

# Results of sanitary-veterinary examination of fish in Poland in 2010-2016

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Received 01.12.2017

Accepted 09.01.2018

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### Summary

Fish and other fishery products are subjected to the official sanitary-veterinary controls as required by Regulation (EC) No 854/2004. The aim of the study was to analyse the results of sanitary-veterinary examinations of fish in Poland in 2010-2016 conducted by the Veterinary Inspection. The results of the laboratory examination on fish were worked out based on the annual reports issued by the General Veterinary Inspectorate. The analysis of the results included the sanitary-veterinary examination of marine and farmed fish (salmonids, cyprinids and other fish species) carried out by the Veterinary Inspection. Moreover, the sanitary evaluation of samples of fish, seafood and their products on the basis of microbiological, chemical and sensory analysis results performed by the State Sanitary Inspection (PIS) were used. Throughout the analyzed period, a total of 1 436 109 009.60 kg of fish were examined, in that 145 711.71 kg (0.01%) were declared unfit for human consumption. The most important reasons for fish rejection proved to be parasite invasions (45.91% of the total amount of discarded fish), viral diseases (41.74%), bacterial diseases (9.71%) and the exceeded acceptable level of histamine (2.56%) and dioxins (0.07%). The sanitary examination of the food samples carried out by the PIS showed that the causes of rejection included the surpassed levels of food additives (2.3-2.7% of all the discarded samples) and chemical contaminants (1.4-2.4%) as well as abnormal microbiological and sensory tests results (0.1-1.2%). Summing up, the amount of fish rejected during the analyzed period was low which indicates the good quality of the obtained raw material.

**Keywords:** fish, examination of fish, food safety

Poland's annual catch of marine and freshwater fish reached 223.1 thousand tons in 2014 and 236.5 thousand tons in 2015. When compared with the average fish harvest in the years 2006-2010 (206.4 thousand tons) the catch was larger by 8.1% in 2014 and 14.6% in 2015. In the years 2014 and 2015, marine fish accounted for 76.5% and 79.1%, respectively, of the total fish catch, while freshwater fish accounted for 23.5% and 20.9%, respectively (8).

According to data supplied by the Central Statistical Office of Poland (GUS), fish and seafood consumption per capita was 13.5 kg in 2014 and 12.5 kg in 2015 (9). Compared with the year 2015, in 2016, saltwater fish consumption increased by 6%, whereas that of freshwater fish remained at a similar level. Among the marine and diadromous fish, the largest consumption growth occurred for sprats, blue hake, herring and tuna, with a noticeable downturn in the consumption of salmon, cod, Alaska pollock and mackerel. Moreover, 2016 marked an increase in the domestic production

of carp and trout, and a clearly lower consumer interest in imported freshwater fish species, such as panga and tilapia (4).

In accordance with Regulation (EC) No 854/2004 (7), fish and other fishery products are subject to official controls. With regard to fish, the official controls include sensory evaluation, determination of the histamine level in conformity with Reg. (EC) No 2073/2005 (2), residues and impurities in compliance with Reg. (EC) No 1881/2006 (1) and food additives in accordance with Reg. (EC) No 1333/2008 (6), as well as visual inspection for parasites in conformity with Reg. (EC) No 2074/2005 (3). When in doubt about freshness, it is recommended that the level of total volatile basic nitrogen (TVB-N) and trimethylamine nitrogen (TMA-N) be determined in compliance with Reg. (EC) No 2074/2005 (3). If well-grounded indications occur during the control procedure, a microbiological study should also be performed. According to Reg. (EC) No 854/2004 (7), fishery products derived from poison-

ous fish of the families Tetraodontidae, Molidae and Diodontidae, and on the genus *Canthigaster*, as well as fish containing toxins, such as ciguatera, that are hazardous to the health of consumers, must not be placed on the market. The aim of the study was to analyse the results of sanitary-veterinary examinations of fish in Poland in 2010-2016 conducted by the Veterinary Inspection.

### Material and methods

The results of the laboratory tests on fish were worked out on the basis of annual reports of the General Veterinary Inspectorate (5). The analysis of the results included the sanitary-veterinary examination of marine and farmed fish. The assessment of farmed fish covered species of the Salmonidae and Cyprinidae families, as well as other unnamed fish species. The evaluation of the causes of fish rejection for human consumption was based on the results of examinations for the presence of parasites, viral and bacterial diseases, as well as acceptable levels of histamine and dioxins. The analysis also encompassed the sanitary assessment of samples collected from fish, seafood and their products subjected to microbiological, chemical and organoleptic tests by the State Sanitary Inspection (PIS) (9).

### Results and discussion

The results of the sanitary-veterinary examination of fish in Poland in 2010-2016 are presented in Table 1. A total of 1 436 109 009.60 kg of fish were examined, of which 145 711.71 kg (0.01%) were deemed unfit for human consumption. The detention rate for particular fish groups varied considerably. The highest was noted for the salmonid fish (138 201.41 kg), followed by marine fish (3789.30 kg) and other farmed fish (3628.00 kg). The lowest detention was determined for the cyprinids, only 93.00 kg. The causes of fish rejection were unnamed parasite invasions, viral diseases, i.e. viral haemorrhagic septicaemia (VHS), spring viremia of carp (SVC) and infectious hematopoietic necrosis (IHN), as well as bacterial diseases and excessive levels of histamine and dioxins.

The overall assessment showed that parasite invasions caused the highest percentage of fish rejection

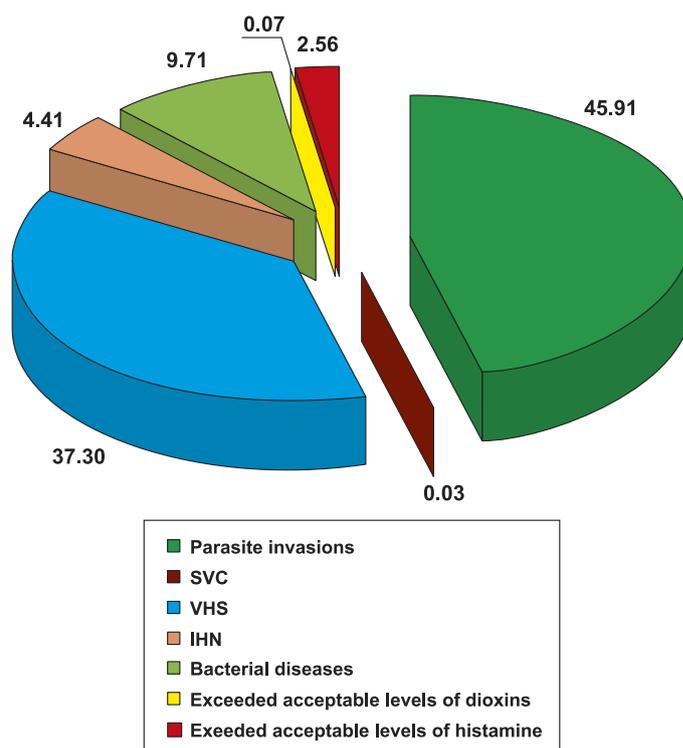


Fig. 1. Causes of fish rejection in Poland in 2010-2016

and accounted for 45.91% of the total fish declared unfit for consumption (Fig. 1). These rejections occurred at high frequency in the years 2011-2013 and caused as high as 99.99% of detentions. The parasite invasions were considered one of the primary reasons for rejection of farmed fish of the family Salmonidae (48.36% of detentions within this family) and one of three rejection causes in the Cyprinidae family (18.29% of detentions within it). Parasite invasions were of minor importance for rejection of marine fish and other species of farmed fish, causing 1.20% and 0.03% detentions, respectively.

The second important reason for fish rejection were viral diseases, which made up 41.74% of the total amount of rejected fish. The rejections were noted in only three reporting periods, but the viral diseases of the salmonids (VHS and IHN) were a high priority in 2014 and 2015 being responsible for 99.99% and

Tab. 1. Results of sanitary-veterinary examination of fish (in kg) in Poland in 2010-2016

Year	Total quantity of fish examined	Total quantity of fish declared unfit (% of examined)	Parasite invasions	Causes of fish declared unfit					
				Viral disease			Bacterial disease	Exceeded acceptable levels of:	
				VHS	IHN	SVC		histamine	dioxins
2010	257 380 716.00	12 143.50 (0.005)	63.50	0	0	0	10 617.00	1459.00	4.00
2011	96 580 424.00	31 322.90 (0.03)	31 319.30	0	0	0	0	0	3.60
2012	207 336 293.60	7 740.00 (0.04)	7 705.00	0	0	0	0	35.00	0
2013	229 957 969.70	30 188.61 (0.01)	27 809.61	0	0	50.00	0	2240.00	89.00
2014	229 842 398.00	53 276.70 (0.02)	0	46 848.00	6423.00	0	3.50	0	2.20
2015	308 648 519.20	11 039.00 (0.04)	0	7 505.00	0	0	3 534.00	0	0
2016	110 362 689.10	1.00 (0.0000009)	0	0	0	0	0	0	1.00
Total	1 436 109 009.60	145 711.71	66 897.41	54 353.00	6423.00	50.00	14 154.50	3734.00	99.80

68% of detentions, respectively. Besides the parasite invasions, they were regarded as one of the key causes of the Salmonidae fish rejection (44% of detentions). SVC was only reported in 2013 when it was a reason for the lowest number of detentions in both the reporting year (0.17%) and the entire study period (0.03%). Regarding the cyprinids, SVC contributed to more than a half (53.76%) of all detentions.

Bacterial diseases led to 9.71% of all the detentions in the years 2010-2016. The sanitary-veterinary assessment indicated their importance in 2010 and 2015 when their percentage reached 87.43% and 32.01%, respectively, in the total amount of fish declared unfit. With regard to farmed fish other than the Salmonidae and Cyprinidae, bacterial diseases constituted the first cause of detentions (97.52%), the second in cyprinids (after SVC, 27.96%) and the third cause in salmonids (after parasite invasions and viral diseases, 7.66%). Bacterial diseases were not recognized in the marine fish during the analyzed period.

Analyzing the causative agents of fish rejections, the exceeded tolerable histamine level was of minor importance as it brought about 2.56% of the total fish declared unfit. It was determined in marine fish only, and contributed to 98.54% of the detentions. In 2010 and 2013, the surpassed acceptable histamine level represented the second cause of the detentions (12.01% and 7.42% of fish regarded unfit, respectively).

Excessive concentration of dioxins was reported to occur in a low percentage (0.07% of the total amount of fish declared unfit) and as a consequence, 2.45% of farmed fish other than salmonids and cyprinids, 0.3% of marine fish and only 0.0007% of salmonids were considered unfit.

The information concerning the quality of fishery product in Poland is complemented with the results of the official control carried out by the PIS (9). In 2010-2015, the results of the microbiological, chemical and organoleptic tests together with excessive levels of food additives led to the rejection of 1% (2014) and 2.4% (2011 and 2012) samples of fish, seafood and their products. The chemical examinations results including the sum total of toxic metals, residues of pesticides, mycotoxins and nitrate contamination contributed to high rates of rejection of these products, consequently, 1.4-2.4% of the samples were discarded. Whereas exceeding the permissible levels of food additives (despite the lack of data from 2010 and 2011) was the reason for rejection of 2.3-2.7% of samples. The percentage of samples discarded due to abnormal microbiological and sensory evaluation was slightly lower and ranged between 0.1% and 1.2%. *Listeria* microorganisms were recovered from the analyzed food samples at each reporting year in 0.1-1.2% of the samples, while *Salmonella* rods in 0.2-0.6% in 2011, 2013 and 2015.

Summing up, the amount of rejected fish was low in the analyzed period, which is indicative of good quality

of the raw material obtained. In 2016, compared to the previous years, a substantial decline in the detention numbers was noted. The detentions were a few times smaller than in 2012 and even tens of thousands lower than in 2011, 2013 and 2014. It is worth noting that, during the last three years, the microbiological factors were the predominant causes of fish rejection with the absence of parasite invasions.

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