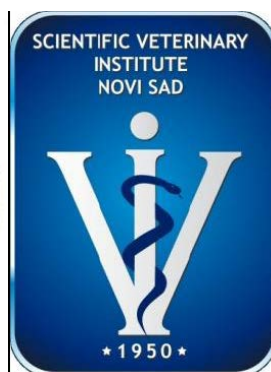


**SCIENTIFIC INSTITUTE OF VETERINARY
MEDICINE OF SERBIA**

**SCIENTIFIC VETERINARY INSTITUTE „NOVI
SAD“**

Second International Symposium of Veterinary Medicine

(ISVM2016)



PROCEEDINGS

**Hotel Metropol – Belgrade
June 22–24, 2016.**

Publisher

Scientific Institute of Veterinary Medicine of Serbia, Belgrade,
Serbia

For the Publisher

Dr sci. vet. med. Dobrila Jakić-Dimić, Principal Research Fellow

Editor in Chief

Dr sci. vet. med. Vladimir Radosavljević, Senior Research Associate

Technical Editor

Dr sci. vet. med. Vladimir Radosavljević, Senior Research Associate

Printed by

IP „Epoha“, Požega

250 copies

Belgrade, 2016.

ISBN: 978-86-81761-55-7

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AQUACULTURE AND FISH HEALTH IN SERBIA

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Abstract: Aquaculture in Serbia is mainly based on common carp (*Cyprinus carpio*) and rainbow trout (*Oncorhynchus mykiss*). Total fish production in Serbia varied from 12 to 14 thousand tonnes per year. Due to the increasement of disease problems in the fish farming industry and the impact disease may have on both feral and farmed fish, monitoring and surveillance on diseases have for many years been considered to be of great importance. Serbia has a national legislation as basis for their surveillance and disease control in aquatic animals, as well as regulations listing notifiable diseases of concern. In addition to national legislation, the principles laid down in the Council Directive 2006/88/EC as regards animal health requirements for aquaculture animals and products thereof are accepted. Serbia runs a surveillance programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) based on EU regulations and a monitoring programme for infectious pancreatic necrosis (IPN), spring viraemia of carp (SVC) and bacterial kidney disease (BKD) takes place in Serbia on a national level. Serbia have established appropriate surveillance and monitoring for fish diseases of concern to the fish farming industry.

Key words: *aquaculture, fish health, surveillance*

INTRODUCTION

On a global scale, fish and fishery products are the main food supply for human beings. It is widely known that the supplies of fish from traditional fisheries are more or less constant and that the shortage in fish and fish products has to be met by aquaculture. The intensive aquaculture is often characterized by high density of fish, poor water quality, accumulation of pathogens in the production systems and in the environment. As a result, most populations of fish from intensive rearing systems are characterized by chronic stress. Stress leads to increased susceptibility to disease, and prevalence of disease depends on the

interaction between fish pathogens and the environment (Jeremic 2003). The appearance and development of fish diseases is a consequence of the interaction of pathogen, host and environment. Also, international trade of live fish and their products is a major hidden cause of many outbreaks. Damages caused by the disease significantly delay the development of fisheries and prevent its transition to modern forms of intensive aquaculture. Many diseases affecting farmed fish also represent a threat to natural fish populations (Thoesen 1994). The relatively small number of pathogenic bacteria is responsible for major economic losses in cultured fish (Toranzo et al. 2005). In addition to the release of active substances in aquatic ecosystems, the usual therapeutic interventions in aquaculture can lead to antibiotic resistance in bacterial pathogens of fish, but also in other bacteria present in the environment (Alderman and Hastings 1998).

Aquaculture in the Serbia

Aquaculture is based on cold water species, rainbow trout (*Onchorhynchus mykiss*), brown trout (*Salmo trutta m. fario*) and warm water species, common carp (*Cyprinus carpio*), grass carp (*Ctenopharingodon idella*), silver carp (*Aristichthys nobilis*), bighead carp (*Hypophthalmichthys molitrix*), catfish (*Silurus glanis*), pike (*Esox lucius*), pike perch (*Stizostedion lucioperca*). Fish are produced in carp and trout fish farms (over 95%), to a smaller extent in cages, enclosed or partitioned natural or man made aquatic ecosystems. There is 13.500–14.000 ha of fish farms in Serbia, with 99,9% of carp farms and 0,1% of trout farms. The total fish production in recent years is between 10.000 and 15.000 tons with 70 to 75% of consumable fish.

Three types of production systems are present: extensive, semi-intensive and intensive. Extensive production is sporadic and is present only at a few carp production units, mostly not economic for semi-intensive production due to remoteness from other production units or neglect. The principal type of production (75–80%) is semi-intensive production of cyprinids, with common carp as the main species. Common carp is present with more than 80% of the total production in warmwater fish farms. The traditional type of feeding is slowly changing. Cereals are more often, at over 50% of production surfaces, totally or partially replaced by complete, pelleted and even more extruded feed. This has resulted in an increase of production per surface unit in recent years. Intensive production systems in carp culture are less present, at a small number of earthen ponds with aeration systems, mainly for fish fry production, and in cages.

However, rainbow trout, the only salmonid species cultured for consumption, is exclusively produced in intensive systems at trout farms in Serbia.

Over the last decade, several emerging or serious diseases in fish have been diagnosed in farmed and feral populations, creating large problems in the fish farming industry and thus being the subject of

surveillance and monitoring programmes. The differences between infectious diseases in fish and those of terrestrial animals mean that the approach to the problems and the eradication efforts differ as the diseases may spread effectively through flowing water (Håstein et al. 1999).

Fish health control in the Serbia

Serbia has a national legislation as basis for their surveillance and disease control in aquatic animals, as well as regulations listing notifiable diseases of concern. In addition to national legislation, the principles laid down in the Council Directive 2006/88/EC as regards animal health requirements for aquaculture animals and products thereof are accepted. The monitoring and surveillance for fish viral diseases has mainly been based on the testing procedures given in the Commission Decision 2001/183/EC while for the bacterial diseases, standard diagnostic procedures has been used for screening purposes.

Serbia runs a surveillance programme for viral haemorrhagic septicaemia (VHS) and infectious haematopoietic necrosis (IHN) based on EU regulations and a monitoring programme for infectious pancreatic necrosis (IPN), spring viraemia of carp (SVC) and bacterial kidney disease (BKD) takes place in Serbia on a national level. The aim of the monitoring and surveillance programmes for fish diseases in question is either to document and maintain freedom of disease, to eradicate a disease or to keep a disease under control within certain bonds. The main target population for the monitoring and surveillance programmes is rainbow trout and common carp.

The basis for the surveillance and monitoring programmes is partly based on EU regulations, OIE criteria or criteria derived from national legislation. The participation is compulsory as regards approval and maintenance of disease free status for the diseases. For the sampling of fish for surveillance the responsible authority is the district veterinary inspector in coordination with local veterinary institute and national reference laboratory.

Organisation of the surveillance in the Serbia

Fish farms are inspected clinically biannually and samples for virological examinations are collected from the fish farms each year to document freedom for KHV, BKD, SVC in cyprinids, and IHN, IPN VHS in salmonid fish. The examination procedures given in the OIE Diagnostic Manual for Aquatic Animal Diseases are the basis for examinations as regards KHV, BKD and SVC.

The Veterinary Authorities is responsible for the implementation of measures that will be used in order to control a given notifiable disease. The implementation involves both central and regional veterinary officers. If disease is diagnosed, stamping out procedures followed by cleaning, disinfection and fallowing will be carried out. Prevention may be achieved

by avoiding introduction of disease free eggs and/or fish into disease free farms as well as using protected water supply (e.g. spring-, borehole water). An infected farm may restock after fallowing if no signs of infection appear after a sanitation programme has been carried out. In Serbia affected farm(s) will have to pay themselves for any measures imposed by the authorities for the time being, because no compensation is granted. Health certificates and/or transportation documents is needed in connection with deliveries of live fish for stocking into grow out farms and restocking into rivers. The record of findings is kept by the responsible authorities, both regionally and centrally. The diagnostic laboratories also keep the necessary documentation on the examinations carried out. Furthermore all farms have to keep records on events in the farms that can be requested by Competent Authority.

CONCLUSIONS

Serbia have established appropriate surveillance and monitoring for fish diseases of concern to the fish farming industry. Due to these systems and good management practises, the fish disease situation is generally good compared to other countries.

ACKNOWLEDGMENT

This research was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia as part of project number 31011 and 31075.

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