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European and Bulgarian legislation related to heavy metal pollution of marine aquacultures

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Abstract

The subject of the study was regulatory documents for implementation of the European legislations in the act of Bulgarian regulation related to marine aquacultures. A summary of Ordinance № 5/2015 on determining the maximum levels of certain contaminants in food was performed, as well as an analysis of Directive 2013/39/EU. Based on the review of European and Bulgarian legislation regarding the maximum levels of heavy metals in aquatic organisms, it can be summarized that the maximum levels of aluminium, arsenic, copper, nickel, chromium and zinc in aquatic organisms were presented in the analysed repealed regulatory documents. Furthermore, in the current legislation, the safety of aquatic organisms with regard to heavy metal pollution is related only to the control of lead, cadmium and mercury. Based on the current research, we can make the following European legislation in this area is fully implemented in the act of Bulgarian regulation.

Keywords: Aquacultures, hydrobionts, heavy metals, European and Bulgarian legislation

Introduction

The basic rules of the Union on food law are laid down in Regulation (EC) (178/2002) to establish the general principles and requirements of food law, creating an European Food Safety Authority and laying down procedures for food safety (Kostov, I., 2019) ^[9, 11].

The food chain legislation is harmonized at EU level and requires Member States to develop national measures to implement it (Kostov, I. 2016) ^[10].

The food chain is defined as a complete chain of production, collection, processing, transport, storage and distribution of feed and food from primary production to the final consumer ("barn to table" concept). At the same time, this legislation is constantly updated, that is why, it is necessary to review to what extent the necessary changes in the national legislation for its implementation have to be made (Kostov I., Kirov V., Nikolova G., 2019) ^[9, 11]. In order to achieve the goal of strengthening, modernizing and streamlining the current legal environment and ensuring a high level of protection of human, animal and plant health, the Commission proposed in 2013 a package of five proposals for the revision of EU law of food chain. Analysing this framework, Kostov, I. (2018) ^[2] emphasizes that its introduction will significantly improve the effectiveness of official food safety controls and the level of protection against risks to human, animal and plant health and animal welfare in the Union.

The aquaculture is one of the valuable sources of many essential nutrients for humans. Rich in protein, carbohydrates and vitamins, it is often present in many healthy diets. In addition to its beneficial effects, the fish consumption can carry a risk to human health in the event of heavy metal contamination (Azaman, F. *et al.* 2015, Isangedighi, I. and David, G. 2019) ^[1, 8].

This issue is extremely important today through the introduction of the EU strategy "From farm to fork" to build sustainable food chains aimed at protecting nature, providing healthy food and supporting farmers, including and growing marine aquaculture. With the strategy presented on 20 May 2020, the European Commission proposes to modernize food chains in order to ensure safe food and protect people and nature.

It is necessary to emphasize that with regard to the protection of human health and food safety, the Bulgarian legislation of food safety was harmonized with the European legislation during the period of Bulgaria's accession to the EU and today can be considered fully harmonized with European legislation.

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The main Bulgarian acts are Ordinance № 31 of 2004 on the maximum levels of contaminants in food, Ordinance № 12 of 21.05.2002 on the maximum levels of heavy metals as contaminants in food, and Commission Regulation (EC) № 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in food, that is directly applicable.

In Annex II of Directive 2013/39/EC, environmental quality standards for priority substances and certain other pollutants, setting an annual average value, the maximum permissible concentration in inland surface waters (covering rivers, lakes and similar artificial or heavily modified water bodies) are set out. Directive 2000/60/EC, in turn, establishes a common framework for Community action in the field of water policy and a list of major pollutants, including metals and their constituents.

The purpose of the study was to analyse the national and European legislation related to the pollution of marine ecosystems with various heavy metals.

Materials and Methods

The subject of the survey is regulatory documents that set maximum levels for certain heavy metals in aquatic organisms over a period of three decades. The analysis covers national laws and European regulations. Researched and analysed is the content of regulations at national and European level in the field of legislation on the maximum level of heavy metals in food, in their various versions (Krippendorff, K. 2004)^[12].

Results and Discussion

In the Bulgarian Food Law, Art. 5. para 1 shall be given the right to the Minister of Health in coordination with the Minister of Agriculture, Food and Forestry to determine the maximum permissible quantities of pollutants and pesticide residues, taking as a basis the requirements of Ordinance № 5 of 09.02.2015 for determining at maximum levels of certain contaminants in food, issued by the Minister of Health (issued and supplemented 11 from 02.02.2018, in force from 02.02.2018). This ordinance describes the hygiene standards for the maximum permissible levels of heavy metals permitted in food. Art. 11 refers to Regulation (EC) № 1881/2006, which introduces maximum levels for certain contaminants in food, and thus in practice creates conditions for its direct application (§ 2 of the Regulation).

From the analysis of the data on the maximum levels of lead, mercury and cadmium in the aquatic organisms, it is evident that the maximum level of lead in the muscle tissue of fish (0.30 mg/kg live weight) according to Regulation (EC) № 1881/2006 is different from the maximum level of lead in fish muscle tissue (0.2 mg/kg live weight) according to Regulation (EC) № 466/2001, where values are set for individual fish species, i.e. changes and the maximum lead level increases from 0.2 mg/kg to 0.3 mg/kg.

As regards the maximum levels of cadmium and mercury, their values are maintained in groups 1 and 2 in both regulations, but in Regulation (EC) № 1881/2006 the composition of the species in group 2 is significantly expanded and there is also increase in the maximum level to 0.1 mg/kg.

Unlike Regulation (EC) № 466/2001, Regulation (EC) № 1881/2006 also sets a maximum level for cadmium in the muscle of swordfish *Xiphias gladius*, so that Commission Regulation (EC) № 1881/2006 increase the control of certain heavy metals in aquatic organisms.

A review of the national legislation (Ordinance № 5 and Ordinance № 31) shows that the former repeals the maximum levels of food contaminants listed in Ordinance № 31 (paragraph 5). However, in Art. 9 (1) of the repealed Ordinance № 31 of 2004, the maximum levels of contaminants in food, and the maximum levels of lead, mercury, cadmium, aluminium, arsenic, copper, nickel and chromium are set out in its Annex 1, Table 5 and Table 5a. The text of the ordinance shows that until 2015 the maximum levels for aluminum, arsenic, copper, nickel and chromium, which are not covered by Regulation (EC) (1881/2006), are specified.

It is also noteworthy that in Ordinance № 5 of 1984. until its repeal in 2004, the maximum levels for aluminum, arsenic, copper, nickel, chromium and zinc were retained in Ordinance № 31 of 2004.

The analysis shows that in the first text of Ordinance № 31 of 2004, and subsequently amended in 2006, there is compliance with the maximum levels of heavy metals, but there is a discrepancy in the species of fish. However, Ordinance № 31 of 2004 also repealed Ordinance № 5 of 1994, and last amendment in 1999 for the maximum hygienic levels of chemical and biological contaminants in food and Ordinance № 12 of 2002 for maximum levels of heavy metals as contaminants in food). (paragraph 4 of Ordinance № 31).

Conclusion

Based on the analysis of European and Bulgarian legislation regarding the maximum levels of heavy metals in aquatic organisms, the following conclusions can be drawn:

1. The European legislation related to marine aquacultures is fully implemented in the act of Bulgarian regulation.
2. In the European (Regulation (EC) № 1881/2006) and Bulgarian legislation (Ordinance No. 5 of February 9, 2015) the safety of hydrobionts regarding heavy metal pollution is only related to the control of lead, cadmium, and mercury.

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