	0.04	0.05	0.06	0.11	-
2015-1094/1	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	0.005	0.04	0.04	0.09	0.13	-
2015-1094/2	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	0.005	0.03	0.04	0.07	0.11	-
				Max value	0.51	3.9	3.9	0.78	4.7	none
				Next Highest	0.12	2.3	2.8	0.73	3.5	

Table 9. Non-dioxin like PCBs (µg/kg w.w.), n=34

The congener sum PCB_6 is calculated as the upper bound sum.

Two different analytical methods were used: one GC/MS and one HRGC/HRMS. This is reflected in the two levels of LOQ values, as seen from the: < values.

Journal No.	Imported from	Species	Scient. Name.	Tissue	Group	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180	UB-Sum PCB_6	Non-comp
2015-1911/1	Argentina	Argentine shortfin squid	*Illex argentinus*	Fillet+skin	Cephalopod	0.01	< .01	< .01	< .01	0.02	< .01	0.07	-
2015-898/1	Thailand	shortbodied mackerel	*Rastrelliger brachysoma*	Fillet	Marine fish	0.05	0.04	0.04	0.04	0.06	0.02	0.24	-
2015-1325/1	Russia	Greenland halibut	*Reinhardtius hippoglossoides*	fillet	Marine fish	0.30	0.47	0.83	1.2	1.6	0.42	4.9	-
2015-26/1	Japan	Yellowtail	*Seriola* sp.	Fillet	Marine fish	0.69	0.96	2.2	2.6	5.4	1.3	13	-
2015-28/1	Australia	Yellowtail	*Seriola* sp.	Fillet	Marine fish	0.06	0.08	0.22	0.34	0.60	0.19	1.5	-
2015-29/1	Japan	Yellowtail	*Seriola* sp.	Fillet	Marine fish	1.1	1.5	3.7	4.3	9.5	2.1	22	-
2015-87/1	Japan	Yellowtail	*Seriola* sp.	Fillet	Marine fish	0.75	0.69	1.4	2.0	3.4	0.95	9.2	-
2015-89/1	Japan	Yellowtail	*Seriola* sp.	Fillet	Marine fish	0.49	0.44	0.90	1.2	2.2	0.62	5.8	-
2015-860/1	Thailand	Indian anchovy	*Stolephorus indicus*	whole	Marine fish	0.07	< .05	0.07	0.13	0.28	0.09	0.69	-
2015-16/1	Philippines	Yellowfin tuna	*Thunnus albacares*	Fillet	Marine fish	< .01	< .01	< .01	0.02	0.03	0.02	0.11	-
2015-27/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	Marine fish	< .01	< .01	0.02	0.03	0.05	0.02	0.13	-
2015-51/1	Maldives	Yellowfin tuna	*Thunnus albacares*	Fillet	Marine fish	0.02	0.02	0.03	0.05	0.10	0.02	0.23	-
2015-93/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	Marine fish	< .01	< .01	< .01	< .01	0.02	< .01	0.08	-
2015-173/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	Marine fish	< .01	< .01	< .01	< .01	0.02	< .01	0.08	-
2015-174/1	Sri Lanka	Bigeye Tuna	*Thunnus obesus*	Fillet	Marine fish	< .01	< .01	< .01	< .01	0.01	< .01	0.07	-
2015-1295/1	USA	Gulf menhaden	*Brevoortia patronus*	Oil	Oil	4.0	11	20	28	44	15	121	-
2015-1583/1	Peru	Oil	*n.a.*	Oil	Oil	0.47	0.66	1.3	2.1	3.1	1.2	8.8	-

Table 9. Non-dioxin like PCBs (µg/kg w.w.), n=34

The congener sum PCB_6 is calculated as the upper bound sum.

Two different analytical methods were used: one GC/MS and one HRGC/HRMS. This is reflected in the two levels of LOQ values, as seen from the: < values.

Journal No.	Imported from	Species	Scient. Name.	Tissue	Group	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180	UB-Sum PCB_6	Non-comp
2015-1587/1	Peru	Oil	*n.a.*	Oil	Oil	0.53	0.68	1.1	2.4	3.2	1.2	9.1	-
2015-1589/1	Peru	Oil	*n.a.*	Oil	Oil	0.59	0.62	0.99	1.9	2.5	0.95	7.5	-
2015-1590/1	Peru	Oil	*n.a.*	Oil	Oil	1.2	1.3	1.8	3.1	4.4	1.8	14	-
2015-1873/1	Thailand	Tuna, mixed	*Thunnus albacares, Katsuwonus pelamis*	Oil	Oil	0.16	0.24	0.81	1.3	2.2	1.6	6.4	-
2015-1281/1	Thailand	Processed tuna	*Katsuwonus pelamis*	Fillet in mixed product	Processed seafood	0.04	< .02	< .02	< .02	< .02	< .02	0.14	-
2015-18/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in mixed product	Processed seafood	0.01	< .01	0.01	0.02	0.05	< .01	0.12	-
2015-1279/1	Thailand	Processed tuna	*Katsuwonus pelamis*	Fillet in water	Processed seafood	< .01	< .01	< .01	< .01	< .01	< .01	0.08	-
2015-1296/1	Vietnam	Processed tuna	*Katsuwonus pelamis*	Fillet in water	Processed seafood	0.01	0.01	< .009	< .009	0.01	0.01	0.06	-
2015-1103/2	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	Processed seafood	0.02	0.01	0.01	0.02	0.03	< .01	0.09	-
2015-1103/1	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	Processed seafood	0.02	0.01	0.01	0.01	0.02	< .01	0.09	-
2015-1103/3	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	Processed seafood	0.01	0.01	< .009	0.01	0.02	< .009	0.06	-
2015-1104/1	Thailand	Processed seafood product	*Katsuwonus pelomis*	Fillet in mixed product	Processed seafood	< .009	< .009	< .009	0.01	0.01	< .009	0.06	-
2015-1280/1	Morocco	Processed seafood product	*Sardina pilchardus*	Headed in oil	Processed seafood	0.04	< .02	0.02	0.10	0.25	0.06	0.48	-

Table 9. Non-dioxin like PCBs (µg/kg w.w.), n=34

The congener sum PCB_6 is calculated as the upper bound sum.

Two different analytical methods were used: one GC/MS and one HRGC/HRMS. This is reflected in the two levels of LOQ values, as seen from the: < values.

Journal No.	Imported from	Species	Scient. Name.	Tissue	Group	PCB 28	PCB 52	PCB 101	PCB 138	PCB 153	PCB 180	UB-Sum PCB_6	Non-comp
2015-1297/1	Philippines	Processed seafood product	*Sardina pilchardus*	Headed in oil	Processed seafood	0.02	0.03	0.02	0.01	0.02	< .01	0.11	-
2015-1094/3	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	Processed seafood	< .07	< .07	< .07	< .07	0.09	< .07	0.41	-
2015-1094/1	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	Processed seafood	< .07	< .07	< .07	< .07	0.11	< .07	0.44	-
2015-1094/2	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	Processed seafood	< .06	< .06	< .06	0.07	0.13	< .06	0.46	-
				Max value	All	**4.0**	**11**	**20**	**28**	**44**	**15**	**121**	none
				Next Highest	All	**1.2**	**1.5**	**3.7**	**4.3**	**9.5**	**2.1**	**22**	

Table 10. Levels of PBDEs (µg/kg w.w.), n=34

n.a.: Data not available.

Journal No.	Imported from	Specie	Scient. name	Tissue	PBDE-28	PBDE-47	PBDE-99	PBDE-100	PBDE-153	PBDE-154	PBDE-183	UB Sum 7-PBDE
2015-1911/1	Argentina	Argentine shortfin squid	*Illex argentinus*	Fillet+skin	< .002	< .003	< .003	< .002	< .002	< .003	< .002	0.02
2015-898/1	Thailand	shortbodied mackerel	*Rastrelliger brachysoma*	Fillet	< .002	0.005	< .004	< .002	< .002	< .004	< .002	0.02
2015-1325/1	Russia	Greenland halibut	*Reinhardtius hippoglossoides*	fillet	0.02	0.30	0.01	0.04	< .002	< .005	0.009	0.44
2015-26/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.03	0.47	0.04	0.11	0.003	< .006	0.02	0.83
2015-28/1	Australia	Yellowtail	*Seriola* sp.	Fillet	0.004	0.13	0.04	0.03	< .002	< .005	0.01	0.26
2015-29/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.05	0.86	0.05	0.17	< .003	< .007	0.03	1.4
2015-87/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.02	0.59	0.04	0.13	0.005	< .006	0.02	0.90
2015-89/1	Japan	Yellowtail	*Seriola* sp.	Fillet	0.01	0.32	0.02	0.07	< .003	< .006	0.01	0.51
2015-860/1	Thailand	Indian anchovy	*Stolephorus indicus*	whole	< .009	< .02	< .02	< .009	< .009	< .02	< .009	0.09
2015-16/1	Philippines	Yellowfin tuna	*Thunnus albacares*	Fillet	< .002	< .005	< .005	< .002	< .002	< .005	< .002	0.02
2015-27/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	< .002	< .004	< .004	< .002	< .002	< .004	< .002	0.02
2015-51/1	Maldives	Yellowfin tuna	*Thunnus albacares*	Fillet	< .002	0.008	< .004	0.002	< .002	< .004	< .002	0.03
2015-93/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	< .002	< .004	< .004	< .002	< .002	< .004	< .002	0.02
2015-173/1	Sri Lanka	Yellowfin tuna	*Thunnus albacares*	Fillet	< .002	< .004	< .004	< .002	< .002	< .004	< .002	0.02
2015-174/1	Sri Lanka	Bigeye Tuna	*Thunnus obesus*	Fillet	< .002	< .004	< .004	< .002	< .002	< .004	< .002	0.02
2015-1295/1	USA	Gulf menhaden	*Brevoortia patronus*	Oil	0.70	12	0.33	1.8	< .02	< .03	0.16	15
2015-1583/1	Peru	Oil	*n.a.*	Oil	0.04	0.34	0.09	0.05	< .02	< .03	< .02	0.61
2015-1587/1	Peru	Oil	*n.a.*	Oil	0.08	0.47	0.13	0.06	< .02	< .03	< .02	0.84
2015-1589/1	Peru	Oil	*n.a.*	Oil	0.06	0.47	0.21	0.07	< .02	< .03	0.03	0.91

Table 10. Levels of PBDEs (µg/kg w.w.), n=34

n.a.: Data not available.

Journal No.	Imported from	Specie	Scient. name	Tissue	PBDE-28	PBDE-47	PBDE-99	PBDE-100	PBDE-153	PBDE-154	PBDE-183	UB Sum 7-PBDE
2015-1590/1	Peru	Oil	*n.a.*	Oil	0.12	0.78	0.21	0.10	< .02	< .03	< .02	1.3
2015-1873/1	Thailand	Tuna, mixed	*Thunnus albacares, Katsuwonus pelamis*	Oil	0.03	0.42	0.08	0.12	< .017	< .034	0.02	0.91
2015-1281/1	Thailand	Processed tuna	*Katsuwonus pelamis*	Fillet in mixed product	< .003	< .006	< .006	< .003	< .003	< .006	< .003	0.03
2015-18/1	Thailand	Processed seafood product	*Katsuwonus pelamis*	Fillet in mixed product	< .002	< .004	< .004	< .002	< .002	< .004	< .002	0.02
2015-1279/1	Thailand	Processed tuna	*Katsuwonus pelamis*	Fillet in water	< .002	< .004	< .004	< .002	< .002	< .004	< .002	0.02
2015-1296/1	Vietnam	Processed tuna	*Katsuwonus pelamis*	Fillet in water	< .001	0.008	< .003	< .001	< .001	< .003	< .001	0.02
2015-1103/2	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	< .002	0.004	< .004	< .002	< .002	< .004	< .002	0.02
2015-1103/1	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	< .002	0.005	< .004	< .002	< .002	< .004	< .002	0.02
2015-1103/3	Thailand	Processed tuna	*Katsuwonus pelomis*	Fillet in mixed product	< .001	< .003	< .003	< .001	< .001	< .003	< .001	0.01
2015-1104/1	Thailand	Processed seafood product	*Katsuwonus pelomis*	Fillet in mixed product	< .002	< .003	< .003	< .002	< .002	< .003	< .002	0.02
2015-1280/1	Morocco	Processed seafood product	*Sardina pilchardus*	Headed in oil	< .004	0.01	< .007	0.01	< .004	< .007	< .004	0.05
2015-1297/1	Philippines	Processed seafood product	*Sardina pilchardus*	Headed in oil	< .002	0.008	< .004	< .002	< .002	< .004	< .002	0.02

Table 10. Levels of PBDEs (µg/kg w.w.), n=34

n.a.: Data not available.

Journal No.	Imported from	Specie	Scient. name	Tissue	PBDE-28	PBDE-47	PBDE-99	PBDE-100	PBDE-153	PBDE-154	PBDE-183	UB Sum 7-PBDE
2015-1094/3	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	< .01	< .02	< .02	< .01	< .01	< .02	< .01	0.11
2015-1094/1	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	< .01	< .02	< .02	< .01	< .01	< .02	< .01	0.11
2015-1094/2	Thailand	Seafood snacks products	*Stolephorus* sp.	Headed, fried and dried	< .01	< .02	< .02	< .01	< .01	< .02	< .01	0.11
			Max value	All	0.70	12	0.33	1.8	0.16	0.65	<LOQ	15
			Next Highest	All	0.12	0.86	0.21	0.17	0.03	0.24	-	1.4

Table 11. Maximum levels of pesticides (µg/kg w.w.), n=34.
Maximum levels for each pesticide in each class of species.
Each value will represent only one sample: The sample with highest value for that pesticide. "-": not measured.

Group	Marine fish (fillet)	Cephalopods	Processed sea food products (excluding oil)	Marine oils	#Samples analysed for this parameter/ and number of real values >LOQ	Max value in one sample	LOQ
Samples/ class	N=14	N=1	N=13	N=6			
Pesticide	Max value	Max value	Max value	Max value	N / #values >LOQ	Max value	µg/kg w.w.
Aldrin	<LOQ	<LOQ	<LOQ	<LOQ	34 / 0	-	0.02 - 0.25
Dieldrin	2.5	<LOQ	0.2	27	34 /13	27	0.04 - 0.4
Endrin	<LOQ	<LOQ	<LOQ	2.5	34 / 1	2.5	0.07 - 0.8
Mirex	0.55	<LOQ	<LOQ	1.3	34 / 7	1.3	0.02 - 0.25
Endosulfane-alfa	<LOQ	<LOQ	<LOQ	<LOQ	34 / 0	-	0.04-1.2
Endosulfane-beta	<LOQ	<LOQ	<LOQ	<LOQ	34 / 0	-	0.04-1.0
Endosulfane-Sulfate	<LOQ	<LOQ	0.51	<LOQ	34 / 1	0.51	0.04-1.0
Cis-chlordane	3.0	<LOQ	0.06	11	34 / 11	11	0.06 - 0.2
Trans-chlordane	0.42	<LOQ	<LOQ	3.9	34 / 5	3.9	0.06 - 0.2
Oxy-chlordane	0.90	<LOQ	<LOQ	1.5	34 / 2	1.5	0.06 - 0.6
Hexachlorhexane alfa-HCH (Lindane)	<LOQ	<LOQ	<LOQ	<LOQ	34 / 0	-	0.06 - 0.6
Hexachlorhexane beta-HCH	1.2	<LOQ	<LOQ	0.77	34 / 8	1.2	0.06 - 0.6
Hexachlorhexane delta-HCH	<LOQ	<LOQ	<LOQ	<LOQ	34 / 0	-	0.06 - 0.6
Hexachlorhexane gamma-HCH	<LOQ	<LOQ	<LOQ	<LOQ	34 / 0	-	0.06 - 0.6
Hexachlorbenzene HCB	6.5	<LOQ	0.08	17	34 / 12	6.5	0.05 - 0.5
Pentachlorobenzene	<LOQ	<LOQ	<LOQ	<LOQ	34 / 0	-	0.06 - 0.6

Table 11. Maximum levels of pesticides (µg/kg w.w.), n=34.

Maximum levels for each pesticide in each class of species.
Each value will represent only one sample: The sample with highest value for that pesticide. "-": not measured.

Group	Marine fish (fillet)	Cephalopods	Processed sea food products (excluding oil)	Marine oils	#Samples analysed for this parameter/ and number of real values >LOQ	Max value in one sample	LOQ
Samples/ class	N=14	N=1	N=13	N=6			
Pesticide	Max value	Max value	Max value	Max value	N / #values >LOQ	Max value	µg/kg w.w.
Heptachlor	<LOQ	<LOQ	<LOQ	<LOQ	34 / 0	-	0.01 - 0.25
Heptachlor trans epoxide	<LOQ	<LOQ	<LOQ	<LOQ	34 / 0	-	0.06 - 1.2
Heptachlor cis epoxide	<0.43	<LOQ	<LOQ	3.8	34 / 5	3.8	0.07 - 0.4
Nonachlor-trans	7.5	<LOQ	0.06	14	34 / 15	14	0.01 - 0.2
Toxaphene-26	3.1	<LOQ	<LOQ	1.7	34 / 6	3.1	0.12 - 1.2
Toxaphene-50	5.0	<LOQ	<LOQ	3.7	34 / 8	5.0	0.12 - 1.2
Toxaphene-62	2.0	<LOQ	<LOQ	3.5	34 / 3	3.5	0.24 - 1.2
o,p-DDD	1.7	<LOQ	0.02	5.2	34 / 13	5.2	0.01 - 0.25
o,p-DDE	0.61	<LOQ	0.01	1.7	34 / 10	1.7	0.01 - 0.25
o,p-DDT	2.6	<LOQ	0.01	1.3	34 / 13	2.6	0.01 - 0.25
p,p-DDD	10	<LOQ	0.12	39	34 / 20	39	0.01 - 0.25
p,p-DDE	37	0.04	0.40	71	34 / 34	71	0.01 - 0.25
p,p-DDT	9.7	<LOQ	0.01	19	34 / 18	19	0.01 - 0.25
#f determinations/ # found					1054 / 205		

Table 12. PAH levels (µg/kg w.w.).								
Sample	2015-1910/1	2015-1299/1	2015-876/1	2015-1298/1	2015-1583/1	2015-1587/1	2015-1589/1	2015-1590/1
Species	Queen scallop	Scallops	Greenshell mussel	Atlantic Cod	Oil	Oil	Oil	Oil
Scient. name	*Aequipecten opercularis*	*Pectinidae*	*Perna canalicula*	*Gadus morhua*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
Tissue/ processing	Meat	Meat	Meat	Fillet	-	-	-	-
5-methylchrysene	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
Benz(a)anthracene	<LOQ	<LOQ	<LOQ	<LOQ	4.6	2.1	1.1	0.79
Benzo(a)pyrene	**<LOQ**	**<LOQ**	**<LOQ**	**<LOQ**	**2.7**	**1.5**	**0.7**	**<LOQ**
Benzo(b)fluoranthene	<LOQ	<LOQ	<LOQ	<LOQ	*3.4*	*1.8*	*0.89*	0.58
Benzo(c)fluorene	<LOQ	<LOQ	<LOQ	<LOQ	1.3	<LOQ	<LOQ	<LOQ
Benzo(ghi)perylene	<LOQ	<LOQ	<LOQ	<LOQ	1.9	0.96	<LOQ	<LOQ
Benzo(j)fluoranthene	<LOQ	<LOQ	<LOQ	<LOQ	1.6	0.88	<LOQ	<LOQ
Benzo(k)fluoranthene	<LOQ	<LOQ	<LOQ	<LOQ	1.4	0.66	<LOQ	<LOQ
Chrysene	<LOQ	<LOQ	<LOQ	<LOQ	5.5	2.7	1.6	1.2
Cyclopenta(cd)pyrene	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
Dibenz(ah)anthracene	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
Dibenzo(a,e)pyrene	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
Dibenzo(a,h)pyrene	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
Dibenzo(a,i)pyrene	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
Dibenzo(a,l)pyrene	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
Indeno(1,2,3,-cd)pyrene	<LOQ	<LOQ	<LOQ	<LOQ	1.9	1.1	<LOQ	<LOQ
LB Sum PAH-4	**0**	**0**	**0**	**0**	**16.2**	**8.1**	**4.3**	**2.6**
Non compliant:	-	-	-	-	**Yes**	**-**	**-**	**-**

ANNEX 2: Method performance

A summary of the chemical analytical methods.								
Compounds		**Matrix**	**Method principle**	**Screening method LOD wet weight (µg/kg w.w.)**	**Analytical method LOD in muscle (µg/kg w.w.)**	**Analytical method LOQ wet weight (µg/kg w.w.)**	**Level of action**	**Laboratory**
Therapeutic agents and dyes	Chloramphenicol	Muscle	LC-MS/MS	n.a.	0.25	-	presence (MRPL=0.3)	NIFES
	Hydroxy-metronidazole[2]	Muscle	LC-MS/MS	n.a.	2	-	presence (MRPL=3.0)	NIFES
	3-Amino-2-oxazolidinone (AOZ)	Muscle	LC-MS/MS	n.a.	0.5	-	presence (MRPL=1.0)	NIFES
	1-Aminohydrantoin (AHD)	Muscle	LC-MS/MS	n.a.	0.6	-	presence (MRPL=1.0)	NIFES
	3-Amino-5-morpholinomethyl-2-oxazolidinone (AMOZ)	Muscle	LC-MS/MS	n.a.	0.4	-	presence (MRPL=1.0)	NIFES
	Semicarbazide (SEM)	Muscle	LC-MS/MS	n.a.	0.5	-	presence (MRPL=1.0)	NIFES
	Malachite green (MG)[2]	Muscle	LC-MS/MS	n.a.	0.15	-	presence (MRPL=2.0)	NIFES
	Leuco malachite green (LMG)[2]	Muscle	LC-MS/MS	n.a.	0.15	-	presence (MRPL=2.0)	NIFES
	Crystal violet (CV)	Muscle	LC-MS/MS	n.a.	0.3	-	Presence	NIFES
	Leuco crystal violet (LCV)	Muscle	LC-MS/MS	n.a.	0.15	-	Presence	NIFES
	Brilliant green[2] (BG)	Muscle	LC-MS/MS	n.a.	0.15	-	Presence	NIFES
POPS	PCDD and PCDF (dioxin and furan) congeners	Muscle	GC-HRMS	n.a.	-	$3*10^{-6}$-0.1 ng/kg[1] TEQ	Dioxins maximum limits are in sum TEQ units See annex 3	NIFES
	non-orto PCB congeners	Muscle	GC-HRMS	n.a.	-	$3*10^{-6}$-0.1 ng/kg[1] TEQ	DLPCBs maximum limits are in sum TEQ units See annex 3	NIFES

A summary of the chemical analytical methods.								
Compounds		**Matrix**	**Method principle**	**Screening method LOD wet weight (µg/kg w.w.)**	**Analytical method LOD in muscle (µg/kg w.w.)**	**Analytical method LOQ wet weight (µg/kg w.w.)**	**Level of action**	**Laboratory**
	Mono-orto PCB congeners	Muscle	GC-HRMS	n.a.	-	$3*10^{-6}$-0.1 ng/kg[1] TEQ	DLPCBs maximum limits are in sum TEQ units See annex 3	NIFES
	Indicator PCB congeners	Muscle	GC-MS	n.a.	-	0.01-0.05	See annex 3	NIFES
	Pesticides	Muscle	GC-MS/MS or LC/MS/MS	See table 10				NIFES/ Eurofins
	PBDE-congeners	Muscle	GC-MS	n.a.	-	0.002-0.01	n.a.	NIFES
	PAH, benzo(a)pyrene(BaP) SUM PAH_4	Edible parts	GC-MS	n.a.	-	0.5-1	See Annex 3	Eurofins/ NIFES
Chemical elements	Pb	Muscle	ICPMS	n.a.	-	4	See Annex 3	NIFES
	Cd	Muscle	ICPMS	n.a.	-	2	See Annex 3	NIFES
	As	Muscle	ICPMS	n.a.	-	2	See Annex 3	NIFES
	Hg	Muscle	ICPMS	n.a.	-	2	See Annex 3	NIFES
Spoilage indicators	TVB-N[2]	Muscle	Volumetry /titration[3]	n.a.	-	0.6 mg(N)/ 100g w.w.	-	NIFES
	Histamine	Muscle	HPLC-UV	n.a.	-	5 mg/kg w.w.	-	NIFES
	TBARS[2]	Muscle	Spectroscopy	n.a.	-	3.9 nmol/g w.w.	-	NIFES

1) The TEQ is a toxicity scale, the product of the analytical concentration and a congener specific toxicity factor.
1) ng/kg is the same scale (unit) as pg/g. 1
2) The method is not accredited according to ISO 17025
3) See: Conway, E.I and Byrne, A: An absorption apparatus for the microdetermination of certain volatile substances. Biochem, J. 27, 419-429, 1933

ANNEX 3: Legal maximum levels

A selection of regulatory maximum levels for contaminants in seafood from on EU Commission regulation no 1881/2006											
Element or pollutant	Unit of measurement	Marin Fish Fillet[1]	Some fish species Fillet[1]	Wild caught Eel Fillet[1]	Fresh water Fish Fillet[1]	Smoked seafood products	Fish liver	Crusta-ceans: White meat	Bivalves and (smoked bivalves)[2]	Cephalo-pods[3]	Marine Oils HC[4]
Arsenic (As)	mg/kg w.w.[6]	-		-	-	-	-	-	-	-	-
Cadmium (Cd)		0.05	0.1-0.3	0.1	0.05	-	-	0.5	1.0	1.0	-
Mercury (Hg)		0.5	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	-
Lead (Pb)		0.3	0.3	0.3	0.3	0.3	-	0.5	1.5	1.0	-
Sum of dioxins and furans[5]	Pg/g TEQ w.w. [6]	3.5		3.5	3.5	-	-	3.5	-	-	1.75
Sum of dioxin like PCBs[5]		-	-	-	-	-	-	-	-	-	-
Sum of dioxins. furans and dioxin like PCBs[5]		6.5	-	10	6.5	-	20	6.5	-	-	6
Sum of six indicator PCBs[5]	Ng/g w.w.[6]	75	-	300	125	-	200	75	-	-	200
PAH Benzo[a]pyrene	µg/kg w.w. [6]	-	-	-	-	5[7] 2[8]	-	-	5 (6)[2]	-	2
PAH_4, sum of 4 PAH compounds[9]	µg/kg w.w.[6]	-	-	-	-	30[7] 12[8]	-	-	30 (35)[2]	-	10
Based on Commission regulation no 1881/2006		1) When fish is intended to be eaten whole, the limit should be applied to the whole product. 2) Value in brackets concerns smoked bivalves. 3) Without viscera. 4) HC = Human consumption 5) Upper bound sum is assumed. 6) Wet weight (w.w.); the concentration in a naturally moist sample. Analytical values for dried food should be transformed to their corresponding w.w. based values before the maximum level is applied. 7) Valid until August 31th 2014. 8) Valid from September 1th 2014 9) Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene and chrysene, calculated as a lower bound sum.									

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