

Organic Aquaculture

EU Regulations (EC) 834/2007,
(EC) 889/2008, (EC) 710/2009

BACKGROUND, ASSESSMENT, INTERPRETATION

CO-FINANCED BY



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WORKING FOR ORGANIC FOOD
AND FARMING IN EUROPE

Organic Aquaculture

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(EC) 889/2008, (EC) 710/2009

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CURRENT EUROPEAN LEGISLATION RELATING TO ORGANIC FOOD AND FARMING *referred to in this publication as “new organic regulations”*

The new Organic Regulation:

- I COUNCIL REGULATION (EC) No 834/2007 of 28th June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91 (*referred to in this publication as “the new Organic Regulation”*)
 - Council Regulation (EC) No 967/2008 of 29th September 2008 amending Regulation (EC) No 834/2007 on organic production and labelling of organic products

Implementing rules for the Organic Regulation:

- I COMMISSION REGULATION (EC) No 889/2008 of 5th September 2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control (*referred to in this publication as “the new organic implementing rules”*)
 - COMMISSION REGULATION (EC) No 1254/2008 of 15th December 2008 Amending Regulation (EC) No 889/2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control
 - **COMMISSION REGULATION (EC) No 710/2009 of 5th August 2009 Amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007, as regards laying down detailed rules on organic aquaculture animal and seaweed production** (*referred to in this publication as “the organic aquaculture implementing rules”*)
- I COMMISSION REGULATION (EC) No 1235/2008 of 8th December 2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 as regards the arrangements for imports of organic products from third countries
 - COMMISSION REGULATION (EC) No 537/2009 of 19th June 2009 Amending Regulation (EC) No 1235/2008, as regards the list of third countries from which certain agricultural products obtained by organic production must originate to be marketed within the Community

Refer also to: Guidelines on imports of organic products into the European Union published by the European Commission, 15th December 2008

All generally applicable rules on the regulation of the production, processing, marketing, labelling and control of agricultural products also apply to organic foods.

See also the European Commission website: http://ec.europa.eu/agriculture/organic/eu-policy/legislation_en

Abbreviations and acronyms:

Commission	European Commission
DG Agri	Directorate-General for Agriculture and Rural Development, European Commission
DG Mare	Directorate-General for Maritime Affairs and Fisheries, European Commission
EU	European Union
SCOF	Standing Committee of Organic Farming

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FOREWORD FROM CHRISTOPHER STOPES

The IFOAM EU Group, in co-operation with IAMB - Istituto Agronomico Mediterraneo di Bari, has prepared this publication to introduce and evaluate the first European regulation on organic aquaculture.

The IFOAM EU Group welcomes this move to regulate the organic aquaculture sector in Europe. Legislation relevant to the sector now includes general provisions set out in the new Organic Regulation (EC) No 834/2007 and implementing rules in Regulation (EC) No 889/2008, in particular the most recent addition to the latter: organic aquaculture implementing rules, Regulation (EC) No 710/2009. Together, the regulations represent an important starting point for the extensive further work that is required to achieve a comprehensive and fair legislative framework, paving the way for the development of organic aquaculture in Europe; and, since Europe is a major importer, organic aquaculture worldwide.

Organic aquaculture aims to provide fish and other products that are ecologically, economically and socially sound. These new regulations will support the sector's ability to provide an alternative to unsustainable practices of fisheries and aquaculture worldwide.

Tough negotiations amongst stakeholders contributed to the creation of the new Organic Regulation and the organic aquaculture implementing rules. Previously, organic aquaculture was not regulated in EU law; private organisations developed independent standards and national laws were created in some Member States, but these efforts were fragmented and few international initiatives existed. We hope that new regulations which establish EU minimum standards will harmonise the EU organic aquaculture sector, while supplementary efforts by private initiatives with their own standards continue to drive innovation and improvement. The organic sector expects this evolution to facilitate the expansion and development of the market for organic aquaculture products.

If preparation of European-level legislation was tough, implementation will be equally so. We can expect further work on organic aquaculture standards to start almost immediately: a revision with changes coming into force after July 2013 is already planned. I believe that this can only encourage the pro-active acceptance and enforcement of legislation, since it provides the opportunity for national administrations, organic aquaculture organisations and businesses to work together for productive and sustainable practices. The IFOAM EU Group will use the time up to the revision to prepare a thorough review and produce concrete suggestions for further legislative developments.

I hope that the future will bring more organic aquaculture products to our tables.

May I wish you an enjoyable and interesting read!



Christopher Stopes,
IFOAM EU Group President

PART I THE CREATION OF ORGANIC AQUACULTURE LEGISLATION

History of organic aquaculture¹

*Stefan Bergleiter (Naturland—
Association for Organic Farming e.V.) and
Udo Censkowsky (Organic Services)*

Historically, organic aquaculture is rooted in the organic agriculture movement, and these roots continue to shape the sector in many respects. Organic farmers and organic farming associations in Austria and Germany first started to develop extensive “organic” carp production systems in the early nineties. At that time, although the organic food market was still a niche market in terms of volume, it already offered most types of food in organic quality – with the exception of fish. Therefore, it was only a matter of time before this gap was filled. The development of organic carp production took place without great public attention. Mostly this was due to the fact that originally the product was exclusively sold regionally in farmers markets or directly in farm stores.

This situation changed with the establishment of the first organic salmon project in Ireland, in 1995. At that time the German entrepreneur Udo Klütsch (who lamentably passed away in 2008), the marine biologist and salmon farmer David Baird (Clare Island Sea Farm) and the Naturland association of Germany entered into a development partnership, wherein Naturland established what would become the fundamentals of international organic aquaculture. The objective was to develop standards for the salmon project, based on the IFOAM organic farming principles and the first European Organic Regulation (EEC) No 2092/1991, thus offering an answer to the numerous problematic issues in the prevailing intensive salmon farming.

Klütsch and Baird were both convinced that the organic salmon initiative would not only help reduce the environmental impact of salmon farming, but also lead to a better price margin for salmon in the market. This latter was badly needed, since salmon prices were down at that time and the salmon farming industry was looking for alternative business models to enable it to become economically sustainable again. In the United Kingdom, the Soil Association had been asked as early as 1989 to develop organic

salmon standards, but it was not until 1998 that the first standards were published.

The successful launch of organic salmon, first in Germany and later in the United Kingdom and France, accelerated the development process of organic aquaculture initiatives throughout the world.

A further milestone in the history of organic aquaculture was the development of organic shrimp standards. Naturland was involved here, too, as well as Sr. Cesar Ruperti, co-owner and manager of the shrimp farm Camaronera Bahia, and processing plant Mar Grande, both in Ecuador. With support of the German corporation Gesellschaft für Technische Zusammenarbeit (GTZ), the standard setting process started in 1998 with round table discussions taking place in Ecuador, and international consultations undertaken through an online forum.

After the launch of the organic shrimp concept, which drew attention internationally, a number of European development agencies became interested in spreading the initiative to more southern countries. Not only did organic shrimp farming promise to solve many of the environmental problems related to intensive conventional production (such as deforestation of mangrove areas or abuse of antibiotics leading to residues in the final product), it also offered an alternative business model for the shrimp industry, suffering at the time from extremely low prices.

Additionally, organic shrimp aquaculture was considered to have the potential to particularly strengthen the position of small scale producers typically employing low-intensity “close-to-organic” systems. Not surprisingly, the first organic shrimp project focussing on small scale producers was in Vietnam, where small scale shrimp production (farms smaller than one hectare) dominates. The Swiss Import Promotion Programme (SIPPO) supported this project, which started in 2000 with a workshop on organic shrimp production in Ho Chi Minh City.

With the two lead products – organic salmon and organic shrimp – having become more commonly traded



commodities, organic farming of additional finfish species started in Europe, Asia, and Latin America. In continental Europe, organic trout and charr production took off; a big organic *Pangasius* catfish project was started in Vietnam by the Germany-based seafood company Binca Seafoods; organic tilapia farming started in Israel, Ecuador, and Honduras; and in the Mediterranean, seabass and seabream farms were converted to organic management.

In the United States, discussions on organic aquaculture standards started in 1998 within the National Organic Standards Board. A first National Organic Aquaculture Workshop took place in 2000, organized by the University of Minnesota and the National Organic Programme (NOP). However, in 2005 discussions on organic aquaculture standards became more complicated when Californian Governor Arnold Schwarzenegger signed a law that prohibited all organic labelling of farmed seafood until the enforcement of a public regulation for such types of product. This law caused a setback for US organic aquaculture production and market development. Until today, it is still unclear when the US Department of Agriculture will introduce the first regulation for organic aquaculture as part of the National Organic Programme of the United States.

In 2000, IFOAM, the world's umbrella organization for organic agriculture, published its first draft basic standards for organic aquaculture, which became fully accepted basic standards five years later. IFOAM subsequently entered into this new field of activities following developments undertaken by some of its affiliated certification bodies and formed the IFOAM Aquaculture Group in 2003. The latter started to organize lobbying activities (particularly in regard to legal standard setting in United States and European Union) as well as to co-ordinate aquaculture standards development.

More recently, seminars, workshops and even conferences have been convened by different organizations involved in organic aquaculture, such as Organic Services (BioFish Forum 2004ff), FAO/VASEP (Organic Aquaculture Conference, 2004, Ho Chi Minh City), the

Soil Association (Organic Aquaculture Conference: Organic Salmon—Setting the Standard, 2006, United Kingdom), Villa (Organic Aquafarming, 2006, Norway) and IFOAM (Conference on Organic Aquaculture, 2008, Italy), illustrating the growing interest in the subject as well as the general move towards organic seafood in major market regions.

Last but not least, the introduction of detailed production rules for organic aquaculture as part of the EU organic regulation in the first half of 2009 has now opened the door to a broader development of organic seafood in European Union markets and elsewhere.

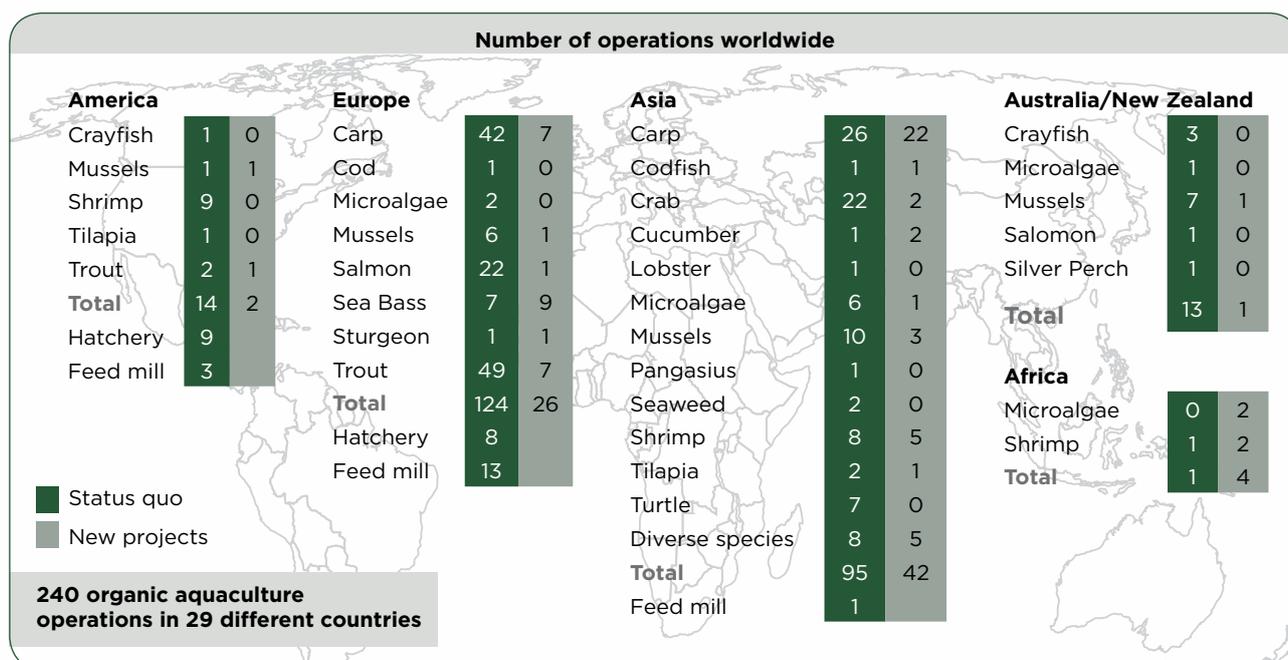
Global organic aquaculture production and markets

Stefan Bergleiter (Naturland—Association for Organic Farming e.V.) and Udo Censkowsky (Organic Services)

The number of certified organic aquaculture operations (including the production of micro algae) amounts to 240 in 29 different countries in 2009 (figure below). Most of the operations are located in Europe. However, it has to be considered that these are often small scale carp or trout farms with less than one hectare pond surface, typically run on a part time basis. In China, 72 operations have received organic certification under the national Chinese regulation.

In Europe, the lead product in organic aquaculture is Atlantic Salmon, followed by the Mediterranean species Seabass and Seabream, freshwater salmonids (Rainbow and Brown Trout, and charr species), and carp. In Latin America, there is a strong dominance of organic western white shrimp operations in Ecuador, Peru and Brazil. Most common in China is carp production in polyculture, i.e. in combination with crabs, shrimps or other local species; but there are also certified operations producing turtles or sea cucumbers. In other Asian countries, there is an increasing organic production of Black Tiger Shrimp (e.g. Bangladesh, India, Thailand, and Vietnam), *Pangasius* catfish (e.g. Vietnam) and micro-algae (e.g. India).

Figure: Global organic aquaculture production 2009



Total organic aquaculture production reached about 53,500 tons in 2009, accounting for about 0.1 percent of aquaculture production worldwide. Further production increases are foreseen, both through organic aquaculture producers expanding existing production and through new aquaculture producers entering the organic aquaculture business. With a growing supply side, the stage is set for market expansion. In the last five years market development has been slow because of a limited number of reliable organic seafood suppliers. This situation is changing right now for major products like salmon and shrimps.

Assuming that 70 percent of organic aquaculture production is sold under an organic label, the total market value might have reached €230 million at the distributor level in 2009.² According to experts, the global market value will increase annually by 40 to 60 percent in the next three years, eventually surpassing a total value of €500 million in 2011. The lion's share of market growth, however, is occurring among a limited number of countries (including France, Germany, Switzerland and the United Kingdom), market regions and fish

species (including Atlantic salmon and shrimps). In Asia, too, the market is evolving, though changes are harder to keep track of. China seems to be experiencing a strong organic fish production, but fish products labelled organic are not readily visible in stores, and market data are not available.

Except in a few countries, the market for organic seafood is still in its infancy with all the associated problems of high costs, low sales volumes, little or no competition, and the need to invest in marketing and create consumer awareness of products. In countries traditionally leading sales of organic seafood such as Germany, the United Kingdom, France and Switzerland, the market already stands at the threshold of the growth phase (at least for salmon, trout and shrimp). Thus, business and sales volumes are scaling up, competition is growing and prices are under pressure.

The introduction of organic aquaculture production rules in the European Union is expected to support further market growth in Europe. Outside of the EU, sales of organic seafood are observed to be growing

² Some 30 percent of products produced under organic standards are not, in the end, sold at a premium price.



in new markets where they are introduced as a premium gourmet food for distribution through retail outlets (such as is the case for organic fish products marketed through Hong Kong's premium supermarkets), or through the tourism and gastronomy sectors of their country of origin (such as is the case for organic shrimps and oysters in the touristic northeast of Brazil). All in all, the low global market penetration of organic seafood translates into an opportunity for the aquaculture industry. A good example is the United States, the largest single market for organic food: here, stakeholder discussion on organic aquaculture production rules is still ongoing, and organic fish products cannot yet carry the US Department of Agriculture label for organic food. Sales of organic seafood are expected to see major growth when this situation changes.

While the outlook for the overall global market for organic fish seems promising (more and more retail chains are moving towards sustainable sources of fish and seafood, either certified organic or certified sustainable fishery), issues at the production level are problematic. In particular, the economic viability of organic fish farms with need of external organic feed inputs represents a challenge. In regions with no or limited availability of organic feed ingredients importation might lead to higher production costs, whereas initiation of organic farm supply projects nearby the aquaculture operation increases start-up costs for entrepreneurs.

The political process of preparing the implementing rules for organic aquaculture

Andrzej Szeremeta (IFOAM EU Group)

Implementing rules for organic aquaculture have been introduced into European regulation as part of the revision of Regulation (EEC) No 2092/1991. This revision was initiated within the framework of the 2004 European Action Plan for Organic Food and Farming. The new Organic Regulation included basic rules on organic aquaculture production but lacked detailed implementing rules which, due to their specific nature, required specialist consideration and development.

The Commission's Directorate-General for Maritime Affairs and Fisheries (DG Mare) is responsible for aquaculture issues and prepared the organic aquaculture implementing rules. It organised a conference in December 2005 to kick off discussion with the organic sector. It then held a series of three meetings with organic aquaculture experts between October 2007 and May 2008. These experts represented the diversity of the European organic aquaculture sector; most of them were also members of the IFOAM EU Group.

The IFOAM EU Group convened a special expert group to address the development of the organic aquaculture implementing rules. They actively provided input to the Commission throughout the process, joining DG Mare experts' meetings, preparing several IFOAM EU Group position papers and submitting letters to DG Mare and DG Agri (Commission's Directorate-General for Agriculture and Rural Development).

With the support of the IFOAM EU Group, DG Agri and DG Mare completed the Commission's first working document on organic aquaculture implementing rules in June 2008. This was then presented to the Standing Committee of Organic Farming (SCOF), a committee of national experts under DG Agri.

The organic aquaculture sector is complex and diverse: it covers a vast number of animal and plant species (more animals, even, than agriculture), a large variety of national and regional approaches, and a series of private standards. The sector's official recognition dates back only to the 1990s, so European-wide research and evaluation is lacking. These factors, combined with the short time periods provided for submitting input into Commission processes, caused many problems with establishing consensus on a number of issues, especially stocking densities. There was also heated debate within the SCOF which delayed decision making. Originally due to be finalised in 2008, the organic aquaculture implementing rules were ultimately approved by the SCOF in June 2009 and published as Commission Regulation (EC) No 710/2009 in the Official Journal of the EU on the 6th August 2009, to take effect on the 1st July 2010.

Table: **The political process of preparing the implementing rules for organic aquaculture**

June 2004	Regulation (EEC) No 2092/1991 still in effect; Commission launches the European Action Plan for Organic Food and Farming
12th-13th December 2005	DG Mare organises stakeholder conference on organic aquaculture in Brussels
21st December 2005	Commission publishes its proposal for revision of Regulation (EEC) No 2092/1991
May 2007	European Parliament adopts its report on the revision proposal
28th June 2007	Council adopts the new Organic Regulation (EC) No 834/2007 on organic production and labelling of organic products (published in the Official Journal of the EU on 20 th July 2007)
18th September 2008	New organic implementing rules are published as Regulation (EC) No 889/2008 in the Official Journal of the EU following approval by the SCOF in July
October 2007-May 2008	DG Mare organises three series of experts' meetings as a preparation for the development of the organic aquaculture implementing rules: 22 nd -23 rd October 2007; 22 nd -24 th January 2008 and 28 th -29 th May 2008
25th June 2008	DG Mare issues its first working document on organic aquaculture implementing rules
1st January 2009	New Organic Regulation (EC) No 834/2007 comes into force together with the implementing rules
27th January 2009	Commission issues draft organic aquaculture implementing rules
6th August 2009	After being adopted by the SCOF in June, the organic aquaculture implementing rules are published in the Official Journal of the EU as Regulation (EC) No 710/2009 as amendments to the new organic implementing rules (Regulation (EC) No 889/2009)
1st July 2010	The organic aquaculture implementing rules are applicable.



PART II OVERVIEW OF ORGANIC AQUACULTURE LEGISLATION

New EU organic aquaculture rules

Richard Bates (Unit B.4: Trade and markets, DG MARE, European Commission) and Maria Fladl (Unit H.3: Organic farming, DG AGRI, European Commission)

In 2009, the Commission adopted for the first time production rules for organic aquaculture:

Commission Regulation (EC) No 710/2009 amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007, as regards laying down detailed rules on organic aquaculture animal and seaweed production.

The new Regulation will apply as from 1 July 2010 together with obligation to use the EU organic logo on pre-packaged goods. That means operators may also benefit from using the newly designed EU organic logo.

The Regulation aims to achieve a balance between the existing national rules and private schemes so as to give a minimum standard for organic aquaculture and seaweed products on the Community market, from both Community production and imports.

Why do we need rules for EU organic aquaculture?

The European Action Plan 2004 for Organic Food and Farming (COM (2004) 415), urging the revision of the EU organic farming legislation, advocates actions to “complete and further harmonise the standards for organic agriculture by considering the need for extending the scope to other areas such as aquaculture” (Action 10). Prior to this, the establishing of a common definition of organic aquaculture with specific norms and criteria was one of the action items listed in the Commission’s Sustainable Aquaculture Strategy published in 2002 (COM (2002) 511f).

The EU organic farming standard has been in place for plants since 1991 and for livestock since 1999. Its revision was a major challenge, and expanded its scope to include aquaculture. The inclusion of aquaculture took account of the developments on the ground in this fast growing sector of food production.

Up to now organic aquaculture has been regulated through a mixture of private schemes and, in a few Member States, national rules. By mid-2009 some

ten approved private schemes were operating in the Community, but only a few of these operate across more than one Member State. Denmark was the first Member State to adopt national rules for organic aquaculture in 2004. France followed suit with very comprehensive rules in 2007; these deal with a large range of species. Ireland had developed draft rules by 2007 but decided to wait for the EU rules to finalise national rules and the Spanish region of Andalucía notified the Commission of its draft rules in 2007.

The situation has been far from satisfactory in terms of the single market, as free movement has not been guaranteed. Producers had to undergo multiple certifications to access markets in the various Member States which is costly and time consuming. Even within a single country a processing plant handling fish certified organic by one standard-holder has not always been permitted to process fish certified under another standard, even if no overlap in processing occurs.

How are the rules for organic aquaculture constructed?

The new rules in Regulation (EC) No 710/2009 are part of the EU organic legislation and cannot be seen as a “stand-alone” Regulation.

1) Council Regulation (EC) No 834/2007

Council Regulation (EC) No 834/2007 builds the foundation of the EU organic legislation by drawing up a set of objectives and principles for organic production of agricultural products, processed agricultural products, feed and seed.

Since aquaculture products are considered to be agriculture products and listed in Annex I of the EU Treaty, they are covered by the scope of the organic legislation. Consequently the organic objectives and principles apply also to aquaculture. Capture fisheries are also listed in Annex I, but are excluded from the scope of organic legislation just as game is.

The same goes for the general rules on production, labelling and control, which are applicable to all organic agriculture products. For example, the use of GMOs (genetically modified organisms) or the use of ionising radiation are generally prohibited. Furthermore,

all organic agriculture products must be labelled under the same conditions and may bear the EU organic logo. Member States—under the supervision of the Commission—have to establish a specific organic control system, which comes under the Official Food and Feed Control system (Regulation (EC) No 882/2004).

The import of all organic agriculture products from third countries is governed by the general trade rules in Regulation (EC) No 834/2007 and further detailed in Commission Regulation (EC) No 1235/2008.

More specific general production rules are laid down for seaweed in Article 13 and for aquaculture animals in Article 15 of Regulation (EC) No 834/2007. For seaweed, the growing areas are clearly defined and provisions are made to ensure the sustainable use of wild seaweed as well as the environmentally friendly cultivation of seaweed. For aquaculture animals, general provisions are set up for the sourcing of animals and for environmentally friendly and high-welfare husbandry practices in breeding, feeding and veterinary treatment. Requirements for growing zones of bivalve molluscs are also outlined.

Any change or amendment of the Council Regulation requires the agreement of the Council and the European Parliament.

2) *Commission Regulation (EC) No 889/2008 and Commission Regulation (EC) No 710/2009*

The Council Regulation is supplemented by **Commission Regulation (EC) No 889/2008**, which lays down detailed implementing rules for production, control and labelling of organic agriculture products. It is addressing mainly operators and control bodies/control authorities.

Embedded in this Regulation are the new specific aquaculture production rules, **Commission Regulation (EC) No 710/2009**, published in the Official Journal L 204 on 6 August 2009. This Regulation contributes two new chapters to the organic implementing rules, a smaller one for seaweed (both wild and cultivated) and a comprehensive one – separated into seven sections—for aquaculture animals. Each of them lays down the scope for the specific species, be they animal or

seaweed, for which the detailed production rules are designed.

For aquaculture animals, certain aquatic plants and micro algae which are not explicitly listed under the scope of Regulation (EC) No 710/2009, national rules or private standards accepted by Member States may apply (Article 42 of Regulation (EC) No 834/2007).

The provisions follow the logic/order of the general production rules as laid down in the Council Regulation and provide more specific details:

Conditions are set for the aquatic production environment, for impacts on other species of animals, plants and birds, and for separation of organic and non-organic aquaculture units (according to the suitability of the aquatic medium). The drawing up and maintenance of a sustainable management plan should support traceability and transparency of environment-specific measures which are taken to minimise negative impacts. Most new production units will be required to carry out an environmental assessment. Provisions also recommend the use of renewable energy sources.

The Chapter for aquaculture animals requires animal welfare conditions in husbandry and slaughter to be addressed (including maximum stocking densities). It specifies that biodiversity should be respected, and does not allow the use of induced spawning by artificial hormones. Organic feeds should be used where they are available, and there are provisions for fish feeds to be derived from sustainably managed fisheries. Special provisions are made for bivalve mollusc production and for seaweed. The final Annex lists production requirements including maximum density by species grouping and type of farming.

Beside the two Chapters and the Annex on specific production rules, a number of Articles of Regulation (EC) No 889/2008 are amended or completed with aquaculture-relevant provisions. This was done for the list of definitions, the processing rules in respect of seaweed, the transport of live fish, the conversion rules, the specific control requirements and statistics.

A specific transition rule should help existing organic aquaculture operators to smoothly move to the new



rules by 2013. However, the EU organic logo can only be used when the operator fully complies with the new EU aquaculture rules.

It goes without saying that other detailed provisions in Regulation (EC) No 889/2008 as regards labelling (Title III), control (Title IV) and exchange of information apply to aquaculture production as to any other organic agriculture products.

Changes and amendments of the Commission Regulations may be carried out under the Commitment procedure at Commission level. They require the positive opinion of the Member States in the Standing Committee for Organic Farming (SCOF) by qualified majority.

How was it done?—The decision making procedure

The organic farming legislation underwent a thorough revision process, which was initiated by the European Action Plan 2004 and carried out in three steps:

In 2007 the EU agreed a new regulation on organic production and labelling (Council Regulation (EC) No 834/2007 of 28th June 2007) which for the first time included aquaculture. The Commission needed to adopt implementing rules to lay down detailed production rules before Member States could translate this regulation into practice. These were adopted for agriculture in 2008 (Commission Regulation (EC) No 889/2008) and came into force on 1 January 2009. The Commission agreed in 2009 on a Regulation setting out a common standard with obligations for various groups of aquaculture products (Commission Regulation (EC) No 710/2009).

The new Regulation resulted from negotiation between the Commission and the EU Member States meeting in the Standing Committee on Organic Farming which finally gave a favourable opinion on 29th June 2009 having discussed the issue on a number of occasions over the previous year. The original draft text was drawn up the DG Maritime Affairs and Fisheries in close cooperation with DG Agriculture following intensive discussions with a representative group of experts which met for seven days in all starting in late 2007.

Setting up EU-wide harmonized rules for the aquaculture sector is an important achievement. It is expected that it will contribute to the facilitation of the single market.

A consolidated version of the implementing rules will be available in the internet in due time (by mid July 2010) under the hyperlink of EURLEX:

http://eur-lex.europa.eu/RECH_naturel.do

Labelling of organic fish products

Alexander Beck (AoeL—The Association of Organic Food Producers)

This article discusses new requirements for labelling and packaging of organic fish products introduced by new Regulation (EC) No 834/2007 and its implementing rules (Regulation (EC) No 889/2008), particularly those applying specifically to aquaculture (Regulation (EC) No 710/2009).

Both the organic aquaculture implementing rules and labelling requirements in the new Organic Regulation take effect from 1st July 2010. For this reason, organic aquaculture products are expected from that day onwards to be in fulfilment of all labelling requirements laid down in Regulation (EC) No 834/2007, Articles 23, 24, 25 and 26; and Regulation (EC) No 889/2008, Articles 57 and 58.

The labelling requirements introduce some new elements into the labelling regime:

- Mandatory indication of organic ingredients in the ingredients list
- Mandatory display of the EU organic logo
- Mandatory indication of product origin
- Mandatory display of new EU-standardised code numbers

Organic products—“the 95 percent rule”

The existing rule that ingredients of agricultural origin must be at least 95 percent organic for use of the organic label to be permitted continues to apply in

the same way as it did under old Organic Regulation. Meanwhile, labels must also incorporate the new elements mentioned above. The example below demonstrates how an organic fish product label may look in practice.

Sample label:

Organic Salmon Wrapped in Organic Dill

Ingredients: Salmon*1, dill*, vegetable oil*, salt, smoke

*organic

[EU logo]

EU agriculture

UK—organic—000XX [code must be clearly visible]

Labelling of products with less than 95 percent organic ingredients

For products with less than 95 percent organic ingredients, the “ingredients rule” applies. This means that organic ingredients may be indicated as such in the ingredients list, but labelling of the whole product as an ‘organic product’ or ‘made with x% organic ingredients’ is not permitted; neither is use of the EU organic logo or an indication of origin.

It is important to note that for even a single ingredient to be labelled organic, the entire product must be processed according to additive and processing aid requirements of the new Organic Regulation. In the ingredients list, the percentage of the whole ingredient constituted by organic material must be indicated. Finally, the code number of the control body must appear on the label.

Sample label:

Herbal salt

Ingredients: Salt, herbs, spices, organic seaweed*

*20% of agricultural ingredients derive from organic agriculture

IR—organic—000XX [code must be clearly visible]

Labelling of products derived from hunting and fishing

The new organic regulations have established specific labelling requirements for products derived from hunting and fishing where these are mixed with organic ingredients. Only with these may there be reference to organic ingredients in the product title. In other words, although the same recipe may have been used, with the same additional organic ingredient(s), ‘organic’ may only appear in the product title where the main ingredient is wild fish or game, e.g. ‘Herring Fillets in Organic Olive Oil’. If the herring were conventionally farmed, it would simply be labelled ‘Herring Fillets in Olive Oil’, with a reference to organic made in the ingredients list. Meanwhile, standard requirements of the new regulations apply in full to the preparation process, including to additives and processing aids. In the ingredients list the percentage of organic ingredients must be mentioned; and neither use of the logo nor indication of origin is permitted. Finally, the code number of the control body must appear on the label.

Sample label:

Herring Fillets in Organic Olive Oil

Ingredients: wild herring, organic olive oil,* salt

*15% of the agricultural ingredients derive from organic cultivation

IR—organic—000XX [code must be clearly visible]



Overview of the organic regulations for aquaculture production

Andreas Stamer (FiBL—Research Institute of Organic Agriculture)

Table: Regulations for the production of organic fish and seafood (including marine macro algae) in Regulation (EC) No 834/2007 and its implementing rules, Regulation (EC) No 889/2008

Area	General provisions in Regulation (EC) No 834/2007	Detailed regulations in the main text of implementing rules (Regulation (EC) No 889/2008 (amended by Regulation (EC) No 710/2009)	Further detail in the Annexes of implementing rules, (Regulation (EC) No 889/2008 (amended by Regulation (EC) No 710/2009)
Scope, principles and definitions	Title I–III (Articles 1–11)	Title I Articles 1–2 Title II Articles 3–4	
Seaweed production	Title III Article 13 General specifications for wild collection General specifications regarding sustainability	Title III Chapter 1a (seaweed production), Article 6 a–e (including sustainable use of wild stocks) Chapter 3 (processed products), Article 29a Chapter 5 (conversion rules) Article 36 a Title IV Article 73a	Annex I (fertilizers, soil conditioners and nutrients) Annex II (pesticides) Annex V (feeds)
Aquaculture animal production	Title III Article 15 General specifications regarding - origin of animals - husbandry practices - breeding - feeding - mollusc production - disease prevention - hygiene measures	Title II , Article 6b, points 1–5 (Suitability of aquatic medium and sustainable management plan) Chapter 2a (aquaculture animal production), Article 25a–t, Sections 1–7 including: - General rules - Origin of animals - Husbandry practices - Breeding - Feeding - Special rules for molluscs - Disease prevention & veterinary treatment Article 38a (conversion rules)	Annex VI (feed additives) Annex VII (cleaning and disinfection) Annex VIII (substances allowed for processing) Annex IX (permitted non-organic ingredients) Annex XIII a (species-specific production rules)
Labelling and transport	Titles IV and VI	Chapter 4 (collection, packaging, transport and storage of products), Article 32a (transport of live fish)	Annex XI (logo)
Control	Title V	Title IV Article 79a–d	Annex XII (operator certification) Annex XIII (vendor declaration)

PART III INTERPRETATION AND EVALUATION OF THE NEW AQUACULTURE REGULATION AND ITS IMPACT ON SPECIFIC AREAS OF THE SECTOR

The carp pond system

A multi-species farming system based on green water production with moderately warm temperatures

Marc Mossmer (ARGE Biofisch)

Carp ponds are drainable reservoirs or lakes with a bottom of natural earth, fed by rain or freshwater in-flow to fill up or replace losses by evaporation. They can reach temperatures up to 25–30°C. They are drained for control, harvest, sorting and restocking, mostly once a year.

There are generally many fish species present in carp ponds, because carp are often produced in polycultures. The leading species is the carp family (*Cyprinidae*), and others may be perch, pike, catfish, coregonids and sturgeon. Pike Perch (Zander) and eel are also commonly present, but are omitted from Regulation (EC) No 889/2008.

Organic Origin

As reproduction of carp and other species in carp ponds is mainly managed naturally and not in hatcheries, rules applying to organic breeding in hatcheries are more relevant to intensive farming systems like those of salmonids or marine and other warm water species. However, the organic aquaculture implementing rules do contain both general and species-specific stipulations which carp pond operators should note.

On the origin of aquaculture animals, the organic aquaculture implementing rules state that locally-grown species are preferred, and breeding should be oriented towards improving adaptation to “farming conditions, good health and good utilisation of feed resources” (Article 25d.1).

Stock should come from organic broodstock and from organic farms, but until 2015, non-organic fish can be introduced under certain conditions and labelled organic as long as at least the latter two-thirds of their life is spent under organic management.

The general requirement in new Organic Regulation (EC) No 834/2007 that “species-specific conditions for broodstock management, breeding and juvenile production shall be established” (Article 15.1c.iii) is

relevant for carp pond systems. It is clearly stated that reproduction induced by hormones and hormone derivatives, as well as “artificial induction of polyploidy, artificial hybridisation, cloning and production of monosex strains” (Article 15.1c.i) are all practices incompatible with organic production.

Production system and husbandry practices

Environmental concerns and the physiological and behavioural needs of animals should all be factored into the design of husbandry practices and containment systems. For carp and the other species produced together with it in polycultures, the containment system is a fishpond or lake with a bottom of natural earth; this is according to provisions described in the new Organic Regulation (EC) No 834/2007, Article 15. The design and management of biological processes in these systems are governed by principles set down in Article 4.

According to animal welfare and health considerations, the organic aquaculture implementing rules limit annual biomass gain to a maximum harvest of 1,500 kg per hectare per year, or a maximum density of 1.5 kg per m³.

Biodiversity requirements for (1) the aquatic ecosystem (Recital 12 of Regulation (EC) No 710/2009), and (2) the vegetation in and around production systems (Annex XIIIa, Section 6; also Article 25g.1b) are both relevant to carp pond operators and should be easy to fulfil.

Meanwhile, new operations applying for organic production with an output of more than 20 tons of aquaculture products per year require “an environmental assessment to ascertain the conditions of the production unit and its immediate environment and likely effects of its operation” (Article 6b.2 of Regulation (EC) No 889/2008).

Clean water provision is discussed in Annex XIIIa, Section 6. While closed recirculation facilities are not permitted (Article 25g), oxygen aeration may be used for animal health requirements and in transport (Article 25h).



Conversion

A crucial point is that the conversion period for new operations (depending on drainage and cleaning according to Regulation (EC) No 889/2008, Article 38a) can be as short as six months. However, if non-organic stock is introduced into an existing organic operation, the conversion time becomes two thirds of their life span; for fish of an average size with a lifespan of three years, this entails at least two years of organic management.

Environmental impact

Carp pond systems are self-sustaining, with little or no need for external inputs. Where organic fertilisation is needed, a maximum nutrient input of 20kg Nitrogen per hectare is applicable. Meanwhile, the new aquaculture rules explicitly prohibit chemical treatments for hygiene: “Treatments involving synthetic chemicals—for the control of hydrophytes and plant coverage present in production waters—are prohibited” (Regulation (EC) No 889/2008, Annex XIIIa, Section 6).

Carp ponds do not necessarily need water inflow once they are filled up, except to replace losses. Water loss would usually only occur through evaporation, which in central Europe accounts for an average loss of 1 litre per second per hectare, so it can be calculated that organic carp ponds produce up to 1,500kg of fish biomass with only one litre per second of steady water supply.

Slaughter

The organic aquaculture implementing rules require, in line with organic principles, that “Slaughter techniques shall render fish immediately unconscious and insensible to pain” (Article 25h.5), and it is widely agreed that for carp and other species from carp ponds, electrocution or stroke against the head are more optimal than the use of carbon dioxide and ice slurry.

Feeds

Apart from carp, algae and molluscs, carp are the only other aquaculture species for which nutrient imports to the production system are not needed. Fish in carp ponds feed on naturally available nutrients. The common carp itself and most cyprinids are omnivorous species, and feed on a mixed diet of plants, detritus (organic matter from decomposition activities of

bacteria and fungi) and small animals (insects, worms, zooplankton...). Even if predator species are present, they do not receive external feed inputs.

Supplemental feeding with organic crops, legumes and oil seeds or seaweed is done where natural feed resources are not available in sufficient quantities; documentation is needed for such cases (Article 25l). All feeds have to comply with Annexes V and VI of Regulation (EC) No 889/2008. Growth promoters and synthetic amino-acids are not allowed. Animal-derived feedstuffs such as fish meal and fish oil are not appropriate for the species in carp pond systems.

Medical treatment

Aquaculture animals in their wet medium are quite exposed to pests, parasites and other factors negatively affecting health. Organic farming standards try to minimize those impacts through design of the production system and husbandry practices, density limits, provisions for optimal feeding and the encouragement of production in polycultures.

In their animal health management plan, operators must address biosecurity and disease prevention practices (Article 25s of Regulation (EC) No 889/2008,).

Where veterinary treatment becomes necessary, non allopathic treatments are clearly preferred (Article 25t.1). In cases of reported illness (this must, again, be well documented), medical treatments of any kind may be given within the standard organic framework, as long as the withdrawal period for allopathic veterinary and parasite treatments is observed. In addition, the use of allopathic treatments is limited to two courses of treatment per year – and if exceeded, those animals may not be sold as organic products (Article 25t.2).

Salmonidae

Jan-Widar Finden (Debio)

In Annex XIIIa of the organic aquaculture implementing rules, salmonids are divided into freshwater and saltwater species:

Freshwater: Brown Trout (*Salmo trutta*) – Rainbow Trout (*Oncorhynchus mykiss*) American Brook Trout (*Salvelinus fontinalis*) – Salmon (*Salmo salar*) – Charr

(*Salvelinus alpinus*) — Grayling (*Thymallus thymallus*) — American Lake Trout or Grey Trout (*Salvelinus namaycush*) — Huchen (*Hucho hucho*)

Seawater: Salmon (*Salmo salar*) — Brown trout (*Salmo trutta*) — Rainbow trout (*Oncorhynchus mykiss*)

Origin of broodstock

The organic aquaculture implementing rules require stock to come from organic broodstock and organic holdings. Until 2015, conventional juveniles that have spent the last two thirds of their life under organic management may also be certified as organic. Yet in salmon and trout aquaculture today, a very few breeding companies deliver roe to many hatcheries, and organic roe is rare (the situation is very similar to that of organic chicken production). For this reason, organic hatcheries are permitted to use conventional roe up to 2015.

Another challenge at this early stage of the aquaculture sector is the limitation placed by new regulations on supplementary oxygen in nursery tanks. Oxygen is generally supplemented for animal welfare purposes.

Husbandry practices

The new regulations decree that freshwater fish must have containment systems with a bottom “as close as possible to natural conditions,” i.e. stones and similar. This gives the fish the feeling of being in nature, but also makes it more difficult for the farmer to maintain optimal water quality, adjusting the feed and water supply.

Most salmonid production today comes from fish smoltified in freshwater tanks with ongrowing at sea. Sea cages can be up to 180m in circumference and 60m in diameter, with a depth of 35m, giving the fish a feeling of free swimming and shoaling which is important for these species.

Environmental impact

Closed recirculation systems are forbidden under the organic aquaculture rules. Production of salmonids in sea cages causes a number of problems: faeces and lost feed affect the sea floor; medication and lost feed affect wild fish populations, along with diseases and the multiplication of parasites in farmed populations; and escaped fish can have a genetic impact on wild

populations if they manage to spawn. The organic approach minimizes these risks in sea cage aquaculture, but producers must make efforts with good feed control and breeding for later spawning.

Slaughter

Article 25h.5 of the organic aquaculture implementing rules decree that, “Slaughter techniques shall render fish immediately unconscious and insensible to pain.” For salmonids, there is no doubt that “the optimal slaughter method” to achieve this should be electrocution or a blow to the head rather than the use of carbon dioxide and ice slurry.

Predators

Fish are susceptible to attack by different predators both on land and at sea. Measures against predators are to be recorded under the new rules (Article 25b.2), and must be chosen in consideration of the species involved. In sea cages nets are placed on top and on the sides of the cages to prevent diving birds from attacking fish. Seals are to be scared away manually or mechanically.

Feeds

Salmonids are carnivores, entailing precautions when increasing the proportion of vegetable material in their diet. In the conventional industry, fish meal and fish oil are respectively replaced by products from vegetable sources, largely due to cost and availability considerations around marine sources. Under Article 25k of the organic aquaculture implementing rules, fish-based feed must itself be a product of organic aquaculture, or must be derived from sustainable exploitation of wild stocks, defined in the 2002 regulation on fisheries (Regulation (EC) No 2371/2002) as “the exploitation of a stock in such a way that the future exploitation of the stock will not be prejudiced and that it does not have a negative impact on the marine eco-systems.” However, the scarcity of certified sustainable fish meal and oil represents at present a major problem.

Fish oil and meal is rich in fat, and oxidizes easily. In conventional production, synthetic antioxidants such as Etoxyquin and BHT are added to delay the process. The organic solution is to use vitamin E or other natural antioxidants (Annex VI).



Wild salmonids also feed on crustaceans, giving rise to the red coloring of their meat. In conventional aquaculture, consumer demands and physiological needs of the animal require the use of astaxanthin, which is an important antioxidant supplied from synthetic sources. In organic production, astaxanthin should come from natural sources such as organic shrimp production, the yeast *Phaffia*, or certain bacteria; the organic aquaculture implementing rules specify these items, but it may be problematic for producers that the limit of animals' physiological needs and therefore the accepted usage levels are not specified.

Medical treatment

A big problem in salmon production in sea cages today is the infection of sea lice. Lice on farmed fish can easily produce many larvae in the spring, infecting and killing the smolt of wild salmon and trout passing from rivers on their way out into the fjords and the sea. Normally, farmed fish are treated with different medications, but increasing problems with resistant lice is necessitating a search for alternative solutions. The organic strategy is to use Cleaner Fish together with the salmon in the cages. It is, however, a challenge for the skilled farmer to handle the Cleaner Fish correctly. The number of Cleaners must be adjusted to lice and other feeding material on the nets.

Siting and environmental issues

Many critics of aquaculture point to the sector's heavy environmental impact. It is stated in the Organic Regulation that organic agriculture, on principle, "respects nature's systems and cycles and sustains and enhances the health of soil, water, plants and animals and the balance between them" (Regulation (EC) No 834/2007, Title II, Article 3). The Regulation (EC) No 710/2009 in Recital 5 notes the need for environmental sensitivity in aquaculture and refer readers to the environmental legislation which governs their activity.

Environmental assessments must be carried out by new operations using Council Directive 85/337/EEC or equivalent to help producers define the quality of the site for intended production (Regulation (EC) 889/2008, Article 6b.3). Based on the assessment, producers are to establish a management plan involving measures to reduce the negative environmental impact of the unit. The plan should also address surveillance, environmental monitoring and repair of

technical equipment, and is to be updated annually to reduce the risk of incidents involving escape of fish and pollution.

Fish can be produced on land in ponds and tanks, but closed containment systems with recirculation of water are not permitted at present in organic aquaculture; while such a system enables control of the environmental impact, it is thought to be unnatural and to compromise the welfare of the animals.

In sea cages, as well as on land, the difficulty is to define the distance at which organic units are safe from the impact of conventional units. The organic aquaculture implementing rules delegate this decision to Member State authorities, which may result in different decisions in different Member States.

Until 2015, the organic aquaculture implementing rules also permit the use of copper on the nets as an antifouling measure.

Tropical fish species

Omri Lev (Geva Organic aquaculture) and Hagai Raban (freelance consultant on organic production)

This article deals with tilapia (*Oreochromis* spp.) and pangasius, or Siamese Catfish (*Pangasius* spp.), classified as Tropical Fish as per Annex XIIIa of Regulation (EC) No 889/2008.

General Industry overview

At present, conventional tilapia and pangasius production are the fastest growing sectors in world aquaculture. The production area of pangasius increased by 15 percent during 2009. The growth of this industry is fuelled by increasing consumer demand for low-cost fish protein with light flesh, light taste and light colour. The western markets' demand for pangasius is supplied from ever-increasing production areas in the Mekong Delta, and recently from other rivers in south east Asia. Tilapia are produced in a wider range of habitats and climates, but the present world production leader is China. In light of current industry growth surrounding these species, the new organic regulations represent an important opportunity to increase consumer confidence in the organic label, and thus increase the shift to organic production methods.

The challenge of sustainable standards

The invasive nature of the tilapia, coupled with increasing pressure on natural habitats as result of production growth, poses considerable environmental challenges of regional and of global scales. In the past year, several new schemes were launched within the aquaculture industry aiming to create frameworks for certified sustainable production of these species. Two main schemes are those of GlobalGap Integrated Aquaculture Assurance and the WWF. Along with those, private schemes have been developed by retailers such as Wholefoods. It is therefore reasonable to assume that the organic offerings for these species will face stiff competition on the market from the newly introduced sustainable labels.

The new Organic Regulation in light of the aquaculture industry today

Organic production of pangasius and tilapia has been developing since the early 2000s in Vietnam, Central America and Israel. Annual organic pangasius production capacity is at present around 4000 tons and that of tilapia around 1000 tons. Production is being regulated by private standards – those of Naturland, Bio Suisse and Agrior.

The organic aquaculture implementing rules cover all relevant and significant aspects of organic production and farm management, and facilitate a wide range of environmental considerations (see, for example, Articles 6b.1-5 and 25b.1). They also regulate parallel management of organic and non-organic production on the same farm. This is important to permit certain new farms an economically sustainable conversion phase. Nonetheless, the new rules are not focused enough regarding some specific points critical to distinguish organic from non-organic management systems and to support safe conversion; tilapia and pangasius are fish requiring very specific organic management practices which are somewhat overlooked.

Overview of some critical points for organic tropical fish management

Position of production units: Article 6b of Regulation (EC) No 889/2008 requires positioning of organic production units in a way that will prevent their exposure to prohibited substances, but does not specify distances. Tilapia and pangasius production commonly

takes place in large clusters of neighboring farms in rivers and lakes. Absence of distance specification may cause difficulties for positioning organic production units in such areas, hindering conversion to organic of existing units in areas already exploited for aquaculture. In addition, conditions for sea cage production set out in Article 25g.3 should also be adapted to apply also to production of tilapia and pangasius in river and lake containment systems.

Aeration: Artificial aeration is a common practice in ponds and dam systems, and is widely used in tilapia production. Reliance on artificial aeration is an indicator for pond/cage stocking conditions and stability. Increased aeration may allow for stocking densities that are high for the carrying capacity of a system. Practice of aeration should be restricted. Reliance on aeration as a normal practice is dangerous, as there may be no safety margin in emergency cases.

Prohibition of hormones: Article 25i of Regulation (EC) No 889/2008 associates the use of hormones with breeding practices, and thus its applicability may be interpreted as only for hatcheries. In conventional tilapia production, however, male hormones (testosterone) are used in the early post-hatchery stages for reversing sex to achieve all-male populations; it is presumed that Article 25i applies equally to this.

Fish meal and oil: Articles 25k and 25l set out provisions for use of these inputs from organic, non-organic and sustainable sources. The use of these inputs for pangasius is limited to 10 percent of the diet, whereas no specification is given for tilapia (an omnivorous species). Currently, in the production of organic tilapia, fish meal and oil from certified sustainable sources generally constitutes up to 30 percent of the diet. To compensate for absence of these inputs in an organic tilapia diet, producers would have to look for alternative protein sources from terrestrial and marine plants; efficient solutions of this nature are yet to be developed. How to supply a balanced diet to this species without fish protein is an open question.

Stocking densities: The definitions given in Section 9, of the Annex XIIIa (Regulation (EC) No 889/2008) for pangasius in cage culture are in line with current practices of organic production, but there are



no definitions for tilapia. Tilapia culture is more common in earth ponds than in cages. Density provisions should be developed for such systems. Tilapia is suited to polyculture systems, which can be argued to be more compatible with organic production principles than monoculture systems. Provisions of Section 6 can be viewed as applicable for tilapia in polyculture, with densities significantly lower than permissible limits.

Conclusions

Organic aquaculture of tilapia and pangasius is in the early stages of development. Current consumption growth for these species can be seen as opportunity for the organic sector. The existing requirements provide a basic framework, but perhaps more detail is needed in certain parts to provide for the wide diversity of production systems in tropical aquaculture.

Penaeid shrimp and freshwater prawns

Stefan Bergleiter (Naturland—Association for Organic Farming e.V.)

Shrimp farming is economically important in many tropical areas, contributing to employment and generating foreign earnings. However, contemporary shrimp aquaculture has been criticized for causing negative impacts on the environment and the livelihood of other parts of coastal society. The significance of organic shrimp aquaculture, therefore, lies in its ability to overcome these problems and to offer sustainable methods of production.

Private standards for organic shrimp farming have operated since the late 1990s. Now, the organic aquaculture implementing rules provide general rules for aquaculture and in Annex XIIa, Section 7 for shrimp farming specifically. This article highlights three central aspects of organic shrimp farming and how they are addressed in the organic aquaculture implementing rules.

Mangrove protection

Mangrove forests are an extremely important element of coastal ecosystems in the tropics, forming a nursery ground for many marine species, a natural shield against wave action and erosion, and a base for traditional fishery and wild collection activities (of mussels or firewood, for example). Shrimp farms, typically

located amongst mangrove forests, have often been accused of heavily contributing to mangrove destruction. Any meaningful certification of shrimp farms must therefore be robust about mangrove protection and, where applicable, reforestation.

The organic aquaculture implementing rules state that “Mangrove destruction is not permitted”. In reality, there is little destruction carried out by existing farms; in any case, most countries consider mangrove destruction illegal. Typically, the control body will encounter a situation where the mangrove on the farm area has been destroyed in the past, either by the current owner or previously. For this situation, private certifiers have developed protocols for mangrove reforestation, giving percentages and time frames to provide a base for inspection and certification. This is challenging and costly, requiring the evaluation of historical maps and aerial photographs to define the areas to be reforested (sometimes requiring ponds to be taken out of production) and a big financial outlay for material and labour.

It seems that Regulation (EC) No 889/2008 offers an “easier deal” on mangrove issues than private standards, at the expense of relevance and credibility. There appears to have been little or no input from environmental NGOs, and it remains to be seen if major criticism will be raised from this quarter. A future revision will have to deal in more detail with mangrove conservation issues.

Use of conventional medicine and antibiotics

Mortalities in farmed shrimp are typically caused by virus manifestations (e.g. WSSV) triggered by stress from factors such as high stocking densities, poor water quality, or drop in temperature. Even though it is generally recognised that (1) it is not adequate to treat virus-borne diseases with antibiotics, and (2) the large size and open character of shrimp ponds and farms are not appropriate for large scale application of conventional drugs, there have been significant scandals about drug residues (particularly Chloramphenicol) in farmed shrimp.

Private standards typically prohibit application of conventional medicine in shrimp, taking into account that they are short-lived (ca. 100-day production cycle)

invertebrates in close-to-nature pond environments with hundreds of different microorganisms.

The organic aquaculture implementing rules, however, permit the use of allopathic treatments (Article 25t), though they set a limit of one treatment per year, the shrimp production cycle being shorter than one year. Until now, the prohibition of conventional drugs in organic shrimp farming has greatly contributed to its standing, and has been widely applauded by markets and the aquaculture sector itself. It remains to be seen if the more permissive approach adopted for EU organic legislation will be equally well accepted. A future revision might do well to distinguish more between finfish and shellfish with respect to conventional treatments.

Density and intensity of shrimp farming

Shrimp are mainly omnivorous feeders, living on a wide range of microorganisms, aquatic invertebrates and algae, particularly diatoms. In extensive shrimp farming with yields below 1 ton per hectare per year (t/ha/y), the shrimps can thrive exclusively on the natural feed growing on the nutrient load of incoming water, which may be moderately enhanced by organic fertilizers. Increasing stocking densities creates the need for external feed, typically consisting of fish meal plus whatever available vegetable source of carbohydrates (e.g. wheat, corn, rice, cassava). Up to a yield of around 3t/ha/y, it is feasible to achieve a ratio of “fish in” to “shrimp out” (both calculated by fresh weight) of 1:1, meaning that there is no net loss of marine protein from the system. Any system more intensive than this becomes a net consumer of marine protein (or at least of highly elaborated vegetable protein feed). Furthermore, with such a high consumption of feed, the farm begins to release nutrients into the environment, causing eutrophication of adjacent water bodies.

Organic shrimp schemes have had, of course, the objective of defining an adequate farming intensity limit, balancing the farmer’s interest in producing viable quantities out of an—often expensive and limited—farm area, and the organic principle of adjusting livestock to the capacity of an area and to the recycling of nutrients.

The matter is complex, and the organic aquaculture implementing rules have set limits for stocking densities at 22 postlarvae per m², for fish meal in the shrimp feed ratio at less than 10 percent, and for the “maximum instantaneous biomass” at less than 240 grammes per m² (which equates to relatively high figures of ca. 4.8t/ha/y). Private standards are generally stricter than this, coming to a more equal “fish in : shrimp out” ratio, but also addressing total protein and feed conversion rate. The latter is important, since it addresses the absolute quantities consumed in producing a certain amount of shrimp, not only the qualitative composition of a typically compound feed.

In the organic aquaculture implementing rules, there is an imbalance between being very strict on the fish meal percentage, and not making clear provisions for other feeding aspects. At least in theory, the limitation of fish meal to not more than 10 percent creates pressure to substitute more certified organic vegetable feedstuff. And experience has shown that this feed component, often imported, is the greatest cost factor for organic shrimp farms. It may be claimed that this requirement therefore discriminates unfairly against “Southern” shrimp (and similarly tilapia and pangasius catfish) versus “Northern” finfish species, for which any amount of fishmeal and oil is permitted in organic diets.

These organic shrimp rules represent a first attempt to regulate this complex aquaculture sector, addressing not only the issues discussed above, but also animal welfare in hatchery/breeding techniques, bio-safety of livestock, chemical processing additives, on-farm biodiversity and others. As the above examples show, there is a definite need for future revisions in several areas.

Molluscs

Tor Kristian Stevik (Norwegian University of Life Sciences)

Bivalve molluscs filter algae and organic particles as food from the surrounding water. Molluscs can therefore have a positive effect on water quality in coastal areas and are well-suited to polyculture (co-production with other organisms). Since the animals are not artificially fed, mollusc production may be undertaken in areas which would otherwise not normally be suitable



for aquaculture species because of potential pollution problems. The uptake of food from the surrounding water represents a challenge since its quality cannot be controlled. Care should therefore be exercised in the localisation of production facilities to avoid the possibility of uptake of harmful substances. Water quality data should be collected over a longer period of time in areas intended for the production of molluscs.

Molluscs are mainly produced in one of two ways: either by bottom culture on the seabed, where they are lying freely, attached to lines, or in closed units (such as nets and cages), or by hanging culture, i.e. attached to a material which is held afloat by buoyancy aids on the sea surface such as long-lines or floats. Additionally, a limited amount of production occurs on poles (bouchot) placed in the intertidal zone.

Bottom culture production of molluscs has limited negative impacts if the density is not too high. The main challenge for production on the seabed is harvesting molluscs which lie freely. Normally, trawling equipment is used to scrape the seabed, or pumps are used to draw up the molluscs, together with material from the seabed, to the surface. These types of equipment have a considerable mechanical impact on the upper centimetres of the seabed. This is undesirable since the seabed provides an important growing environment for marine organisms. The seabed fauna should be disturbed as little as possible in order to avoid changes as a result of mollusc production. The following comments refer to Articles 25n to 25r of Regulation (EC) 889/2008.

Growing area

For molluscs, which are filter feeders, the area of production is a key consideration. Molluscs are completely dependent on the nutrients suspended in water currents. Therefore, the quality of sediments on the seabed as well as emission sources within a certain radius of the production area should be verified. In addition, it would be advantageous to map currents in the location.

The organic aquaculture implementing rules are mainly focused on polyculture, the need for clear marking of areas for organic bivalve mollusc production; and limiting the risks for protected species and diving birds.

In order to be able to carry out organic production of bivalve molluscs, strict requirements should apply, particularly in relation to environmental toxins. It should be established as a future goal to limit organic production to 'status A' areas.

Sourcing of seed

Large parts of mollusc production are based on the collection of spawn from wild populations. The spawn can be either on the seabed or pelagic. In bottom culture, it is not unusual to collect spawn from one geographical area and grow the molluscs to market size at another. However, in hanging culture production it is more normal that spawn is collected and grown in the same area. In some areas, spawn is an important source of food for birds. Article 25o ought to make it clear that harvesting of spawn should not be permitted if it leads to negative impacts in areas where bird species depend on spawn for food. However, seed from non-organic bivalve shellfish hatcheries maybe introduced to the organic production until 2015.

Management

The production density of molluscs means, in bottom culture production, the number of individual organisms or kilograms of biomass per square metre of seabed, or in an installation standing on the seabed. In hanging culture installations the density relates to the number of individual organisms per metre of core material.

Density is an important consideration for animal welfare and product quality, but it is also important in terms of the farm's effect on the surrounding environment, including animal life on the seabed. It is important that organic production does not negatively impact biodiversity around the farm. A maximum value for density should be set out before negative impacts are registered. Article 25p gives no specific details about density of organic mollusc production other than that it should not exceed that for non-organic production in the area.

Cultivation rules

All known production methods, like long-lines, rafts, bottom culture, net bags, cages, trays, lantern bets, bouchot poles and other containment systems, are suitable for organic mollusc production. Only in the case of bottom culture are general restrictions given

relating to environmental impact. A superficial regulation of this type will undermine confidence in organic products. In order for production to be correctly described as organic, better guidelines should be created for each production form. As an example, the following could be considered in relation to specific production methods:

- I Buoys used in long-line equipment should have the same colour and form
- I The size of equipment placed on the seabed should not be large enough to significantly prevent the movement of bottom dwelling organisms
- I Bouchot-poles should not be placed so densely that they lead to significant changes in sea currents

Conclusions

The most important omission from the organic aquaculture implementing rules is the lack of a description of the equipment for the harvesting of molluscs grown in bottom cultures. Current techniques involve the use of trawling equipment or pumps, both of which can have serious negative impacts on the seabed. For trawling equipment and pumps to be approved, environmental impacts will need to be documented and guidelines drawn up for their use.

Mollusc production, due to its being quite natural and ecologically friendly, can be described as “organic by default”. The specific regulations for molluscs in the new aquaculture rules lack detail and make it difficult to distinguish an organic and a conventional product. Time will tell whether they and stricter private rules will be enough to develop production of and market for organic molluscs and justify an eventual price premium.

Seaweed

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The new Organic Regulation (EC) No 834/2007 introduces principles for the production of organic seaweed. Since this production area had not formerly come within the scope of EU organic law, a legal framework had to be created afresh for it. The process was complicated: EU-level negotiations revealed that there is little consensus between the different

European stakeholders with regard to either water quality or harvesting and collecting methods.

Growing areas

The regulation of appropriate growing areas for seaweed was a case in point: stakeholders struggled to find a standard that could satisfy all. Ultimately, the approach adopted by legislators has been to define water quality according to the EC’s Water Framework Directive and to conventional shellfish production standards. The relevant wording is to be found in Article 13 of Regulation (EC) No 834/2007, which requires that seaweed growing areas be situated in zones of “high ecological quality” as defined by the Water Framework Directive (2000/60/EC), and that they be “of a quality equivalent to designated waters under Directive 2006/113/EC of the European Parliament and of the Council of 12 December 2006 on the quality required of shellfish waters”. Shellfish are not a hundred per cent relevant to seaweed, but were thought to be a good enough provisional indicator.

The main problem with the reference to these two Directives in the legislation is that they have not yet been transposed into national law by all Member States, and this will cause some problems with implementation. In theory, areas of high ecological quality should have been defined by all Member States by 22nd of December 2009 within River Basin Management Plans (RBMPs), but in practice this has not happened. Meanwhile, there are also Member States which have no areas at all qualifying as of “high ecological quality.” In these two cases, Member State authorities are instructed to use criteria defined in Regulations (EC) No 854/2004 (see its Annex II) on specific rules for the organisation of official controls on products of animal origin intended for human consumption and Regulation (EC) No 1881/2006 on setting maximum levels for certain contaminants in foodstuffs; but these criteria were created for molluscs and are not felt widely to be appropriate for seaweed. Overall, water quality criteria are stricter for seaweed than for other forms of aquaculture production, which has caused some dissatisfaction in the sector.

Since the Organic Regulation (EC) No 834/2007 already imposes requirements for site selection, the organic aquaculture implementing rules do not go into



additional detail, stating only that “Operations shall be situated in locations that are not subject to contamination by products or substances not authorised for organic production, or pollutants that would compromise the organic nature of the products” (Article 6b.1), and “Member State authorities may designate locations or areas which they consider to be unsuitable for organic aquaculture or seaweed harvesting and may also set up minimum separation distances between organic and non-organic production units” (Article 6b.2).

A case study: application of the new Organic Regulation to growing areas in France

Seaweed grows in sea water; of course, the quality of seaweed therefore depends a lot on the quality of the water. In France, the authorities have been working towards establishing tough criteria for classifying seawater quality, and for improving seawater to meet those criteria. All operators whose activities have an impact on water quality have been involved in these efforts.

Currently, criteria are being prepared for approval; their initial public release is set for the first half of 2010. Only a small number of ocean zones will meet the criteria right away; for others, it will take years, and the work hitherto undertaken by the authorities will provide a useful foundation. In the meantime, the Ministries of Ecology and Agriculture will probably permit organic seaweed harvesting in ocean sites which meet the criteria for oyster and seashell production. This is only a temporary measure, and seaweed operators must begin to prepare for the tougher criteria to come.

Harvesting methods

The implementing rules for the new Organic Regulation define appropriate seaweed harvesting techniques in broad terms. Article 6c.2-4 of Regulation (EC) No 889/2008 states that, “Harvesting shall be carried out in such a way that the amounts harvested do not cause a significant impact on the state of the aquatic environment. Measures shall be taken to ensure that seaweed can regenerate, such as harvest technique, minimum sizes, ages, reproductive cycles or size of remaining seaweed. If seaweed is harvested from a shared or common harvest area, documentary evidence shall be available that the total harvest complies with this Regulation [...] These records must provide

evidence of sustainable management and of no long-term impact on the harvesting areas.”

Even if this wording is not very detailed and open to some degree of interpretation, it is much more restrictive than the equivalent articles for terrestrial organic wild collection. Indeed, for terrestrial wild collection, control bodies have much more freedom and responsibility in defining “sustainable management” of a collecting site. They generally rely on documents such as good practice handbooks created by the private sector.

Therefore, it would be helpful to give guidelines to control bodies so that they can refer to scientific evidence to support their decision making on issues such as biomass estimation or main harvesting seasons. The process of creating the new Organic Regulation and its implementing rules has brought into focus the need for research into optimum harvesting methods and creation of a strong basis for robust guidelines. Inter Bio Bretagne is one agency that has started such research, having launched a programme that aims to undertake constant monitoring of approaches applied in different European regions with regard to the sustainable collection of wild seaweed and the management tools set up by different stakeholders.

Ideally, the following issues should be treated separately for each of the main seaweed species falling within organic definitions:

- | A description of the global and seasonal life cycles and identification of the proper harvesting season
- | A description of the management frameworks, tools, methods and fallows applied in practice by harvesters
- | Identification and evaluation of the impact of once-off biomass on target and non-target species as well as on biodiversity
- | Establishment of a means to determine “sustainable annual yields” for each harvesting site.

The answers to these questions should provide the competent authorities and control bodies with concrete tools for the verification of whether practices are in line with Organic Regulation requirements.

PART IV CHALLENGES FACING THE ORGANIC AQUACULTURE SECTOR

Inspection and certification systems for aquaculture products under the new rules

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For the first time in organic history, European regulations will include requirements for aquaculture products. The organic aquaculture implementing rules aim to harmonise certification and inspection by establishing common production rules across the EU. Their implementation has caused some confusion among the competent authorities, accreditation and certification bodies applying different approaches in different states; truly successful harmonisation will depend on effective oversight and control of competent authorities by the Commission itself.

The new development will certainly harmonise all organic aquaculture producers on the same minimum production level (after a fairly extended transitional period during which competent authorities may allow continued use of existing private or national standards; see below). Bringing aquaculture fully under the new Organic Regulation should also help to combat fraudulent use of the term “organic” on aquaculture products. Thus it should reduce unfair competition and increase consumer confidence.

On the other hand, implications have arisen for aquaculture producers operating under previously accepted organic rules (e.g. private label standards or national requirements), whether those standards are either below or above the new minimum production level.

The organic inspection system

According to Title V of Organic Regulation (EC) No 834/2007, the organic inspection and control system (including aquaculture production, processing and trade) has to be in compliance with general food legislation. This includes Regulation (EC) No 882/2004 on official food and feed controls. However, no specific requirements regarding the organic control system of aquaculture production, processing and trade were added by Regulation (EC) No 710/2009. This fact is quite bewildering, as aquaculture is a very specific animal production system which requires that audit personnel are highly qualified and really understand their subject. The clear trend towards higher demands

on the certification system has been ignored, a fact which could well jeopardise the integrity of organic aquaculture.

The new Organic Regulation specifies that organic control bodies must be accredited according to DIN EN 45011 or ISO Guide 65. This highlights the increased responsibility that is assigned to control bodies and the control system. Since aquaculture is a new technical scope within the regulations, most accreditation bodies request formerly EU-accredited control bodies to apply for an aquaculture scope extension. This obligatory procedure is not defined by the new regulations` legal framework, but is specified in the ISO/IEC 17011, point 7.12 on Extending Accreditation (the ISO/IEC 17011 describes the general requirements for accreditation bodies accrediting conformity assessment bodies).

Qualification of inspection and certification personnel

The organic aquaculture implementing rules have not imposed additional requirements on the organic inspection and certification personnel. Therefore, it is at the discretion of the competent authorities to define additional requirements if felt necessary. There is a risk that this will result in diversified requirements for the qualification of these personnel in different countries, which might therefore cause unequal frameworks and unfair competition. The fact that control bodies have different levels of knowledge and experience of aquaculture production and its specific requirements both highlights and exacerbates the above mentioned risk.

It is to be welcomed that the competent authorities are developing guidelines for the qualification of inspection and certification personnel. It is also to be welcomed that the Commission seems to be taking its responsibilities for oversight of the competent authorities more seriously than hitherto.

Transition period 2009–2013

Article 95 of Regulation (EC) No 889/2008 rules that “The competent authority may authorise for a period expiring on 1 July 2013, those aquaculture animal and seaweed production units which are established and produce under nationally accepted organic rules before entry into force of this Regulation, to keep their organic



status while adapting to the rules of this Regulation.” Thus aquaculture operators that already produce under nationally accepted organic rules have the possibility of applying for a transition period. Aquaculture operators that have not been certified according to nationally accepted organic rules prior to 8th August 2009 have to comply with the new organic regulations from the time of their first certification.

On the one hand this may result in several inequalities for organic aquaculture operations until 1st July 2013, but on the other hand it seems to be a feasible way to make progress regarding the new organic regulations’ implementation, considering the diverse nature of organic aquaculture operations worldwide.

After 1st July 2013, operators will have to adapt their production systems where they fall below the new minimum requirements, and some of these adaptations could be significant. Equally, where existing private label standards are above the minimum requirements, the organisations will have to decide how to respond, either adopting the lower implementing rules or maintaining their own standards.

Due to the fact that private label certification will likely continue to be requested besides the obligatory inspection and certification according to the new Organic Regulation, it has to be highlighted that private label certifications are going to become more target market orientated than in the past, depending upon the private labels’ popularity within the respective countries.

Communication between stakeholders

Since 1st January 2009 a widespread confusion has grown among all stakeholders in the aquaculture sector (control bodies, accreditation services, competent authorities, organic fish farmers, other affected operators and even consumers) about implementation of the new Organic Regulation. Lack of clear definitions and criteria and the general lack of communication have resulted in different procedures in the different Member States, even to the point that operators who could not fulfil certain requirements might be sanctioned in one Member State while the same situation was approved by authorities in another.

A general problem that came up was the cross-border implementation of the new organic regulations, emphasizing the urgent need for action to harmonise the procedures and implementation in regard to organic aquaculture.

Since Regulation (EC) No 710/2009 entered into force, the situation has generally improved. Over time, the sector has gained more experience and communication between the stakeholders and understanding of the specific requirements will quickly improve.

Procedures in non-EU countries

The situation in third countries (non-EU states) is more complicated. Where aquaculture operators had to undergo inspection and certification according to the import rules requiring “equivalent” standards, each accredited certification body designed its own equivalence standard for the Commission’s approval. Thus the risk is high that there will be many different criteria and methodologies applied and called “equivalent”, pushing products on the market that might be produced in questionable ways. Nonetheless, despite this problematic situation the mechanism does provide the opportunity to implement the requirements of the organic aquaculture implementing rules in non-EU Member States in a way that is possible and feasible. And this, in turn, allows these producers to provide certified aquaculture products for the EU and world markets.

Fish welfare – a key issue for organic system standards

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From the public and from governments, there is nowadays an increasing interest in the welfare of farmed fish; among farmers, there is growing awareness that good welfare equates to increased success of production activities.

Recital 10 of Regulation (EC) No 710/2009 states, “Organic aquaculture animal production should ensure that species-specific needs of animals are met. In this regard husbandry practices, management systems and containment systems should satisfy the welfare needs

of animals. [...] To minimise pests and parasites and for reason of high animal welfare and health, maximum stocking density should be laid down.”

Stress and welfare

In aquaculture facilities it is important to consider the animal's state of health and the amount of stress it faces; thus, a more comprehensive welfare definition could comprise the fish's physiological and psychological capability to cope with its environment. Stress responses represent a natural reaction to adverse environmental conditions, so they can be used as indicators of the impairment of the normal welfare conditions. Notwithstanding, physiological responses to stress are not necessarily indicative of suffering or of compromised welfare. Stress and its associated responses must be regarded, first and foremost, as an adaptive condition of the organism that has the fundamental function of preserving the individual life.

The welfare indicators of farmed fish selected for Regulation (EC) No 889/2008 include “fin damage, other injuries, growth rate, behaviour expressed, overall health and the water quality” (Article 25f.2). All these are among the most common indicators (Table below) used to assess impairment of each one of the Five Freedoms, which have become an accepted framework for evaluating suffering of land-based animals and farmed fish. The framework recognises that animal welfare is complex, reflected in many physiological and behavioural traits, and therefore that combining different indicators offers a much more useful assessment than relying on a single indicator.

Water quality and environmental conditions

Fish biochemistry and behaviour are closely connected to the water in which they live. Changes in water parameters can reduce growth and cause stress that increases the incidence of disease, which is detrimental for fish welfare and might even be lethal. Water quality could be influenced by different factors such as the production system, rearing densities and the amount and quality of food. Water quality refers to chemical parameters such as concentrations of dissolved oxygen, carbon dioxide, un-ionized ammonia nitrogen and nitrite-nitrogen. Alkalinity, calcium hardness, nitrate concentration, pH and chloride levels are also important. Theoretically, increasing rearing density will decrease water quality because of the oxygen consumption, metabolite accumulation and the increased amount of suspended solids. The latter are caused by the greater faecal production and the increased fish movement. Thus, the presence of faeces and food waste are probably the most critical aspects of the environment for fish welfare.

Feeding and food quality

Inappropriate composition and timing of feeding regimes could cause the impairment of fish welfare. Feed distribution in a small area could generate competition and increased aggression among fish that in turn could lead to growth variations reinforcing dominance hierarchies. Feed composition too is important for preserving welfare. Diets lacking in critical micronutrients impair welfare, causing morphological abnormalities, poor immune function, abnormal behaviour and slow

Table: The Five Freedoms of animal welfare and the indicators used to assess welfare impairment

	Five Freedoms of animal welfare	Indicators
1	Freedom from hunger and thirst	Feed intake, growth rates, condition factor
2	Freedom from discomfort	Physical damage: fin condition, cataracts, lesions Immune responses (e.g. lysozyme activity, respiratory burst activity, phagocytic activity)
3	Freedom from pain, injury or disease	Environmental monitoring: water quality monitoring (dissolved oxygen, ammonia, pH, carbon dioxide, suspended solids) Targeted sampling of fish: gill condition and checking for parasite infestation
4	Freedom to express normal behaviour	Abnormal behaviour: swimming and feeding behaviour, distribution of the fish within a system (eg. clumping around inflows), response of fish to an approaching farmer
5	Freedom from fear and distress	Measuring primary and secondary stress responses: plasma, cortisol, glucose, lactate, muscles activity



growth. Insufficient levels of high polyunsaturated fatty acids have a negative impact on the immune system and reproductive functions, and therefore, fish meal and oil are considered essential components of feed used in aquaculture. The problem is that feeding wild fish to farmed fish puts wild fisheries under unsustainable pressure. For this reason plant protein and oil have been used to partially replace fish meal and oil, but over a certain level in the diet, plant sources often show anti-nutritional factors and/or unsuitable content of amino acids and essential fatty acids that could impair fish welfare.

The specific rules on feeds for carnivorous aquaculture animals in the organic aquaculture implementing rules give first priority to the sustainable exploitation of fisheries, using ingredients of fish origin derived from trimmings of fish. Other considerations include “animal health, high product quality, including the nutritional composition, which shall ensure high quality of the final edible product, and low environmental impact” (Article 25j). The most challenging problem is, therefore, to find the better trade-off between the high quality of the final edible product, a low environmental impact and the amount of trimmings, in which content of amino acids and essential fatty acids is generally poor.

Stocking density

Fish live and move in a three-dimensional medium that is vital for both their survival and the expression of their full range of natural behaviours; this makes the concept of minimum space for fish more complex than for terrestrial animals. Furthermore, among fish, there are many interspecific differences in space needs and tolerance to stocking density. In general, high density conditions may increase swimming activity and behavioural interactions between fish, leading to a rise in energetic expenditures up to levels that could be detrimental for physiological processes. Particularly, higher swimming activity can result in a higher use of the anaerobic metabolism, which represents energy reserves used in a situation of stress. Less availability of this reserve might cause reduced ability of the fish to react to other stresses in their environment. Thus, stocking density results to be an important factor for fish welfare, but cannot be considered in isolation from other environmental factors.

Dealing with this last consideration, Regulation (EC) No 889/2008 states that stocking density should be set according to species or species group and the effects of stocking density on the welfare of farmed fish are monitored considering both the condition of the fish and the water quality (Article 25f.2). The stocking densities indicated in Annex XIIIa represent an attempt to balance consideration for welfare, high quality and profitability. If duly justified, a possible revision of these limits might be introduced after July 2013, depending on on-farm experiences.

Disease and parasites

When fish live in poor welfare conditions, stress events reduce their ability to fight diseases. Indeed, various severe health problems are associated with intensive fish farming, such as cataracts, post-immunisation peritonitis, skeletal deformities, soft tissue malformations, viral disease and wound or skin ulcers. The occurrence of these conditions in aquaculture may impact the ability of fish to undertake normal respiration, feeding and reproductive behaviours, also resulting in poor production performances. The actual incidence of several diseases that had been a major problem in aquaculture in the recent past has been to some extent reduced by vaccination practices, even if these prevention procedures have also shown to be stressful to the fish. However, further studies on the effects of handling, transport, and feeding on stress physiology should help to improve welfare standards.

Regulation (EC) No 889/2008 states that animal health management should be primarily based on the prevention of disease. But when, despite this, health problems arise, veterinary treatments may be used with a limit of two courses of allopathic treatment per year or, in the cases of a production cycle of less than a year (i.e. invertebrates), with a limit of one treatment. In this last point there is the sole significant difference with the IFOAM basic standards, which state a prohibition of any treatment for invertebrates.

Pre-slaughter and slaughter

An optimal slaughter method should render fish unconscious until death, without avoidable excitement, pain or suffering prior to killing. Behaviour can be a good and non-invasive indicator of fish welfare at the time of slaughter, because it rapidly responds to

environmental changes. The most frequent behavioural observations are related to the strength and the persistence of the swimming motility and gill ventilation. However, it is important to study methods that would be useful when the achievement of instantaneous induction of insensibility is not possible, the objective being that the animal should be rendered unconscious and insensible until death. Furthermore, the biochemistry of the muscle *post-mortem* and the onset of *rigor* are influenced by the method used in pre-slaughter handling, stunning and killing of fish which, in turn, can compromise the organoleptic qualities and marketability of the final product.

Regulation (EC) No 889/2008 affirms that slaughter techniques should render fish immediately unconscious and insensible to pain, but does not provide specific indication of the most suitable techniques. This might result in different application of the principle in different countries. In any case, scientific and technological understanding in this field should be further expanded, particularly in terms of on-farm experimentation.

Conclusions

Just as do other animals, fish require proper consideration for their welfare in management, and this is reflected both in the organic principles and in European regulations. To this purpose, organic fish farming procedures should consider, as a priority, how to minimise unnecessary stress and keep under control the whole life cycle of farmed fish. The improvement of rearing conditions will benefit fish welfare as well as aquaculture profitability. Welfare concerns are interconnected: water quality, stocking density, feeding, nutritional condition and management procedures all have a direct effect on fish stress levels, subsequent stress tolerance, health and overall welfare, so care for the whole requires conscientious attention to each individual part.

Challenges of the organic standards: what will the future look like for European organic aquaculture?

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Europe's organic aquaculture sector has been asking for many years to be included in the Organic Regulation. Since the 1990s, the sector has developed based on private standards, and more recently also national laws which have appeared in a few European countries. Consequently, the organic aquaculture implementing rules come into being at a time when European aquaculture is diversified and fragmented: basic approaches vary from region to region, and standards differ from and sometimes even conflict with each other.

While implementation will be a challenge both for operators in the organic sector and for authorities at national and EU levels, a European regulation that creates common basic standards has been welcomed. It has, however, brought up many deeply problematic issues which are not yet near resolution.

Feed sourcing and feed quality have become one of the most important challenges for aquaculture and organic aquaculture especially.

Organic production tries to minimise its environmental impact as much as possible with respect to feeding systems. The systems most in line with this objective are extensive production systems of omnivorous fish species, seaweed and molluscs which can utilise nutrients naturally available in the water. Such systems need little or no external inputs of feed; or, in the words of the Regulation, they achieve "nutrient removal" and "facilitate polyculture" (Recital 7 and 16 of Regulation (EC) No 710/2009). Examples of species well suited to self-sufficient polycultures include the carp family, tilapia, pangasius, milkfish, shrimp and prawn. The organic aquaculture implementing rules require all of these species to feed on material naturally available in ponds and lakes, and only where natural feed is not available in sufficient quantity might they be fed with organic plants or seaweed products. In case of shrimp, prawn and pangasius, feeding with fish meal or oil up



to 10 percent of the total feed ration is allowed. While for many polyculture systems the complete avoidance of nutrient inputs should be entirely possible, seaweed fertilisation is sometimes used to introduce nutrients. Such an approach is possible only for limited number of omnivorous fish species. It is common in Asian and African aquaculture, but in Europe is so far practiced only in small carp ponds and lagoon systems.

In addition to polycultures, multi-trophic systems are another area for future development. Integrated multi-trophic aquaculture includes organisms from different trophic levels of an ecosystem, so that the by-products of one become the inputs of another. Such systems used in conventional aquaculture, and could be of great interest to the organic sector.

In organic production, the ideal would be to mimic nature as closely as possible. Consistent with this value, an important goal for aquaculture could be to develop self-sustaining natural systems (with perhaps some additional fertilisation) such as those mentioned above as the mainstay of the sector. Such systems reflect naturally-occurring ecosystems which cycle nutrients and self-clean effectively. Ecological impact would be small, and resilience high.

The production of carnivorous fish is much more difficult to undertake sustainably. Depletion of wild fish stocks was one of the incentives for development of aquaculture, but it did not solve the problem as the majority of the farmed fish require wild fish as a source of feed. The needs of carnivorous farmed fish are so great, indeed, that the industry uses not only trimmings and bycatch but also fish caught specifically to be processed into fishmeal and oil.

Of course, the organic aquaculture implementing rules state that carnivorous fish should preferably be fed with “organic feed products of aquaculture origin” (Article 25k.1a). However, they also permit the use of “fish meal and fish oil and ingredients of fish origin derived from trimmings of fish already caught for human consumption in sustainable fisheries” (Article 25k.1c). Furthermore, there is a transition period (up to 2014) during which the use (up to 30 percent of daily rations) of ingredients “from non-organic aquaculture trimmings, or trimmings of fish caught for

human consumption” (Article 25k.1d) are permitted. Opponents argue that such ingredients are, in essence, conventional feed, with all the associated problems of pollution, contamination, perpetuation of an unsustainable conventional sector and the disappearance of the distinction between organic and non-organic products. Even where ‘sustainable’ fisheries are concerned, part of the problem is that the concept of sustainability as defined in European Policy is implemented poorly in Member States, leaving a significant proportion of the organic sector unsatisfied. More radical elements of the sector cannot accept any use at all of ingredients of fish origin.

In a related issue, globalisation of the production and trade of fish meal has resulted in the transport of raw materials and final products over long distances across the globe. This is not addressed at all in the Regulation. It is felt by many that the organic sector should devote resources to developing the local production of fish meal and plants for feed; feed plants can even be grown on site in many cases.

It is because organic feed sources are not sufficient that the feed provisions described above were made; but their opponents argue that the solution should be to reduce production of resource-intensive carnivorous fish rather than compromise organic integrity. This has made feed one of the more controversial elements of the organic aquaculture implementing rules.

Supply of nutrients to carnivorous fish will be a subject of attention for the organic aquaculture sector in future. Fish are more efficient than other animals at converting dietary protein into body protein. Nonetheless, the production of 1kg farmed fish generally requires at least 1kg of wild fish. This sort of approach (common in conventional aquaculture) is not a solution to the depletion of wild fish stocks; to the contrary, it will worsen the problem. Scientific research in the organic sector aims to reduce the consumption of fish meal and oil by replacing them with plant-based ingredients. Scientists, however, face a trade-off, since a more plant-intensive diet reduces the content in fish meat of Omega-3 and Omega-6 fatty acids. The organic aquaculture implementing rules have adopted the interim solution of limiting the plant fraction of carnivorous fish diets at 60 percent (Article 25k.3),

but it is hoped that research into the production of essential fatty acids from algae will produce a better solution in the future.

The objective of replicating nature in organic production is also a theme in the issue of containment systems, just as it is in the issue of feeding systems. Closed recirculation aquaculture facilities are banned by the organic aquaculture implementing rules, with the exception of hatcheries and nurseries. While open systems may help to reduce the ecological footprint of organic aquaculture, they could bring many uncertainties and risks: infection by wild stocks of less resistant, more densely populated farm stocks; interaction with predators; contamination from the drift of conventional feed and fertilising material; and escaping fish.

The organic aquaculture implementing rules recognise these problems and include measures to minimise risks in open aquaculture systems. Nonetheless, in some cases no perfect solution exists. For example, the Regulation suggests that fish stocks could be made hardier and more competitive through breeding programmes; but as farmed fish improve in this way, escapes pose an increasing potential risk to wild stocks and the local ecosystem.

At the same time, many of the measures presented in the Regulation are somewhat vague, imposing a substantial responsibility on producers, control bodies and certification bodies to interpret and implement them in the best possible way. This has occurred in respect to siting of aquaculture facilities. The organic aquaculture implementing rules demand clear distinction and separation of conventional and organic aquaculture farms and farm-units, but leave a wide margin for interpretation by competent authorities, opening the door to regional differentiation. Power is given to Member State authorities to designate locations or areas unsuitable for organic aquaculture or seaweed production, and to establish their own minimum separation distances if desired, and to specify those distances. Separation distances are controversial for the aquaculture sector, since they are not required in any other organic production sector.

The organic sector with its sustainable approach is careful about its ecological performance but also about its economic and social dimensions. This is visible in private standards, many of which include rules related to strengthening economic and social performance. The new organic regulations overlook economic and social aspects of aquaculture production, focussing exclusively on the creation of a market for organic aquaculture products.

Market accessibility for small producers is one area where the new rules have fallen short. Looking at both conventional and organic aquaculture, we observe that the market is dominated by big production units. Small producers face many market barriers, one of which is the burden of control and certification costs faced by all organic operators. The organic aquaculture implementing rules do not extend special opportunities to small, extensive producers, though doing so could create employment, facilitate development of rural or coastal economies and improve social structures. The challenge for the organic sector is to allow those small farmers to enter the market and benefit from it.

Many producers intensify production by increasing the scale of production, utilising more inputs (feed, energy) while complaining of the limitations on stocking densities in organic farming. Another challenge faced by the organic sector is to strike a balance in the organic aquaculture market between producer and consumer needs and expectations, between economic viability and ecological performance. Time will tell whether the sector can deliver out of this balance a clear distinction between organic and conventional products.

Organic aquaculture has not yet developed a market for organic production inputs such as brood stock and feed sources. This makes the sector still receptive to compromises.

Europe is big market for organic products, including aquaculture products, and the new legislation will develop it further. Meanwhile, there is huge import of aquaculture products to Europe from distant parts of the globe, and the organic sector should consider whether consuming fish with so many food miles is in line with the organic principles.



There are problems anticipated with the application of the organic aquaculture implementing rules which could disrupt competition in the market. Vagueness and the room for different interpretations (such as, *inter alia*, the EU's definition of sustainable fishery practices) is one problem. Another is that the organic aquaculture implementing rules create a confusing and potentially unfair system for the transitional period expiring on 1st July 2013: Regulation (EC) No 710/2009 applies fully to all new producers; exceptional rules can be made by competent authorities for producers who operated under nationally accepted organic rules before the entry into force of the Regulation. The transition period postpones harmonisation, and delays implementation of long fought-for standards. Regardless of these potential complications, however, it is of crucial importance that private labels, with standards stricter than those of the Regulation and with their own unique selling points and histories, will continue to exist, since they clearly benefit the organic market by preserving diversity and differentiation.

There is likely to be a revision of the aquaculture rules around 2013 on the basis of proposals from the Member States. This leaves a window open for adjustment after few years of their application; a good approach, bearing in mind the diversity of the organic sector and the difficulties of achieving consensus on rules for European organic aquaculture. The new legislative regime will have a substantial impact on business practices, and the sector is expected to require some time to adapt, having acted quite independently so far.

However, research is vital to provide meaningful input to make this revision feasible and relevant. There is a need to improve our understanding of the aquatic environment in relation to aquaculture production; the potential of polyculture and multi-trophic systems; fish behaviour and welfare; different feed management systems; ecological performance and the footprints of different aquaculture production systems; and last but not least economic performance and market characteristics. There is potential for collecting a lot of information on organic aquaculture production, since the new rules oblige producers to take detailed records for control and certification purposes. With a special system to assemble and analyse these records, information could be used to develop more

sustainable production. Another use would be to enrich communication with consumers. The organic credo in the aquaculture sector means not only the absence of food additives and residues in products, but also a proper "egg to plate" product history; it is up to the sector to reveal this to consumers.



The IFOAM EU Group is the European working level of IFOAM, the International Federation of Organic Agriculture Movements. It has more than 300 member organisations from the EU and EFTA countries, representing production, processing, trade, research, certification, inspection, and consulting: all stages of the organic production chain and all areas of the organic sector. Members also include environmental and consumer NGOs. This network of national representatives unites organic competence across the EU.

The IFOAM EU Group undertakes activities to promote and advocate for organic farming in the context of EU policy, regulation and research. One of IFOAM EU's core roles is to help shape EU regulations relating to organic farming by transmitting its members' views and experiences to European institutions. To do this, representatives participate in the European Commission's Advisory Groups, expert meetings, hearings and consultations as well as advocating directly amongst Parliament and Commission members.

The new Organic Regulation (EC) No 834/2007 and its implementing rules are examples of legislation on which the IFOAM EU Group has had a strong influence. Another aspect of the Group's role is to communicate legislation and its implications to stakeholders and to provide a platform for discussion and development; this dossier is part of such a process. By facilitating two-way communication, the IFOAM EU Group hopes that it can help the organic sector to operate more smoothly, and raise its profile in EU food and farming.



The project "Promotion of domestic and international demand for organic products - INTERBIO" is financed in the framework of the Italian Action Plan for Organic Farming by the Italian Ministry of Agricultural, Food and Forestry Policies (MiPAAF) and coordinated by IAMB - Istituto Agronomico Mediterraneo di Bari. Its main objective is to promote Italian organic farming both at national and international level.

The project is divided into three main actions pursuing three overall objectives:

1. To facilitate the commercial penetration of organic productions into international markets, addressing and valorising the promotional action of public Institutions and private traders and operators at the same time as strengthening their interrelationships.
2. To reinforce relationship networks at domestic and international levels, particularly in the framework of commercial cooperation, cooperation and development, research and training activities. A particular focus is given to the Mediterranean area.
3. To facilitate information flow and knowledge exchange on the principles and practices of organic farming.

The publication of this aquaculture dossier in cooperation with the IFOAM EU Group contributes, along with other publications, to the third project objective.



BioFach