



SEACASE SUSTAINABLE EXTENSIVE AND SEMI-INTENSIVE COASTAL AQUACULTURE IN SOUTHERN EUROPE

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REPORT PREPARED BY: **M. YÚFERA**

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1 Introduction

As in other countries in the European area, the alimentary crises and the exigencies of consumers have promote during the last decades the progressive interest in the processes of sanitary control and the quality in general of food products from agriculture and fisheries. On the other hand, the elaboration of traditional products as well as products with particular organoleptic characteristics with high economic relevance in determined regions leded the establishment of Regulation Councils and Origin denominations since long time.

In addition to normative of obligatory application referring sanitary conditions and labelling, currently there is a politic of voluntary application of a series of rules related to the quality of food products that consider the integrity of the productive process (sources, production methods, post-elaboration, final quality, sanitary control and environmental care, etc). The observance and analysis of the implementation process of quality management and their certification according to ISO 9000 and ISO 14001 respectively, as well as the norm (CE) 761/2001 of the European Parliament is responsibility of the General Directorate of Agriculture and Food Industry (Ministry of Agriculture, Fisheries and Food - MAPA). Besides, there are branches for specific quality which embrace diverse sectors, products and that have been promote for stockholders associations and for the Regional Governments of the Spanish state with special reference to agriculture and food quality, health, traceability of supply chain, as well as the condition of the commercial products, labelling, origin denominations and consumers defence against frauds. Some examples of these branches promoted by Regional Governments are "Calidad Certificada" and "Parque Natural" in Andalusia, "Galicia Calidade" in Galicia, "Marca Q" in Catalonia, and "Eusko label" in Basque country. These labels are voluntary and complementary to the others possible and confer to the product a added value because its differentiate quality and value of safety and retailer and consumer confidence, with a wide dissemination and promotion strategy by part of the Regional Governments in the National and International field. Certification bodies for fulfilling those regulations and norms are accredited by the National Body for Accreditation (ENAC), a private institution with participation of Ministries and bodies conform to the requirement of the European Standard EN-45011.

In Spain, this movement toward the certification promoted by the administrations and producer associations is observed as a way to face the competency in a global market with new markets and developing countries offering lower prices. Therefore, the certification of goods considers the product quality and differentiation a mean against the challenges of markets in the coming years, and as a requisite for exporting goods.

2 Historical background

Observance of food quality in Spain started by the adoption of the Codex alimentarius (FAO and WHO 1962), and the progressive implementation of HACCP protocols (Hazard Analysis and Control Critic Points) and codes of good practices to develop food standards, protecting health of the consumers and ensuring fair trade practices.

Likewise, the desire to protect products with an identifiable geographical origin led to introduce registered designation of origin in consonance with Council Regulation (EEC) No 2081/92 of 14 July 1992 on the protection of geographical indications and designation of origin for agricultural products and foodstuff. Currently, collective and guaranteed branches, and quality denominations are regulated in Spain by the Law 17/2001 of December 7, and the obligatory labelling for guaranteeing the traceability by the Decree 121/2004 of January 23.

According to the General Directorate of Agriculture and Food Industry (Ministry of Agriculture, Fisheries and Food - MAPA) which examines the changes in the sector of agriculture and food from 1995, the first industries obtained the certification ISO 9000 in the year 1993, while the first certifications in the ISO 14001 occurred in 1997. The statistic of 2005 includes 1818 industries certificates in ISO 9000 and 298 in ISO 14001.

In the field of marine aquaculture, none product or company was certificate in 2000 although some process had already started as the case of the "Mejillón de Galicia" and intention was declared for other products. The process toward the certification of products from aquaculture accelerated after the 2001-2002 price crisis in seabream and sea bass due to the competency of other Mediterranean countries. The report of the University of Stirling commissioned by the European Commission for examining the impact of such market crisis (University of Stirling, 2004) recommended the development of products focussed in key attributes such as freshness, origin, traceability, environment, contemporary packaging, etc. These recommendations follow the same line already established by the producers in order to differentiate the product by quality commitments, mainly freshness, and promote a favourable reception by the consumers.

Regarding the certification for ecological productions in aquaculture, the first step was done by adapting the rules CEE 2092/91 for trout and sturgeon production (Soriger et al 2000) of the company Piscifactoria de Sierra Nevada in 2001 and certificated by the Andalusian Committee for Ecological Agriculture (CAAE), the official certification body in Andalusia, which established for the first time in Spain the "Norms for the ecological production of products of aquaculture" (Domezain and Hernando, 2003). Then other similar norms were promoted by other Regional Governments. Recently (March 2007) the Spanish Ministry of Agriculture, Fisheries and Food (MAPA) in collaboration with the Spanish Association for Normalization and Certification (AENOR) and the Associations of Trout producers presented the Spanish Norm UNE 173002: "Aquaculture. Production processes. Ecological production of Trout". In addition, the Regional Government of Andalusia recently implemented the regulations for the ecological production of marine aquaculture (BOJA 215, 31 October 2007).

During the last few years different seafood products, including products from aquaculture, obtained certifications at different levels (collective branches, PGO, ecological production, etc)

3 Seafood certification picture of the actual moment

The following table shows the main aquatic food products that have obtained certification in Spain. Canned, salted and cooked fish and other seafood are not included.

(COUNTRY)	PRODUCTS	CERTIFICATION NAME, ENTITY AND DETAILS
Spain	<i>Sparus aurata</i> , <i>Dicentrarchus labrax</i> , <i>Psetta maxima</i> from Aquaculture	<i>Crianza del Mar</i> Seabream, sea bass and turbot cultured APROMAR, FROM. Boureau Veritas www.criazadelmar.es
Spain - Galicia	<i>Mytilus galloprovincialis</i> from Aquaculture	<i>Mejillón de Galicia</i> (Mussel from Galicia) Mussel cultured in Galicia Consello regulador del Mexillón de Galicia DOP www.mexillondegalicia.org 2001 Spain, 2006 Brussels
Spain – Andalusia	<i>Mytilus galloprovincialis</i> from Aquaculture	<i>Mejillón Cultivado</i> (Cultured mussel) Mussel cultured in Andalusia ASEMA Junta de Andalucía Calidad Certificada
Spain - Andalusia	<i>Sparus aurata</i> from Aquaculture	<i>Dorada de Crianza</i> Seabream cultured in Andalusia Organization of fishery producers (OPP- 56) Junta de Andalucía Calidad Certificada
Spain - Andalusia	<i>Sparus aurata</i> from Aquaculture	<i>Dorada de Crianza del Sur</i> Seabream cultured in Andalusia Organization of fishery producers (OPP- 56) www.doradadecriazadelsur.com Oficina Española de Patentes y Marcas (OEPM). Collective brand
Spain - Andalusia	<i>Sparus aurata</i> , <i>Dicentrarchus labrax</i> , <i>Psetta maxima</i> from Aquaculture	<i>Crianza del Mar</i> Seabream, sea bass and turbot cultured APROMAR, FROM. Boureau Veritas www.criazadelmar.es
Spain - Andalusia	<i>Onchorhynchus mykiss</i> from aquaculture	<i>Trucha ecológica</i> Piscifactoria Sierra Nevada Trout Ecological production CAAE SL Acuicultura ecológica

		Junta de Andalucía Calidad Certificada
Spain - Andalusia	<i>Acipenser naccarii</i> from aquaculture	<i>Esturión ecológico</i> Piscifactoria Sierra Nevada Sturgeon Ecological production CAAE SA Acuicultura ecológica Junta de Andalucía Calidad Certificada
Spain – Strait of Gibraltar	<i>Pagellus bogarabeo</i> from fishery	<i>Voraz de tarifa - Besugo de la Pinta</i> From Strait of Gibraltar area. Junta de Andalucía Calidad Certificada
Spain	<i>Procambarus clarkii</i> from fishery	<i>Cangrejo Rojo de Río</i> Red Crayfish alive, frozen or cooked. Junta de Andalucía Calidad Certificada
Spain - Gulf of Cadiz	<i>Pagrus auriga, Pagrus pagrus, Dentex gibbosus, Plectorhinchus mediterraneus, Sparus aurata, Argirosomus regius,</i> Wild fish from fishery	<i>Pescado de Conil</i> (Fish from Conil) Cofradía de Pescadores de Conil Junta de Andalucía Calidad Certificada SGS Iberica
Spain - Gulf of Cadiz	<i>Tunnus thynnus</i> from traditional fishing trap	<i>Atún rojo de almadraba</i> Tuna fished in traditional s trap in South Atlantic Spanish coast. Organization of fishery producers (OPP- 51) Junta de Andalucía Calidad Certificada CAAE SA
Spain – Cantabrian Sea	<i>Thunnus alalunga Tunnus thynnus</i>	<i>Bonito del Norte y Cimarron</i> From the fisheries of the Cantabrian Sea (North Spain) Gobierno Vasco Eusko label
Spain – Catalonia	Fish from fishery	<i>Pescado Azul</i> (Blue fish) Marca Q Generatitat de Catalunya
Spain – Cantabrian Sea	Fish from fishery	Pescado del Cantábrico (Fish from Cantabrian sea) In process
Spain – Galicia	Crustaceans and Molluscs from fishery	PescadeRías Galicia In process

Table 1 Farmed and wild seafood certified companies, processes and products in Spain.

Some relevant and illustrative articles of the rules document of the collective brand “Crianza del Mar” are shown as an example of certification procedure. Specifically the Chapter II, article 7, referring the specific conditions of the product:

Art.7.- The fish included in the collective brand “Crianza del Mar” should fulfil the following specific conditions in each one of the processes described below.

7.1. Control of culture medium.- The culture medium will be controlled to guarantee the health of consumers and the welfare of animals.

a) The fish will be cultured in water of controlled quality. The water will be checked periodically during the culture season by periodic measurements of the physical and chemical parameters.

b) The supply and flux of water will be the adequate to guarantee optimal hygienic and health conditions and welfare of fish.

c) Culture density will fit to biological requirements of fish, considering the environmental variables, and their health and welfare. Besides, the fish density will depend on the production system, specifically on the ability of the system to maintain the water quality.

d) The production of organic waste will be reduced to a maximum during the culture in order to maintain good environmental conditions in both the culture and surrounding areas.

7.2. Feeding.- The feeding of fish will be controlled to assure its suitability for the development, to guarantee the health and to preserve the environment.

a) The fish will be fed, from the juvenile stage to the end of the reproductive cycle, with feeds of well-known and demonstrated quality in order to satisfy the nutritional requirements and to minimise the release of phosphorus, nitrogen and organic matter to the medium.

b) The feeders and feeding system will be designed to minimise losses of food, to facilitate the uniform access of the whole fish population, and to allow the control of the amount supplied.

c) The fish included in the collective brand “Crianza del Mar” should be fed on feeds elaborated with ingredients obtained from sustainable resources.

d) The producer should ask to feed dealers the guarantee of absence of genetically modified organisms (GMO) or derivatives in the ingredients.

e) The producer should ask to feed dealers the guarantee of absence of terrestrial animal material in the ingredients.

f) The producer should ask to feed dealers the guarantee of having done the required analyses to certificate that the feeds fulfil the legal limits of potentially toxic and harmful substances.

g) The feed dealers with demonstrated environmental management protocols in the manufacture procedure will be considered in first instance.

h) The fish included in the collective brand “Crianza del Mar” should not be fed on feeds which include hormones and other artificial promoting-growth substances.

i) The feeds will be stored under the appropriate conditions to prevent the deterioration of their properties.

7.3. Sanitary control.- The basis for the sanitary measures will be those adequate for a correct management and prevention.

a) The fishfactory should perform a plan for the prevention of pathologies and for the application of hygienic and sanitary measures.

b) The company should have at least one graduate expert in fish health in the staff and/or subscribe an agreement with a laboratory of pathology.

c) The application of pharmacological treatments will be minimised

d) A daily visual inspection will be carried out to check the status of fish, and the dead animals will be removed, except when prevented by adverse meteorological conditions.

e) The fish that received a preventive or curative treatment, approved by the proper technician, will be perfectly identified up to the selling, and the legal obligations of composition, dosage and quarantine period will be observed.

7.4. Fishing.- The following conditions are established to assure the quality and mitigation of unnecessary damages to fish during the harvesting.

a) The fish destined to the market will spend enough time of starvation before the harvesting and slaughtering to ensure that the digestive tract is empty.

b) The necessary measures will be adopted to minimise the time of fishing and mitigate the stress of fish.

7.5. Slaughtering.- The following rules are established to assure a bloodless slaughter of fish and the appropriate preserving conditions.

a) The fish will be slaughter immediately after fishing by immersion in a mixture of water and ice at a temperature between 0° C and 3° C. With this purpose, tanks containing the mixture will be available in the place of fishing. This process should be monitored automatically or by hand in order to allow the verification of the registered temperatures.

b) Clean sea water or potable water will be used to prepare the ice and the mixture of water and ice.

c) The handling during this process should ensure the absence of risk of contamination in water and fish.

d) All the tanks will be kept in perfect hygienic conditions. Therefore, the tanks will be cleaned and disinfected after the slaughtering.

e) A normalised registry will be recorded for the correct identification of each batch fished and slaughtered.

7.6. Classification, handling and packing of fish.

a) The fish should be packed in expanded polystyrene boxes (or material with similar properties) with 10 Kg maximum capacity. The fish should be carefully arranged in the box and covered with ice (crushed, liquid or flakes). A plastic sheet will separate the fish from the ice, except in the case of liquid ice. The boxes should include the cover and holes for draining the water from thaw out, except in the cases of flight transport and liquid ice.

b) All the facilities, equipment and material used in this process will be kept in perfect hygienic-sanitary conditions, being cleaned and disinfected after their use. The cleaning should be done in accordance with the current regulations or any other norm that replace it.

c) The residues derived from handling and packing, coming from fish, tanks, equipment and material will be treated in accordance with the current regulations.

d) Chemical preservatives and artificial additives should not be used.

7.7. Transport and selling.

a) The fish boxes marked with the collective brand “Crianza del Mar”, properly sealed and labelled, will be transported in isotherm or refrigerated vehicles. The temperature will never be above 3° C.

b) The companies (producer or vendor) of the collective brand “Crianza del Mar” will guarantee that the fish will be provide to the supply chain in less than 24h after the time of the slaughter.

c) In order to promote the collaboration with the retailers, the producer can supply informative sheets with the name and logotype of “Crianza del Mar”. Likewise the company can provide promotional material of the collective brand.

7.8. Organoleptic and physic characteristics of fish protected by the collective brand.

a) The aspect should be clean in general, with a wet and bright skin, and without noticeable external malformations.

b) The fish should have a pleasant sea odor.

c) The gills should be dark and red-bright coloured, with separate filaments, clean and free of mucous. In seabream, pink-hot gills.

d) The eye should look bright and prominent, with transparent cornea and free of mucous.

e) Meat should have a firm and elastic texture.

f) The abdominal wall should be intact and firm, with a white of light blue colour

g) The entrails should be intact, separate, bright and wet

7.9. Environmental conditions. The culture and all the associated activities of the company should be environmentally friendly. With purpose, it should be taken into consideration the corresponding management and prevention measures to prevent the impact and for the integration into the surrounding landscape.

a) The facilities of the company should fulfil the current regulations or the corresponding environmental authorisation in relation to the quality of effluents. For this purpose, the producer should:

1) To identify the legal requisites applicable to this issue.

2) To have the established permissions and licenses.

3) To fulfil the control and inspection requests solicited by the authority in charge.

b) The facilities of the producer will be integrated into the landscape with the appropriate design.

c) The cleaning of the organic matter attached to the nets of the facilities in the sea will be carried out in the land, and with the appropriate management of waste. In

those factories that this task was not technically possible due to the structure of conception of the facilities, the cleaning may be carried out in the sea.

d) The factories should have the correct management to avoid fish escapes.

e) The culture system will be environmentally sustainable and will consider the welfare and the physiological and ethological necessities of fish.

f) The producer will establish the systems and protocols for an efficient use of energy, water, raw matters and other resources.

4 Perspectives for the future

Currently there are open processes for the certification of other products from fishery and harvesting in some regions of Spain which pretends the differentiation from aquacultured seafood. In addition, the aquaculture companies are immersed in certification processes for protecting product of special quality, as in the case of “Crianza del mar” and “Dorada de crianza” based in codes of good practices of production, sustainability and environmental care. The association ASEMA has developed the requisites for the ecological production of seabream and sea bass, and the General Directorate for Ecological Agriculture of the Regional Government of Andalusia recently implemented the procedure up to norm level (BOJA October 2007).

In the Cadiz area there is a discussion toward the possibilities of protecting the fish cultured in earthen ponds following both the traditional extensive or novel semi-intensive and intensive method with a collective label “Pescado de Estero” (Fish from saltponds) traditionally known as symbol of special quality and taste in fish. This denomination would be extensive to fish on-grown in ponds in the South Atlantic littoral of the Iberian Peninsula. On the other hand, the producers are also discussing about the possibility of protect the pure extensive system in differentiation to those receiving compound feeds, something that could be assimilated to the ecological certification.

5 Conclusions

The advances in the certification processes are slow but progressive. The analysis of the Spanish Ministry of Agriculture and Food (Ministerio de Agricultura y Alimentación - MAPA) in relation to implantation of certification in the food industry mention a deceleration after years of continuous increase due to difficulties of some companies to maintain the additional effort and costs of certification. This could be the case of extensive and semi-extensive aquaculture systems. These productions are generally associated to small and familiar traditional exploitations with low productivity in which the balance cost-benefits is scarce and left few room for extra-expenses. Other important issue is the education of consumers for improving the acceptance of products coming from aquaculture. Something that is also extensive in some cases to retailers. In any case, the aquaculture producers associations are promoting and implementing the certification processes of different species and production systems.

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