

The Quality of Fishery Product on the Moldovan Market, Regulations, National Institutions, Controls and Non-Compliant Products

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Abstract—This paper presents the aspects of the official control of fishery in the Republic of Moldova. Currently, the regulations and the activity of national institutions with responsibilities in the field of food quality are in a process of harmonization with the European rules, aiming at European integration, quality improvement and providing a higher level of food safety. The National Agency for Food Safety is the main national body with responsibilities in the field of food safety. In the field of fishery products, the Agency carries out an intensive activity of informing the citizen and controlling the products marketed. The paper presents the dangers related to the consumption of fish and fishery products traded on the national market, the sanitary-veterinary inspections conducted by the profile institution and the improper situations identified. The national market of fishery products depends largely on imports, mainly focused on ocean fish. The research carried out has shown that during the period 2011-2018, following the inspections carried out on fishery products traded on the national market, a number of inconsistencies have been identified. Thus, indigenous products were frequently detected with sensory characteristics unfit for consumption, and being commercialized in inappropriate locations or contaminated with chemical pollutants. On import products controlled, the most frequent inconsistent situations have been represented by inconsistent sensory aspects and by parasite contamination. Taking into account the specific aspects of aquatic products, including the high level of alterability, special conditions of growth, marketing, culinary preparation and consumption are necessary in order to decrease the risk of disease over the population. Certificates, attestations and other documents certifying the quality of batches, completed by additional laboratory examinations, are necessary in order to increase the level of confidence on the quality of products marketed in the Republic. The implementation of various control procedures and mechanisms at national level, correlated with the focused activity of the specialized institutions, can decrease the risk of contamination and avoid cases of disease on the population due to the consumption of fishery products.

Keywords—Fishery products, food safety, insurance, inspection, Republic of Moldova.

I. INTRODUCTION

FOODS in general, and fish products in particular, are very important for the human body, providing the energy needs and nutrients necessary to every individual.

For the food production to be competitive, it is necessary to promote and support a sustainable and healthy agricultural

sector in order to ensure the food security. National food safety legislation aims to protect the consumers' rights by providing a support that allows the buyer to choose right the food from the market [1]. Law no. 113/2012 regulates the work of the National Agency for Food Safety (ANSA) in Moldova, supporting the consumption of safe food products and the producers to comply with the food safety standards. ANSA is a control body established by law that protects human health and acts as a public power [2].

II. SHORT LITERATURE REVIEW

Providing safe and high-quality foods represents the basic goal for each country. Standards and requirements of the food supply chain aim at providing a high level of food safety on a sustainable, efficient and innovative national market [3]. Traditional restaurants specific for preparing fish and fish products can be visited in the Republic of Moldova, maintaining a correct attitude towards the customers' wishes by being able to satisfy the gourmets with the most demanding tastes [4].

Food quality can be affected by internal factors such as: the chemical composition of the product and external factors such as air temperature, air humidity, light and radiation [5]. Food production can affect the external environment through some effects over the climate, CO₂ emissions and pollutants (spread of environmental toxins, including pesticides) [6].

In order to maintain a diversified and sustainable fishery production in the natural waters of Republic of Moldova, it is necessary to systematically monitor the quality, dynamics and quantity of fish in aquatic ecosystems in order to exclude mineralization, pollution and damages caused to the fish production that can be transmitted to humans [7].

A better collaboration of control bodies with different areas of action on educating citizens in order to combat different violations would lead to a sustainable favoring over fish fauna breeding and over preserving aquatic biological resources [8]. ANSA performs food monitoring programs annually regarding the level of residues of drugs or other substances, as well as the absence or presence of various diseases in poultry meat, eggs, natural honey and fish [9].

If a notification is sent via RASSF, national authorities take the required measures to eliminate nonconforming product from the commercial network [9].

Each batch of fishery products is inspected by using samples before the commercialization, to verify the food safety conditions required for human consumption [10].

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Official inspections on imports of food of animal origin must include at least a systematic inspection of documents, a random inspection, and a physical one as appropriate. Exports from the Republic of Moldova, to the European Union or to other industrial countries are limited not only due to the difficulties of meeting the quality requirements of the products but also because of their lack of competitiveness [11].

Assessing the organoleptic quality of the product is very important because some fish species are more suited to processing than others. Not all fish species are suitable for fillets, as some change their appearance (color and firmness) and may influence consumer choice [12].

III. MATERIALS AND METHODS

Information regarding the quality of fishery products and consumer health protection has been collected from the website of the ANSA. Information on research to develop fish farming and food safety in the Republic of Moldova has been obtained from the Web of Science, Scopus, and Google Scholar. Regarding the legislative regulations, the official information base of the Government of the Republic of Moldova was examined. For the legislative field, the official information base of the Government of the Republic of Moldova was examined. For additional data, media information of specialty publications or official press reports was used. Data collected were ordered, processed statistically and presented graphically. The results achieved were compared with other data from the specialty literature for an appropriate interpretation.

IV. GENERAL ASPECTS

The Republic of Moldova is located in the south-eastern part of Europe, in a temperate continental climate zone. The river basin of the country is represented by 3,621 rivers and streams with a total length of 16,000 km [7]. The Republic of Moldova has a significant agricultural potential and business from the agricultural sector remains strategic for the country. The agricultural sector generally accounts for 30% of GDP. The structure of agricultural production is 55-70% of plant origin and 30-45% of animal origin [13].

The Republic of Moldova has natural resources where sufficient quantities of fish and other fishery products can be grown, following a series of requirements and rules that would imply the healthy growth of the fish from the larva stage to reaching the appropriate age for consumption. In some situations, producers cannot control the environmental contamination, except for aquaculture systems where influence over water quality is allowed. For the control of fishery and aquaculture products, there are a number of laws that govern and regulate a number of standards that aim to protect the health of consumers. [13].

At the national level, according to the census from 2011, there are a total of 99 fish farms, operating in natural or specially designed pools [9]. Most of these farms operate as individuals, and not as registered businesses (Fig. 1).

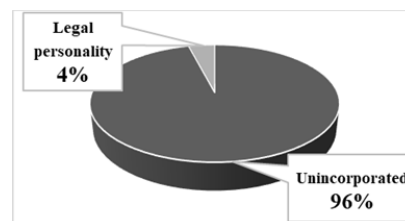


Fig. 1 Organizational form of fish farms [9]

At the level of 2018, according to the statements of ANSA President, 395 fish farms were licensed and supervised at national level, up to 400% compared to 2011 [9].

In accordance with ANSA's order, both pool and fish water are subject to laboratory examinations, sporadically being registered cases of parasitosis that are not dangerous for humans, the larvae/parasites being located in the bronchi and under the scales, sometimes in the abdominal cavity. In the Republic of Moldova operate 8 large fish farms specialized in breeding and harvesting the sapling, with private or state capital. The largest fish farm in Moldova is Gura Bicului Company, which has over 365 hectares of lakes. The farm owns a 12-hectare breeding pond and four ponds of six hectares. During the water temperature lowering, the sapling is placed in wintering ponds; the surface of each does not exceed two hectares. There are developed especially the breeds of herbivorous carp, bighead carp, blenny carp, carp, perch, shawl, crucian carp.

A sturgeon farm with a production area of 7 hectares is located in the Tiraspol region. The exploitation uses 7 water recirculation pools for reproduction and growth of sturgeons with a capacity of 30-100 tons of fish and modern laboratories equipped with advanced technologies for analyzing the quality of fishery products [14]. Each year, five tons of caviar and about 50 tons of fish can be produced here. The company is a member of the Convention on International Trade with Wild Fauna and Flora Species (CITES), member of the International Organization of Scientific Centers of Aquaculture from Eastern Europe (NACEE). In 2011, the company achieved the TUV THURINGEN Certificate in the field of International Quality Standards ISO 9001: 2008 and ISO 22000: 2005.

V. QUALITY OF FISHERY PRODUCTS IN THE REPUBLIC OF MOLDOVA

A. National Legislation in the Field of Fishery Products

National legislation in quality is correlated with the acquis communautaire in the field of internal/management control that recommends for implementation the requirements of the ISO 9001 and ISO 17020 management systems.

At national level, the main legislative regulation in the field of quality of fishery products is GR 435/2010. The document establishes rules of quality and work practices for producers and processors, specific rules and requirements for the marketing of aquatic products, hygienic requirements for processing units in order to avoid certain inconsistencies that would endanger consumers [15].

Moldovan legislation on the quality of fishery products is pending harmonization with the European legislation. The main normative acts in this field are:

- Law 10/2009 on the state supervision of the public health which regulates and establishes the organization and supervision of the health of consumers according to certain general public health requirements in order to ensure the optimal conditions for the prevention of illnesses, the promotion of health and the improvement of the quality of life of each individual.
- Law 113/2012 on the establishment of the principles and general requirements of food safety legislation aims at achieving a high level of protection of human health and at protecting the consumer's interests, taking into account the current diversity, including traditional products for ensuring the efficient operation of national markets.
- Law 50/2013 on official inspections in order to verify the compliance with food for animals and food products and with the rules on health and welfare of animals sets out general rules on how to carry out the inspections in order to verify the compliance for the prevention, exclusion or mitigation of risks to the acceptable level so as not to endanger human health, either directly or through environmental conditions. Business operators involved in the food chain must ensure the compliance of fishery and aquaculture products marketed for human consumption. It is allowed to sell fish and fish derivatives only in specialized units registered under sanitary-veterinary terms.

The hygienic quality of products is essential so as to not cause illness to consumers. A sector-specific priority consists in the existence of the refrigeration chain, a mandatory requirement for maintaining the product quality. Quality risks for aquatic products are represented by the presence of chemical pollutants (lead, mercury, dioxins), biological contamination agents, bacteria, viruses, parasites and the production of allergens during product degradation. The supply chain must ensure the compliance with the conditions of handling and transport of fish and fishery products.

For each production batch, it is mandatory to have the documents/certificates of origin, with the validity term [16].

VI. ORGANIZATION OF INSPECTIONS WITHIN THE NATIONAL SYSTEM OF MONITORING AND CONTROL

Official inspections in the food safety field are carried out by the ANSA through the territorial structure within companies that produce, process, store or distribute products of animal or non-animal origin. ANSA was established on the basis of the reorganization through merger of the Sanitary-Veterinary Agency and for the Safety of Products of Animal Origin (the central public authority responsible for the implementation and monitoring of policies and strategies in the sanitary-veterinary field and for the safety of animal products) and the General Inspectorate for Phytosanitary Supervision and Seed Control (the administrative authority responsible for the implementation of state policy on phytosanitary quarantine, plant protection, seed control, as

well as for the quality of cereals and derived products, production and marketing of tobacco and tobacco products).

The National Multi-Annual Control Plan of the Republic of Moldova in the field of monitoring the food products, the animal health and plant health provides the measures to be taken during the period 2016-2020 within the framework of the official inspection on the fields mentioned and provides guidance for the annual control plans. Monthly and annual monitoring programs are developed in each Territorial Subdivision by the Food Safety Agency through verification, inspection, sampling and laboratory analysis with the purpose of preventing the breaches of legislation and the risk of dangerous illness (Table I).

The minimum frequency of official inspections for any category of food is once a year but inspections can be carried out more frequently depending on the severity of the infringements detected. Supervision and control methods are based on monitoring, supervision, verification, inspection, laboratory analysis.

ANSA operation is based on GR 51/2013 on the organization and functioning of the ANSA. The institution has 1141 employees, out of which 110 work at border checkpoints, 171 in the central administration, the rest being distributed to the 37 regional working points, including Chisinau and Balti. ANSA is funded entirely from the state budget.

The measures that may be ordered following the inspections consists in prescription for removing the deficiencies with a re-inspection term set, the enforcement of contravention sanctions in accordance with the Contravention Code, the issuance of the order for the suspension of the operating permit, the notification of prosecution bodies in case of serious deviations.

TABLE I
MONITORING THE PUBLIC UNITS OF FISH TRADING IN THE REPUBLIC OF MOLDOVA

Approval date	Name	City/ Region	Product Category
16.08.2011	Ltd Prestopac	Merenii Noi, Anenii Noi	FFPP
24.10.2011	Ltd Pascofish	Chişinău, Chişinău	PP
13.11.2012	Ltd Coral Expres	Bereozchi, Anenii Noi	FFPP
29.01.2013	II Valerii Gavrilita	Călăraşi, Călăraşi	PP
06.02.2013	Ltd Casandi	Chişinău, Chişinău	PP
17.06.2013	Ltd Trilux-Prim	Voluntiri, Ştefan Vodă	PP
25.03.2014	Ltd Slavena Lux	Chişinău, Chişinău	PP
16.05.2014	Ltd Selida Lux	Gratieşti, Chişinău	PP
09.06.2014	Ltd Dalmors	Chişinău, Chişinău	PP
23.09.2014	Ltd Blue Shark	Gratieşti, Chişinău	PP
25.11.2014	Ltd Salipetrier	Chişinău, Chişinău	PP
29.07.2015	Ltd Asamblor	Gratieşti, Chişinău	PP
03.11.2015	II Breusov Nicolae	Duruitoarea Veche, Râşcani	PP
18.12.2015	Ltd Telemar	Chişinău, Chişinău	PP
10.03.2016	Ltd Amager Com	Chişinău, Chişinău	PP
14.07.2016	Ltd Regatul Cărmurilor	Bălţi, Bălţi	PP
28.07.2016	Ltd Agro-Rusanovski	Cojuszna, Sraşeni	CS
12.12.2016	II Gavaziuc	Bălţi, Bălţi	PP
09.01.2018	Ltd Blue Shark	Măgdaşceşti, Criuleni	PP

FFPP = fresh fishery products, PP = frozen or processed fish, CS = live fish.

VII. ORGANIZATION AND STRUCTURE OF THE CONTROL SYSTEM IN THE REPUBLIC OF MOLDOVA

Inspections in the Republic of Moldova are carried out according to the inspection plan in accordance with the procedures approved by the inspectors within the DTSA and coordinated by the line management at the central ANSA level [1]. Under the control program and in accordance with the provisions of the Regulation on the organization and operation of inspection procedures, they may be of a substantive or limited nature.

Documents on official inspection have the type of the company being inspected, the number of existing companies to be subjected to inspection and the frequency of inspections established.

TABLE II
FREQUENCY OF INSPECTIONS INSIDE ANIMAL FOOD PROCESSING UNITS

Units	Number	Inspections periodicity
Agri-food markets	77	quarterly
Refrigerated warehouses	115	half-yearly
Production/processing units for meat and meat products	103	quarterly
Fish processing and processing units	28	quarterly
Slaughterhouses and slaughter centres	147	quarterly

For breaches of the rules on fish marketing and preservation, the ANSA has the right to withdraw and destroy the products that do not meet the health standards so that they do not reach on the consumer's table [8].

VIII. RESULTS OF OFFICIAL INSPECTIONS CARRIED OUT BY THE ANSA

Following the inspections carried out by the ANSA, the following inappropriate aspects were highlighted: On 29 March 2014, the Food Safety Agency together with the Inspectors of the Directorate carried out an official inspection on the Chisinau-Orhei route, near Ratus village, where an improvised market for fishery products was found. Fish products, prepared under unhygienic conditions, without adequate packaging and sold by unauthorized producers, were found under control. All products did not have any mandatory marketing documents. An official inspection was carried out at Bacioi on 17 April 2014, where approximately 2 tons of fish were found in assortment ready for the smoking procedure. The fish were processed without respecting sanitary conditions, being destined to be sold in local food stores and in Chisinau markets. On February 5, 2018, an inspection was carried out at a fish farm in Ialoveni. According to the experts, the fish were only stored there being brought from Ukraine. The fish were kept in unhealthy conditions and exposed to the sale markets from Chisinau. Specialists within the National Food Safety Agency conducted an unannounced inspection within a meat processing unit from Drochia. As a result of this inspection, about 1735 kg of fish meat were found without documents of origin and quality. A batch of raw material intended for processing was expired, thus under the law the entire fish

meat was stated as inconsistent. Inspectors from the National Food Safety Agency conducted a rigorous inspection on 29 March 2018 within the largest fish processing company from Măgdăcești, Criuleni. The inspectors took samples from the work area in order to be tested inside the laboratory, where it was found that the trading company is operating in compliance with the hygiene requirements and the temperature regime.

TABLE III
INCONSISTENCIES FOUND BY ANSA IN VARIOUS REGIONS OF THE REPUBLIC OF MOLDOVA

Approval date	City/Region	Non-Compliant
29.03.2014	Rătuș	Lack of documents, lack of proper packages
17.04.2014	Băcioi	Anti-sanitation conditions to prepare the smoked fish.
05.02.2018	Ialoveni	Sanitation preservation conditions
23.02.2018	Drochia	Lack of origin documents, validity term expired.
29.03.2018	Criuleni	-

IX. SANITARY-VETERINARY STANDARD REGARDING THE IMPORT OF FISHERY PRODUCTS IN THE REPUBLIC OF MOLDOVA

The sanitary-veterinary standard for the import and trading certain aquaculture products is brought in line with Commission Regulation (EC) No 790/2005 from 25 May 2005. Aquaculture products are allowed for being marketed only in packages having clear and visible information on the label: country of origin, scientific name of the product, freshness categories, net weight, the classification category and the dispatch date, name and address of the producer (Decision No 103, 18.02.2011) [3].

Animal welfare activity is supervised by the Veterinary Supervision subdivision in collaboration with Border Inspection Stations. In order to allow the import and export of animals, Border Inspection Stations verify the animal health condition during transport and the loading and unloading ramp. Business agents responsible for unloading and landing fishery products must ensure that handling is carried out quickly with placing the fishery and aquaculture products in a protected environment under a temperature not more than 20 °C [1]. A product achieves a high level of quality thanks to the manufacturer's efforts to adhere to certain rules regarding the avoiding of overloading the fish boxes, transportation with safe equipment that ensures a good maintenance, cleaning and disinfection. These elements can help ensure the quality of products that can be certified by an ISO certification body or for smaller manufacturers by following a code of best practice.

X. CONCLUSION

Food safety represents a responsibility of all those involved in the food chain, from professionals to consumers. In every public food and fish processing unit, various inspection mechanisms must be implemented to ensure the product quality and safety so as not to affect the health and safety of the population. The researches carried out have highlighted the lack or insufficiency of data related to fish production,

marketing or processing of fish in the Republic of Moldova. The main food safety authority is pending organization, the market control measures being notified, but the results are not available for scientific research.

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