codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

JOINT OFFICE: Viale delle Terme di Caracalla 00100 ROME Tel: 39 06 57051 www.codexalimentarius.net Email: codex@fao.org Facsimile: 39 06 5705 4593

JOINT FAO/WHO FOOD STANDARDS PROGRAMME
CODEX COMMITTEE ON FISH AND FISHERY PRODUCTS

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DISCUSSION PAPER ON THE PROCEDURE FOR THE INCLUSION OF ADDITIONAL SPECIES IN STANDARDS FOR FISH AND FISHERY PRODUCTS

TECHNICAL PAPER PREPARED BY FAO

Introduction

At the twenty fifth session of the Codex Committee on Fish and Fishery Products, the representative of FAO indicated that FAO was in the process of compiling a list of common names and scientific names used in all member countries, and also offered to provide information on current work on the authentication of fish species with techniques such as electrophoresis and DNA sequencing

The Committee agreed that the establishment of such a list would be very useful for its further work on the identification of species and in general to facilitate the standardization of fish and fishery products, and encouraged FAO to proceed with its work. The Committee also recognized the importance of such work to facilitate trade and especially exports from developing countries.

As a contribution to the twenty sixth session, FAO presents a list of common names used in member countries and an advanced copy of a Fisheries Technical Paper on application of

modern techniques to ensure seafood safety and authenticity, both available on a CD-ROM.

1. Technical paper (advanced copy)

Application of modern analytical techniques to ensure seafood safety and authenticity

By Iciar Martinez, SINTEF Fisheries and Aquaculture Ltd 7465-Trondheim, Norway

David James and Henri Loréal , FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy

This paper is intended to give a general view of the application of some analytical techniques to ensure seafood safety and authenticity. The following is an abstract of the technical paper.

FOOD SAFETY

Seafoods have been involved in 10-25 percent outbreaks of food borne diseases in developed countries due to their being contaminated with toxins, viruses, bacteria or parasites.

Toxins, bacteria and viruses

Classical methods to detect **toxins** are chemical analyses or the "mouse-test", which is expensive, time consuming and aggressive on the animal welfare. There is therefore great interest in developing fast, user friendly methods such as immunological ones.

Today it is suspected that the real impact of **viruses** on food-borne infections has been greatly underestimated because the classical techniques for detection of viruses are complicated and expensive and many viruses cannot be cultured. Development of molecular techniques may simplify their detection and then their real impact on food safety can be mapped.

The document presents also a detailed review of methods for detection and typing of bacteria and develops the example of *Listeria monocytogenes*.

Parasites

Parasites such as trematodes or flukes and nematodes can cause serious fish-borne diseases. Their study has been hampered because of their complicated life cycles, the fact that most of them do not cause immediate severe disease or rapid death and the difficulty of identifying the species and the life stage. They are also endemic in countries with poor sanitary conditions - usually poor countries where detection, treatment and eradication of these types of diseases come second to other parasitic diseases, particularly malaria. This has discouraged investment in the development of techniques for the specific detection and identification of these trematodes. Moreover, the tools for identification of parasites in clinical, veterinary and especially food samples are troublesome, fastidious and require expert personnel.

The increase in international trade, travel, and new fashionable food habits, such as sushi and sashimi consumption in richer countries, will undoubtedly contribute to the development of more reliable screening techniques and procedures for identifying and eliminating these organisms from the food chain.

- *Bacterial resistance*

The use of some cleaning and disinfecting agents, common in health care and in the food industry, has selected **bacterial strains resistant to disinfectants and to some antibiotics**. Application of molecular techniques, (in particular the polymerase chain reaction, PCR) and the increased accessibility of sequencing, will aid in the detection and typing of undesirable bacteria and in characterizing some important properties, such as whether they are carriers of genes for resistance to antibiotics and/or disinfectants. In addition they can help to optimize processes, identify sources of contamination in natural reservoirs, processing environments and human carriers, then proceed to their elimination or treatment, as well as selecting methods and chemicals for cleaning and disinfecting; thus avoiding the development of resistant strains and cross-resistance to antibiotics. With advances in the fields of genomics and proteomics, it is reasonable to assume that there will be an increase in the number of kits and equipment to conduct identity and safety tests on foodstuffs.

SPECIES AUTHENTICATION

The second objective of the technical paper is to describe methods to ensure the authenticity of seafood. This has become a problem due, mainly, to *i)* the great number of species used as human food; *ii)* the increased consumption of fish products in which the morphological characteristics necessary for species identification have been removed; *iii)* increased international trade and, *iv*) the introduction of foreign species and increase of aquaculture. Consumers are entitled to reliable information about what they purchase; fishermen and producers have the right to have their products known for what they are, and their quality recognised by the next link in the chain up to the final consumer, and finally, endangered stocks must be protected to allow them to recuperate to reach exploitable levels again.

Legislation

To fulfil those needs most countries have passed legislation to ensure correct traceability and product labelling. One section of this report is dedicated to the current legislation mainly in the USA and Europe, since those two philosophies illustrate how not all countries agree on the quantity and nature of information their citizens are entitled to have to make their choices.

Analytical methods

The following sections of the report review the most suitable methods to ensure correct species identification.

It is likely that DNA-based techniques will be the favourite approach for species identification, both in single products and in mixtures, because they are easy to use. Even if the DNA is severely degraded, identification and also quantification is very likely to be feasible by using quantitative PCR. Moreover, development of suitable DNA-chips for this purpose is also under way.

DNA based techniques are, on the other hand, poorly equipped to determine the geographical origin of biological material. For this latter approach, spectroscopic techniques, such as trace element analysis and distribution of natural isotopes will most likely be the preferred choice. To differentiate wild from cultivated fish and in the absence of a comprehensive database to cover all possibilities, either trace element analyses or nuclear magnetic resonance techniques have proven to be adequate.

Proteomics and NMR methods may have a major application within food authentication to characterise the “quality” of the material, the word quality intended to refer to species and tissue, health status of the organism, contamination levels in the place where it was bred and post-mortem treatment. The last would include stress, freshness, and some processing conditions. Conditions that affect the composition and nutritive value of the foodstuffs will be of particular relevance and proteomics and NMR based studies can make a significant contribution in this area as well.

Summary and recommendations

Many countries' fisheries are severely depleted and alternative raw materials will have to be provided either from aquaculture or by using different species. Interestingly, the main aquaculture producers and remaining exploitable fishing grounds for alternative species are in the poorer regions in the world - Asia, Africa and South America.

It is very important that when these countries introduce their products in new markets, the "new" consumers are properly informed about the identity and properties of their purchases, which means ensuring that the products are safe, with characteristic organoleptic properties and that they are correctly labelled and identified. This will help the consumers to become familiar with a new product that they can come to appreciate and be willing to pay for. If, on the other hand, a new species is introduced as a substitute for another species or, even worse, it is deceitfully labelled as something else, consumers will automatically assume that the new species is of lower quality than the "original". Since it is more difficult to restore a ruined reputation than to acquire one, it is critical to avoid situations that can lead to negative perceptions from the very beginning.

Correct identification of the species and their origin requires the collaboration of the international community. Dr Rehbein proposed during the 1st Trans-Atlantic Fisheries Technology Conference held in Reykjavik, Iceland, in June 2003, the creation of an international network of institutions to provide authentic reference samples, since the main problem to authenticate a sample is often the lack of authentic reference material at the location where the analysis is required. It would be most useful to construct a database or a web page, containing a list of each species being used as food, with the common names for each species, the location where each common name is indeed common, the scientific name, description of the analyses performed on the species and link to the results (for example, material and methods used for IEF, 2-DE analyses, PCR amplifications, NMR and trace element analyses, etc).

This could link to a page containing a figure of how the results look (photograph of the gel or the scan) and, if possible, to a table containing the values corresponding to the figure. For each species, it would also be most helpful to include a link to an institution from which any other institution in the world could obtain samples of authentic material (the costs of the preparing the authentic material and sending it should be covered by the requesting institution).

The support of an internationally recognized institution could be of great value to establish the infrastructure and the contacts among the relevant interested institutions in each country. FAO will examine the possibilities of taking on this responsibility in relation to the Aquatic Food Product Initiative developed under the direction of Fishery Industries Division.

2. List of common names and scientific names

As agreed in the twenty fifth session of the Codex Committee on Fish and Fishery Products, FAO has undertaken the compilation of a list of common names and scientific names used in all member countries.
The document is presented as an EXCEL file. The first sheet provides the list of member countries and organizations with their code and the regions they are related to.
1462 species and genera have been identified as fishery products of commercial interest. The corresponding common names have been indicated, where available, in the different languages used in the different countries classified according to the regions: Africa, Asia, Europe, Latin America and Caribbean, Near East, North America, and Southwest Pacific. FAO names are also indicated (not completed). By way of illustration, an extract from the list of common names in Latin America and Caribbean is attached below.

This document should be considered as a starting list which needs to be improved and completed. FAO appeals to member countries to collaborate on this long term work.

Extract from the list of common names of fishery products – Latin America and Caribbean

Scientific name	Main grouping	Creole French (Martinique)	Dutch (Netherland Antilles)	English (Trinidad and Tobago)	Portuguese (Brasil)	Spanish (Chile)	Spanish (Mexico)
Coelorynchus spp.	Fish					Peje-rata, Granadero	
Cololabis saira	Fish						Sauri
Concholepas concholepas	Molluscs					Loco	
Conger spp.	Fish						
Conodon nobilis	Fish			Cro-cro grunt, Yellow cro-cro			
Coryphaena hippurus	Fish	Dorad, Ti klik	Dolfijn, Dolfijnvis, Goudmakreel	Green dolphin	Dalfinho, Dourado, Dourado-de-alto-mar, Dourado-do-mar, Grassapé, Guaraçapema, Macaco	Dorado, Dorado de alta mar	Dorado, Dorado delfín, Doradilla, Llampuga,
Coryphaenoides spp.	Fish					Granadero	
Crangon spp.	Crustaceans						
Crassostra corteziensis	Molluscs						Ostión de placer
Crassostrea commercialis	Molluscs						
Crassostrea gigas	Molluscs				Ostra	Ostra japonesa	Ostión japonés
Crassostrea rhizophorae	Molluscs						Ostión de mangle