ACTA SCIENTIARUM POLONORUM
Acta Sci. Pol., Technol. Aliment. 9(2) 2010, 125-131
ISSN 1644-0730 (print) ISSN 1889-9594 (online)

ORGANIC FISH PRODUCTION AND THE STANDARDS

Yesim Ötles, Osman Ozden, Semih Ötles
Ege University of Izmir, Turkey

Abstract. Fish that are produced under natural conditions in accordance with the principles of organic agriculture without any use of preservative additives and without any genetic modifications, that are fed feed produced from natural raw materials, that are certified by a qualified institution are defined as "organic fish". Organic fish production is a production model that emphasizes human health without using pesticides, chemical and genetically modified products, as well as ensuring animal welfare by decreasing the stocking density. This alternative model is used in many developed and developing countries in the world and the demand for this product has been the cause of increase in production amount and species variety in the market, although the model comprises 0.01% of the world aquaculture production. However, organic aquaculture production has not been developed as rapidly as organic agriculture. One of the most important reasons of this is the absence of international standards issued for organic aquaculture production. In this paper, the production principles of a number of authorized institutions certifying organic aquaculture are comparatively discussed.

Key words: organic fish, organic aquaculture, certification

INTRODUCTION

The fish that are produced under natural conditions according to the organic agricultural principles, not exposed to any protective additives or genetic modification, fed with baits prepared with completely natural materials and certificated by a control agency are called "organic fish". Organic aquaculture is the production process every stage of which is controlled and certificated by the control and/or certification agency according to the articles of regulation related to the organic agriculture, with such aims as supplying organic raw materials for the industries getting their raw materials from agriculture, from fish grown with organic agriculture method in seas, domestic waters, pools, net cages, barrages, lakes, ponds, fish traps and farms, aquatic plants, sponge,

Corresponding author – Adres do korespondencji: Prof. Semih Ötles, Department of Food Engineering of Ege University of Izmir, 35100 Bornova Izmir, Turkey, e-mail: semih.otles@ege.edu.tr

mollusk, crustacean, mammals and the products generated from them and with other sportive, medical and scientific purposes. Organic products have richer and more beneficial attributes and term of food valve.

Organic fish production is a model of production which supplies animal's lease with low stock density and attaches importance to human health without wing any chemicals, pesticides or the products modified genetically. Although this alternative production model used in many developed and developing countries in the world constitutes only 0.01% of the world's aquaculture production, demand for this production has caused an increase both in the production quantity and the diversity of types released to the market. The production rate of organic fishery products in the world is about 25 000 t. Considering the distribution according to the continents, we see that, in Europe 14 000 t, in Asia 8000 t, in America 3000 t production is made (Fig. 1). The organically development status of fishery products which is one of the world's fastest growing sectors is highly similar to the one of organic agriculture. Besides, today, organic aquaculture has fallen behind the agriculture in terms of certificated product diversity and quality [Willer 2008].

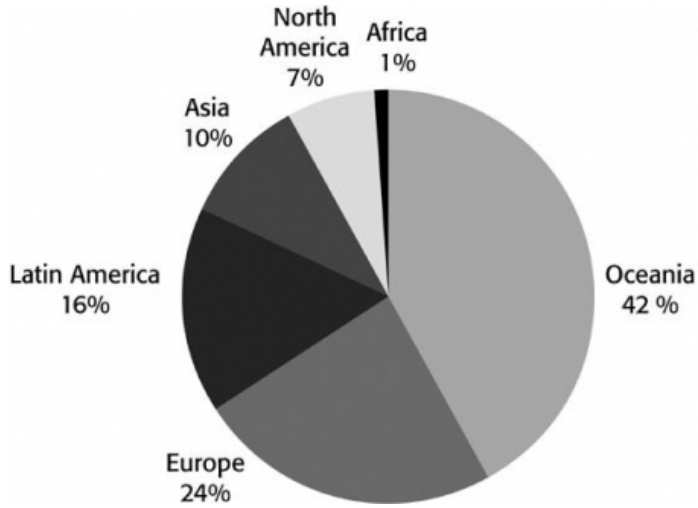

Fig. 1. Distribution of global organic agriculture land by continent [Hilage 2005]

United Nations Food and Agriculture Organisation collects the necessity of organic aquaculture around the world under different titles which are: consumer needs, food safety, environmental requirements and commercial purposes.

Organic fish production started with the certification of a carp fish grown by a group of fisheries as "organic" by Bio Entre which is a certification company in Austria. This first attempt was followed by the entrance of salmon and rainbow trout to the market. First organic trout was put up for sale in England in 1998. Atlantic salmon (*Salmo salar*), shrimp (*Penseus* sp.), carp (*Cyprinus carpio*) and rainbow trout are among the species which have been produced and certificated according to the organic standards. Moreover, the production of gilthead sea bream (*Sparus aurata*), sea bass (*Dicen-*

trarchus labrax), mussel (*Mytilus* sp.), charr (*Salvelinus alpinus*) and sturgeon (*Acipenser* sp.) as organic has started. Works for production of new species including *Mastacembelus* sp. and cod for organic aquaculture production in future are still in progress [Bergleiter 2001, Brister and Kapuściński 2001].

There are many independent organic certification organisations and standards. One of them, although European Union regulation of "Ecological Agriculture" no. 2092/91 that came into force on 24th of June, 1991 has designed standards for organic agriculture, has not yet constituted any standards for organic agriculture. Among the European countries, some private corporations such as Naturland (Germany), KRAV (Sweden), Debio (Norway) and Social association (England) have developed their own standards for organic fishery products (Table 1). The standards for producing organic fishery products of these organisations differ from each other [Brister and Kapuściński 2000, Naturland 2007, Soil Association 2008].

Table 1. 2001 World organic aquaculture certification programmes [FAO 2008]

Certification program	Certified species
Europe	
Bio Suisse (Switzerland)	trout
Debio (Norway)	trout, salmon
Ernte (Austria)	trout, corp
Krav (Sweden)	salmon, trout
Bioland, Demeter, Biokreis (Germany)	corp
Naturland (Germany)	corp, salmon, mussels, trout and shrimp
Soil (England)	salmon, trout
Tun (Iceland)	salmon, trout, *Ascophyllum nodosum*
Qci (Italy)	trout, sea bass, gilthead sea bream
France, England	Organic Aquaculture Standards [2000]
North America	
FOG, FVO, IOWA	ABD Organic Aquaculture Standards
Asia	
India	Organic Aquaculture Standards [2001]
Act (Thailand)	Shrimp
Oceania	
Biogro (New Zealand)	salmon, crayfish, oyster
Bfa (Australia)	Organic Aquaculture Standards [2001]
Nasaa (Australia)	Organic Aquaculture Standards [1999]
Australia	Organic Aquaculture Standards [2001]
International Organic Aquaculture Standards (IFOAM)	Standards for Organic Aquaculture [2000]

Baits that will be used in organic pisciculture, are needed to provide, a part from being sustainable, the natural requirement of the species as much as they should not spoil the natural flavour. In feeding, organically produced baits and additives should be used and feeding should be performed in a way that will enable the natural nutrient inputs and causes the least loss of baits. It is not preferred that the kind of bait and feeding has a negative function on biodiversity in the region. Most baits should not be used because of environmental and inflectional reason.

The criteria for organic aquaculture production are taken from organic agriculture principles. Because of the different ecology and private problems of aquatic environment, new ones have been added to these main original principles or the old ones have been changed. As a good instance for this, while fish flour is considered to be the raw material in organic fish production, it is not allowed in organic agriculture principles.

PRODUCTION FIELD AND ENVIRONMENTAL IMPACTS

The facility which will be used in organic fishery production should be constructed in a region that will not be affected negatively from conventional production units, has strong water-currents and will be far from polluting and stressing elements. The natural landscape in the facility usage field should be given importance and especially, it should not be given any harm to the plants that are dying out. Besides, a part of the facility field should be kept a part for natural vegetation.

Water source which will be used is needed to be of high quality. This water source (stream, river etc.) should continue its ecological functions in its natural bed. If the production is held in watercourse, 25% of the water should remain in its natural bed [IFOAM 2000]

For the protection of the farm field, it is suitable if measures that will not harm other living creatures in the region physically are taken. Domestic animal species should not be disturbed. For instance, protective materials such as nets and similar items can be used for this purpose. Besides this, it is need to take measures to prevent fish from entering the region from nature and fleeing the region to nature. For this purpose, individual branding, cage and pool designing can be used. If there are any constructions such as barrages in the farm field, some ways suitable for fish transition can be constructed. Sedimentation pools or some plant species (some species of *Typha* and *Phragmites*) that will sufficiently infiltrate water can also be used. In addition, waste feed and excrements should be used as inputs such as fertilizer in organic herbal and animal products if possible [Naturland 2007, Soil Association 2008].

In organic fishery production, farm wastes should not be released in amounts that will affect biological diversity negatively or cause over pollution. The organic left over amount that emerges from feeding and excrements and is likely to occur on the bases of net cages should be observed regularly and water released from the system and water in the pool should be analysed every 3 or 4 months [Bio Suisse 2001].

GENERAL PRINCIPLES CONCERNING ORGANIC FISH FARMING AND PRODUCTION

In organic fishery production, the ease of the animals is one of the main issues to be considered. Stock intensity is lower in comparison with the vertical production (usual

stock intensity for trouts: 10 kgs/M, for gilt head sea bream and sea bass: 25 kgs/M). High stock intensities that could cause any damage and injury to fish should be avoided. Stock intensity differs according to the water source and species. Stock intensity is determined according to the species that will be grown by authorized organizations. The stock which will be used in the culture of organic fishery products should come from organic production and, if possible, domestic species or the ones adapted to local conditions should be preferred. Besides, for the culture in order to be organic, genetically modified organisms or transgenic fish cannot be used [Bio Suisse 2001, IFOAM 2000, Naturland 2007].

In addition, the production should be sustainable and the sources should be used effectively. As for the pool structure, it should be compatible with the natural environment in which the animal lives. Artificial shelters or canopies can be used.

Another important matter is that the usage of hormone is not allowed in organic culture even if it is taken from the same species. Usage of the hormones stimulating growth, synthetic appetizers, synthetic colouring and identical to natural pigments is not proper. Besides, the dependence of the production inputs on outer side of the farm is needed to be kept on minimum level and polyculture can be used in appropriate conditions.

In the baits that will be used in organic fishery production, synthetic products such as blood meal of animal origin, bone flour or baits having chemical treatments cannot be used. The baits and other foods cannot include the products that have been obtained by charging it genetically or from them partly, additives and complementary substances. It is not proper to use excrements as food additions. Moreover, the baits should be of high quality and have a nutrient composition adapted to the species. Because of the reasons concerning health quality, the fat ratio of the baits should not go beyond 18%. They should consist of products produced organically and/or commodities received from nature. These substances should be taken from a stock that is not used as human food and/or they should be aquatic food obtained by organic production method. At least 50% of the aquatic protein in feed mixture should be provided from the by-products of the products used in human consumption. In organic culture, using fish flour obtained from terrestrial animals such as birds, mammals, the same species and farm fish, and from nutrients derived by solvent extraction (e.g. hexane) is forbidden. If the producer cannot supply all of the food substances from organic agriculture, it is allowed to be used under the control of an authorized organization on condition that the rate of conventional baits will not exceed 20% and for a limited time. However, if commodities obtained from natural fish are used, these fish should be from a sustainable stock and certificated environmentally by a certification company. Besides, vitamins and minerals which can be added to the baits should be from a natural source. When nutritional additives are needed to in order to ensure the need of feeding fishery products, vitamins and minerals can be used according to the allowance of authorized organisations. Natural colouring agents (shrimp shell, phaffia yeast etc.) are allowed. However, if natural colouring agents are used in order to tint the fish meat, it should be declared while selling the fish. Besides, for the bait production, the process of forming by pressing is allowed [IFOAM 2000, Soil Association 2008].

At least 20% of the tools used in culture units are needed to be renewed every year. Detailed and formal records consisting dead-alive quantities, feeding, water properties and treatment applications should be kept. It is important to use methods which will not

cause so much stress during the process of catching, carrying and cutting the fish. Moreover, measures to protect the stocks from the predators (bird etc.) should be taken.

FISH HEALTH AND WELFARE

Organic management practices achieve a high level of disease resistance and prevention of infection. Principally, some precautions for the fish not to be sick should be taken. All management techniques, especially when influencing production levels and speed of growth maintain the good health and welfare of the living organisms. To maintain this, the stock intensity should be low, regular health checks should be made: dead fish should be immediately removed from the pool and stressing factors should be lowered to the minimum level. The choice of the species resistant to diseases and subspecies should be considered. The species whose races are in danger can be preferred [Bio Suisse 2001, IFOAM 2000].

In case of disease, it is proper to use natural treatment methods (homeopathic method). Synthetic chemical medicines, antibiotics are not allowed. If any medicine is given in 3 months line before the sale of the product, any kind of fish meat, roes, aquatic creatures or products obtained from them cannot be sold as organic. The preparates obtained from some plants in nature, garlic (*Allum satium*), euphorbia (*Euphorbia* sp.), sumac (*Rhus coriaria*), shallaki (*Liqudambar orientalis*), fillix mas (*Aspidium filix mas*), horse chestnut (*Aesculus hippocastanum*) and from tropical species such as *Ryania speciosa*, *Perris eliptica*, *Azadirachta indica* and the preparates of *Basillus thuringensis* can be used. In the fight against diseases and the disinfection of pool equipment, the usage of some organic components (hydrogen peroxide, rock salt, quicklime, sodium hypochlorite) and the components that are not toxic in nature (formic acid, citric acid, alcohol) is allowed. Besides, in case of insemination and during the period of incubation, iodoform and disinfection can be allowed [IFOAM 2000, Naturland 2007, Soil Association 2008].

CONCLUSION

Organic aquaculture aims to have natural fish production, improving traditional production and high efficiency production with low stocking density. Disuse of chemical products and growth or breeding hormones also controlled and certified production until consumption are the major advantages of organic aquaculture. Because of these reasons, organic aquaculture takes much attention all over the world. However, lack of certification organisations and standards for organic aquaculture in many countries causes lower production speed for organic aquaculture compared to organic agriculture.

Today intensification of works on food safety and consumers' perception of this information through developing communication technologies brings about the fact that consumers want to protect and process their own individual health. When considered from this point of view, organic fish produced in the way that is controlled and healthy will be a product principally-preferred by the consumer. For our own and the next generations' health, organic fish production should start, its consumption should be paid attention to and become widely spread all over the world.

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EKOLOGICZNA PRODUKCJA RYB I JEJ STANDARDY

Streszczenie. Ryby hodowane w naturalnych warunkach z zachowaniem zasad rolnictwa ekologicznego – bez udziału substancji dodatkowych i modyfikacji genetycznych, żywione paszami produkowanymi z surowców naturalnych – uzyskują od uprawnionych instytucji certyfikat „ryb ekologicznych". Ekologiczna produkcja ryb jest modelem hodowli uwzględniającym aspekty zdrowotne konsumentów, realizowanym bez stosowania pestycydów, produktów modyfikowanych chemicznie lub genetycznie, a także opartym na zapewnieniu dobrostanu zwierząt poprzez zmniejszenie wielkości obsady. Metoda jako alternatywna jest stosowana w wielu krajach na całym świecie, rozwiniętych i rozwijających się, wyróżnia się tendencją do wzrostu wielkości produkcji i zróżnicowania gatunków ryb, chociaż ten model obecnie dotyczy tylko około 0,01% światowej produkcji akwakultury. Pozyskiwanie ze środowiska wodnego nie rozwinęło się jednak tak szybko, jak rolnictwo ekologiczne. Jedną z najważniejszych przyczyn tego zjawiska jest brak międzynarodowych standardów ekologicznych metod w akwakulturze. W publikacji omówiono zasady takiej produkcji i porównano je z wymaganiami różnych instytucji zajmujących się ich certyfikacją.

Słowa kluczowe: ryby, hodowla ekologiczna, atesty, jakość

Accepted for print – Zaakceptowano do druku: 29.10.2009

For citation – Do cytowania: Ötles Y., Ozden O., Ötles S., 2010. Organic fish production and the standards. Acta Sci. Pol., Technol. Aliment. 9(2), 125-131.