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Mariojouls C.

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C. Mariojouls
Département des Sciences Animales, Institut National Agronomique Paris-Grignon, CEREOPA
16 rue Claude Bernard, 75231 Paris Cedex 05, France

SUMMARY – Quality is a multiform concept, nowadays widely used in the trade of any good, and notably in agri-food business. We shall introduce the different notions of quality, applied to aquatic food products, and the procedures and services set up by public administration and economic operators, in order to regulate and/or validate the various forms of quality. A comparison between the case of fisheries products, and the case of farmed products, will be presented. The approach of quality for aquaculture products is today in a dynamic phase, integrating the notions already known in agri-food business, and in the group of aquatic food products. We shall introduce the main approaches used to create various segments of quality levels in a foodstuffs market, through national or European regulatory systems (PDO, PGI, certification, labelling) and through branding, and their applicability to aquatic farmed products. Specific questions arise for this family of products being at the cross-roads between two groups: aquatic food products like fisheries products, farmed products like agriculture products. We shall try to make an outline of these questions, that will be addressed further in the papers which follow.

Key words: Quality, concept, aquaculture, products, procedures.

RESUME – *"Introduction à la qualité : Concepts de qualité ; perception de la qualité par les producteurs, les clients et les consommateurs ; distinctifs de qualité (origine géographique, eco-étiquetage, etc.) ; traduction des concepts de qualité en produits, procédures et services". La qualité est un concept multiforme, aujourd'hui largement utilisé dans le commerce de tous les biens de consommation, et notamment dans l'agroalimentaire. Nous introduisons, dans leur application aux produits aquatiques, les différentes notions de qualité, et l'ensemble des dispositifs mis en place par les pouvoirs publics et les opérateurs économiques, pour réglementer, et/ou valoriser commercialement, la qualité dans ses différentes composantes. Nous mettons en parallèle et comparons la situation des produits issus de la pêche, et les produits d'aquaculture. L'approche de la qualité des produits de l'aquaculture est actuellement dans une phase dynamique, intégrant des notions déjà connues dans l'agroalimentaire, ou dans l'univers des produits de la mer. Nous introduirons les principales démarches utilisées pour segmenter les marchés agroalimentaires du point de vue de la qualité, au travers de dispositifs réglementaires nationaux ou européens (IGP, AOP, AS, CCP, labels) et par la création de marques, et leur possibilités d'application aux produits aquacoles. Nous voyons émerger des questions spécifiques pour cette famille de produits à la double appartenance : produits aquatiques comme les produits de la pêche, produits d'élevage comme les produits agricoles. L'exposé tend à mettre en évidence ces questions, auxquelles les exposés suivants apporteront des éléments de réponse.*

Mots-clés : *Qualité, concept, aquaculture, produits, procédures.*

Introduction to a multi-aspect notion

Quality is defined by international standards ISO 8402 as "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs".

That definition shows that quality is *per se* a relative notion, depending on what actor is considered in the product chain, and what needs, and demand, he will have: for instance, a processor will pay attention to the ability of the raw material to be processed (texture, processing yield, etc.), while the final consumer will give a priority, *inter alia*, to the organoleptic characteristics, as taste and aspect. It must be underlined that quality in the common vocabulary, often refers to the idea of good quality, sometimes high-level quality. But obviously, the concept of quality today covers a much wider range of aspects, as will be shown here.

Quality has become in the last decades a key-notion for trade of any good, and notably in agrifood business. That was well summarised in a speech at the beginning of the nineties, by J.R. Fourtou, head manager of Rhone-Poulenc, saying: "La qualité….ce presque rien devenu tout!" (quality … that almost nothing that became everything!).

The different types of quality

For aquaculture products, two steps must be considered if we speak of quality: the first one is the intermediate product (living fish or eggs) sold for further farming. The quality will cover all characteristics influencing the ability to survive and grow with a good efficiency. The main characteristics that will be considered are the homogeneity of the population, or size grading, the fish health, for which certification and quarantine are being developed (Goswami and Bhattacharjya, 1999), the initial condition of the fish, and, as far as it is available, the choice of the strain (with selected characters).

The second step is the final product, sold for human consumption, and this is the main focus of our communication. The final aquaculture product belongs to the same group as the fisheries products, that we shall call "aquatic food products". For aquatic food products, quality, in a common sense, first refers to freshness, which can be regarded as the basis and common denominator of it, whatever is the user.

But quality of food can actually be declined in several notions (Deperrois, 1987): hygienic quality, nutritional or dietetic quality, organoleptic quality, psycho-social quality, convenience quality, technological quality, and we shall see how it applies to the aquatic food products sector, and especially to aquatic farmed products. As those sectors show recent developments and changes ("industrialisation" of the aquatic food chain with the growing importance of supermarkets, increasing role of farmed products on markets), the consideration of quality is also going through important changes, and arises questions.

The *hygienic quality* first refers to fish freshness. The most commonly used method for quality assessment of raw fish in the inspection service and fishing industry is the sensory evaluation following the EU scheme, defined by regulation 103/76, and allowing a grading into three categories: extra, A, B.

The need to find fast and objective analytical methods to evaluate fish freshness, and to validate criteria and methods, has motivated a recent European Concerted Action (AIR3CT94 2283). It gathered the leading fish laboratories in Europe, cooperating in sub-groups about sensory analysis, microbiology, volatile compounds, proteins, lipids, ATP and physical measurements, who gave their conclusions and recommendations in a final meeting in November 1997. For sensory analysis, the trend is to standardise sensory analysis by improving methodologies and training of panels. The Quality Index Method has been used by many research laboratories and is now being implemented in the fish industry. Its main advantage, compared to EU scheme, is that it is specific to each species, and fluctuation between assessors is minimised. We shall not develop here the other new methods for assessing fish freshness, as it will be further done (see Rodríguez *et al.*, this volume).

Hygienic quality of fisheries and aquaculture products is also largely due to the conditions of packaging, processing, and marketing. The main European regulation concerning fisheries and aquaculture products is the Directive 91/493/EEC of 22 July 1991 (OJ 24/09/91), laying down the health conditions for the production and the placing on the market of fishery products. The conditions for auto-controls, planned in Article 6, have been further defined by Decision 94/356/EEC of 20/05/94 (OJ 23/06/94).

The equivalent regulation for living bivalves molluscs (cultured or wild), is the Directive 91/492/EEC of 15 July 1991 (OJ 24/09/91).

The HACCP (hazard analysis critical control points) is not compulsory but widely used for management of health quality in aquatic food products processing plants. Traceability is also considered as an important skill for the sector, still difficult to implement for fisheries products, while it can be set up much easily for farmed products.

The high *nutritional and dietetic quality* of the fish must be recalled, thanks to low energy content, low SFA (saturated fatty acids) content, high PUFA (poly-unsaturated fatty acids) content, notably high content in omega-3 fatty acids, with positive effects on the prevention of heart diseases. In farming conditions, the lipid supply in food has an important influence on the final composition of flesh, and will need a careful management.

The *organoleptic quality* is obviously a variable notion, according to cultural differences. One important question for marketing farmed fish is whether or not, there is a noticeable difference between wild and farmed fish, concerning taste and aspect.

The *"psycho-social" quality* of fish is characterised by a highly positive image of fish, which nevertheless could be altered by the recent concerns about overexploitation of the seas, and pollution of oceans. For farmed fish, the recent concerns about intensive husbandry may bring a negative image of farmed fish compared to wild fish.

While fish and shellfish have been for long considered as difficult to cook and eat (bones, smell, difficulty to prepare bivalves), today the *convenience quality* is largely under development in the aquatic food sector, through new processing and packaging (including prepacked fish in modified atmosphere or vacuum packed), fitting with the distribution in supermarkets. Thanks to the regularity in supply and size, farmed products have a better ability to enter these industrialised processing chains.

The criteria for the *technological quality* of fish are mainly the texture and filleting rate. Again, the farmed fish may offer an advantage on those criteria through the regularity of supply (size, condition index), and, to a certain extent, on composition (high lipid content needed for smoking salmon).

The *recent demands of the consumers* might also be taken into account, and translated into specific quality characteristics:

(i) A farming related to roots, tradition and soil. Does it mean that a farmed fish should be as close as possible to the wild, for those consumers searching for traditional fish? It is obviously a difficult question to be asked, for a recent industry being working hard on technological and economical improvements.

(ii) A farming bringing a guarantee for the consumer health. The recent events in animal productions (mad cow disease, dioxins, etc.) have arisen a lot of concerns among consumers about the reliability of animal products. The intensive husbandry is badly considered, and the intensive aquaculture can also be rejected. Does this mean that there is a demand for aquaculture with no animal meals, with no chemicals, with no antibiotics, with no additives, with no GMO, etc.?

(iii) A farming environment friendly. The consumers concerns about environment are increasing for any sector, including fish farming. That can be translated into a farming with no spoiling of animal proteins, with no impact on natural environment, with no suffering of animals, etc.

All these new concerns of the consumers may be considered as difficult constraints for the aquaculture industry. They, too, may be difficult to satisfy as they are contradictory: for instance, to farm a fish "as naturally as possible" means to feed it mainly with fish meals, which production and use can be considered as not "environment friendly".

They can also be regarded as opportunities to create special quality products, answering the demands of niche markets. We shall see in the following paragraph how the certification of production modes, and products, can be a way to valorise those specific qualities.

The segmentation of markets through quality

The segmentation of markets according to quality level is widely used in food markets, and have appeared quite recently in the seafood market, which used to be classically a generic market. A strong competition, together with the growing concerns of the consumers, have motivated the creation of quality approaches, with a double goal of creating a segmentation of the market, and re-assuring the

consumer. The quality approach can focus the production system, or only the product itself; it can be individual or collective; it can be a self conducted approach, or controlled through a certification.

The last decades have seen quite a lot of different systems being implemented. While the creation of quality signals is supposed to make clear the available levels of quality, it can, on the contrary, be confusing for the consumer, if faced with too many signs and systems.

Quality schemes, certification, collective or individual branding, quality assurance

The *Generic Quality Assurance Schemes*, usually called *Quality Schemes*, are widely used in primary industries, as agriculture, and have been developed in seafood sector. The base of a Scheme is a quality assurance system made visible by a "generic brand" (NORBERG, 1996). The quality assurance system is based on specifications set up by the concerned group of producers. The implementation of specifications can be controlled by internal agents, or by a third part when the quality assurance system is certified, by a certification body.

Quality schemes have been established in salmon farming in the nineties, on the basis of specifications required for entering the scheme: Irish Quality Scheme, Quality Approved Scottish Salmon (with Tartan label). The Norwegian Quality Cut is slightly different from that system: it defines a national norm for measurement of quality, the conditions for quality management, and a classification of products according to quality.

In France, Bretagne Qualité Mer is a certified quality scheme for seafood. Since 1999, it includes cultured bivalves (oysters and mussels) complying with specific standards.

The *collective branding* of aquaculture products has been developing also in the last decades: collective brands developed for farmed oysters and mussels, according to region and techniques (in France, in Spain, etc.), collective brands for farmed trouts.

As said before, a collective brand can be the visible signal of a quality scheme, with specifications and controls, meaning a restricted access. On another hand, it can be simply a way to communicate about characteristics already existing, like region, and technics, etc, with no restriction.

Out of the collective branding, or associated with it, exist in aquaculture products a lot of *individual brands*, based classically on the notoriety of the production or processing company.

Another step in the development of quality approach for an individual company is *the quality assurance*, which is a long and costly approach. Quality Assurance of a company is defined by European (EMAS) or international (ISO) standards. The series of ISO 9000:1994 (9001, 9002, 9003, 9004) relates to production (conception, production, controls, management). It is under revision, and will be replaced in year 2000 by new standards: 9001:2000 and 9004:2000. The ISO 9002:1994 and ISO 9003:1994 will be withdrawn on the publication of ISO 9001:2000, which will address the provisions of ISO 9002:1994 and ISO 9003:1994 .

The standard ISO 14001 defines environmental management. It is beginning to be applied in aquaculture sector, largely concerned by environment impact. The ISO 8402 gives the definition of traceability, becoming a key-notion for seafood, and particularly aquaculture products.

The official identification signals and protection of origin, and their application to aquatic products

The EU regulation has defined in 1992 some official signals for traditional foodstuffs: the Protected Designation of Origin (No. 2081/92), and the Protected Geographical Indication (No. 2081/92). The diary of quality (Qualitor), in a list dated October 1998, mentions aquatic food products: PDO for Messolongui poutargue (Greece), and PGI for Schwarzwalforelle (Germany), Whitestable oysters (UK), and Coquille St Jacques des Côtes d'Armor entières vivantes (France).

The Certificate of specific character (No. 2082/92) does not concern any aquatic food product in 1998.

The European regulation has not replaced the regulation existing in different State members. Particularly in the Mediterranean countries, the need to protect traditional products and geographic names has led, for a long time, to the creation of standards and official designations well known in the domestic markets.

In the case of France, there is a set of official designations identified as "quality signs", defined by national texts, attributed individually by Public Powers following the advice of a commission including private sector, the further control of standards implementation being done by agreed certification bodies. These designations include the protection of origin (Appellation d'Origine Contrôlée), the Label Rouge (trademark belonging to the French Ministry of Agriculture, reserved to superior quality), the Agriculture Biologique (AB logo, for organic agriculture), the certification of products after a specifications list (Certification de Conformité Produit), and the "mountain" appellation.

A review of September 1999 (OFIMER, com. pers.) shows that 8 aquatic farmed products have official identification signals, plus 5 files being under examination (Table 1). Such an identification well recognised on the French market is also interesting for imported products, like Scottish salmon which obtained in 1990 the Label Rouge. The French seabass and seabream farming sector has recently entered several procedures for obtaining identification signals: the Label Rouge for Mediterranean seabass has been agreed in April 1999 after the application presented by the Mediterranean Fish Farmers Syndicate (see Bermejo, this volume), and two files concerning a product certification for farmed seabass and seabream are under examination. Another important file has been under examination for more than a year; for the definition of organic fish farming and processing, both on a general viewpoint, and with specific standards (salmon and trout in marine waters, trout in freshwater, seabass and seabream, carps).

Table 1. French identification signs for aquaculture products in September 1999 (Source: OFIMER, 1999)

AOC	Bouchot mussels from Mont Saint Michel Bay *(under examination)*
Label Rouge	Marennes Oléron green oysters
	Scottish salmon
	Smoked salmon, hand sliced
	"Pousse en claires" special oysters
	Seabass (from Mediterranean coast)
CCP	Labeyrie Atlantic smoked salmon
	Fresh salmon from Norway
	Farmed seabass *(under examination)*
	Farmed seabream *(under examination)*
	Oysters from Marennes-Oléron (fine, special) *(under examination)*
AB (Agriculture Biologique)	Organic fish farming *(under examination)*

Some questions about the definition and application of quality for aquaculture products

The aquaculture products have gained an increasing market share thanks to specific advantages that fit the quality requirements of economic actors and consumers:

(i) The regularity of size and delivery, through the management of farming, control of reproduction, grading, etc.

(ii) The best freshness and care of the product, through best conditions of slaughtering and transport, best chain of cold, shortest delays between slaughter and delivery to the market.

(iii) The ability to control inputs (feeds, etc.), and master the final flesh quality, to a certain extent.

(iv) A recognition as an alternative to fisheries, and a way to avoid natural fish stocks overexploitation.

But a lot of questions remain if one speaks of prospective development of aquaculture products markets based on quality.

Technically, are the farming systems stable enough to manage and deliver a constant and perfect quality?

In the recently developed sectors, despite the dramatic technical improvements, the quality of farmed products is still variable, because of a great heterogeneity in genetical characteristics, and farming conditions. There is an important challenge for the sector in the improvements that can be gained through selection (allowing standardisation of animals, and creation of a range of qualities), better feeding and farming management.

What image of quality does the aquaculture sector choose for its products?

That question covers several points that must be today considered:

(i) What is the quality reference of consumers for aquaculture products? Are the consumers ready to accept farmed products?
(ii) Do we play wild versus farmed?
(iii) Do aquaculture products have a specific quality and place in the markets?

As underlined by Valcheschini (1998) for foodstuffs, "advertising of foodstuffs frequently recalls the activity of production, whereas it almost never does for other products", and the consumers "act as individuals who have knowledge and competence (even limited) about the product", and "thus do not seek information on labels only, but also have other resources with which to evaluate and choose quality". That assumption refers to the main foodstuffs, issued from agriculture. One can wonder about the existence of such references, and a culture, of consumers about aquatic farmed products.

That question has obviously different answers depending on species, and regions, and proximity of fish farming units. In Europe, unless for the products which have been farmed for a long time, like mussels, oysters, carps, to a certain extent trouts, the reference is still the wild products, for most of aquaculture products issued from recently born industries. But the actual trend to replace on the market wild products, whose resources are declining, by farmed products, has been made without informing the consumer. Therefore, it is obvious that he keeps the reference of the wild, and it can be assumed that he may feel betrayed when he learns that these products are farmed products.

The present times have brought a lot of difficulties for the image of animal production, especially under intensive conditions (environment impact, animal welfare, risks for the consumers). It is then necessary to anticipate the reactions of the consumers when they discover that a number of species offered on the market are now farmed, by a good communication about fish farming. This is especially important because the European legislation will make compulsory, by January 2000, to precise the origin, farmed or wild.

What organisation of the aquaculture sector is needed to promote quality?

The question of organisation is a key in the effectiveness and valorisation of quality. It is a difficult question, that can be considered under several aspects: should it be through individual or collective action? in the aquaculture sector today enough organised to create and manage identified quality products? are there adequate structures and politics?

Quality concerns all the steps of the food chain. To deliver a product of good quality on the market, it is necessary not only that producers have the appropriate farming modes, but also that this quality is kept and valued all along the chain. Moreover, the efforts being made in the first steps of the chain can be valorised only if this quality is recognised by the actors at the following steps. We come here also to the notion of commercial valorisation of quality. A close and important question, when speaking about payment of quality, is obviously whether the consumer will be willing to pay for a special quality, and this relates to market surveys (see Young, this volume). Another question is how the extra margin allowed

by a premium price will be shared between actors along the chain, with the necessity to consent to the producer a higher price, incentive produce quality.

An inter-professional agreement is the best way to create a remuneration of a certain level of quality for each actor implicated in the process of creating and keeping that quality. It is already done in very organised land animals sectors, like milk or pork, where products can be standardised, and quality objectively measured. This is a very efficient way for increasing quality in mass products. The creation of superior quality products, with premium price, is another step, that will concern only a small group of producers and companies.

In the aquaculture sector, there are a few examples of objective measurement of quality based on defined standards: quality index for Dutch mussels has been used for years in Yerseke wholesale market, Norwegian quality cut can be quoted too. But it is by far not a general rule, and the lack of common definition of an objective measurement of quality is perceptible in a lot of sectors.

The organisation between actors in the product chain is especially important in the case of setting up a particular quality, identified through a quality scheme, or official signal of quality or protection of origin, or branding. Several examples of such organisation can already be found in the aquatic food products sector: the quality scheme Bretagne Qualité Mer relies on a contract between producers, fish processors and distributors, in order to grade the landed or farmed products following specifications, and to attribute a premium price to this segment of the offer, clearly differentiated on the market.

The present organisation of aquaculture sectors offers various situations depending on countries or regions, species and their history regarding to farming. Shellfish culture, existing for a long time, shows very different situations: the cofradias in Spain are an example of a long existing and efficient common organisation, while in France, an effective concern about a common organisation in oyster and mussel culture has been set up only in the last years, under the pressure of economical difficulties. That made at last possible the emergence of different actions to create quality signs.

The finfish farming sector offers also some examples of a late organisation in a traditional sector: the freshwater trout farmers in France have set up in the last years an interprofessional organisation, clearly to fight against a depressive economical situation through the creation of a "quality chart". The Mediterranean marine fish sector, very young, has recently gathered into a collective application for creating the Label Rouge for seabass.

Public policies can play an important role in the improvement of quality of products, in collaboration with private sector, by setting up the necessary structures, standards and controls, and supporting the professional organisation needed for collective approaches of quality (see Paquotte, this volume).

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