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REVIEW AND ANALYSIS OF CURRENT TRACEABILITY PRACTICES

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1 Introduction

1.1 Motivation

The Twenty-ninth Session of the Committee for Fisheries agreed that FAO should initiate work to develop international best practice guidelines for traceability of fish and fishery products. The best practice guidelines would facilitate the coherence of different traceability systems.

The Sub-Committee, with the assistance of a group of Friends of the Chair, agreed to the following terms of reference for future work to be carried out in relation to the consideration and development of best practice guidelines for traceability:

- Invite the FAO Secretariat to compile and analyse best practices and existing standards for a range of traceability purposes, including a gap analysis.
- Identify options for future work including possible instruments.

The paper will explain the context of traceability more fully and will identify current systems and standards to avoid duplication for the future work. The following principles for traceability schemes will provide the framework for the analysis:

- Not create unnecessary barriers to trade;
- Equivalence;
- Risk based;
- Reliable, simple, clear and transparent.

In order to expand the capacity to comply with the rules governing trade in fishery commodities, the trade partners are required, among other things, to establish traceability systems. These rules are set out in various regulations and public or private standards. The objective of this report is to review the current requirements of food/fish product traceability in the main markets and identify some gaps before developing traceability best practice guidelines.

1.2 Various applications of traceability

Traceability is a new term that appeared a few years ago after the various food safety crises in the western world. Food safety, product tracing, and product recalls have become predominant for both government regulations and industry concerns around the world. Companies have been facing numerous economic challenges while trying to recall some suspect products. Moreover, technology offers various ways of achieving traceability and many solutions exist for national, regional and global supply chain participants. As a result, to facilitate trade today, it is necessary to implement international standards and ensure interoperability of traceability systems and comply with an increasing number of certification schemes.

Consumers all over the world are more and more aware of the need for traceability as a way to prove the high quality of food and feed products, non-GMO (genetically modified organisms) foods and other specialty products such as organic food. These factors have led to a growing interest in developing systems for food supply chain traceability.

It is often found that there are “traceability drivers” identified in the food industry showing that the concept can be applied in various ways. The figure 1 shows some of the drivers for k.

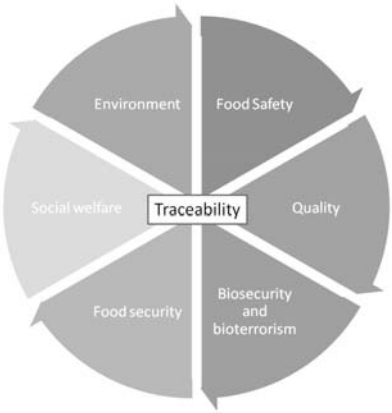


Fig 1: Some drivers for food traceability

Establishing traceability for a product may have several purposes. For food, many of the bigger markets, for example the European Union, United States of America and Japan, require traceability by law and many big customers all over the world also have different requirements for traceability:

- Demonstration of the production of safe, high quality food products is a key issue. Some of the main foci are the absence of natural contaminants, as well as the responsible use of drugs and chemicals, including the monitoring of residues in farmed products. There is a need to ensure the use of uncontaminated land and water sources for farming operations as a crucial food safety requirement. Finally, proper microbial sanitation during the handling and transport are also included under this topic. Traceability is required by law mainly for the purpose of protecting consumers against food safety hazards. The food producers must be able to demonstrate to their buyers as well as to the food safety authorities that all materials and processes have been applied in compliance with prevailing regulations. If a product with a hazard is found on the market, it must be possible to recall the product to avoid any harm to consumers. All inputs and operators must traced back to find out where the problem may have occurred, so measures can be taken to avoid it happening again.
- Demonstration of the ability to follow food products throughout the supply chain. This traceability information may be shared with interested parties in the form of certification to serve as food security and/or environment protection.
  When it comes to fishery products, the origin of a fish product (farmed or from catch) and the demonstration that the raw material has been legally sourced is established through data collection and record keeping of all inputs and outputs to a given operation.
  Traceability is required by law to demonstrate that the fish product is legally caught by an authorized fishing vessel or produced in an authorized farm. As a consequence, a fishing vessel must be able to demonstrate that the fishing has been carried out by legal methods, equipment (gears) in areas and seasons allowed by the local fisheries management schemes. Many customers and governments around the world are concerned about the sustainable management of fisheries resources.
- Protecting the products from fraud and proving the labelling claims. The traceability system is required by law to demonstrate that the country of origin is correctly declared.
- Reduction of the biosecurity and bioterrorism threats: risk of transmission of infectious diseases, quarantined pests, invasive alien species, living modified organisms or dissemination of biological agents.
- Demonstration of the production of food products according to particular requirements, most often within the frame of certification schemes (e.g. organic, fair trade). These schemes are indispensable to access some markets and thus can represent a competitive advantage.

In order to compile this report, the existing references on traceability identified in the regulatory, non-regulatory standards drawn up by international organizations having incidence in veterinary and food safety sectors, as well as the provisions on the Illegal, unreported and unregulated (IUU) fishing have been consulted and taken into account (see 1.3).

This approach was necessary in order to be able to establish some common principles and components in traceability (see 1.4). These principles are then used to compare the regulatory and non-regulatory standards (see 3).

1.3 Relevant regulations and standards

This report encompasses various international guidelines and mandatory requirements as shown in figure 2:

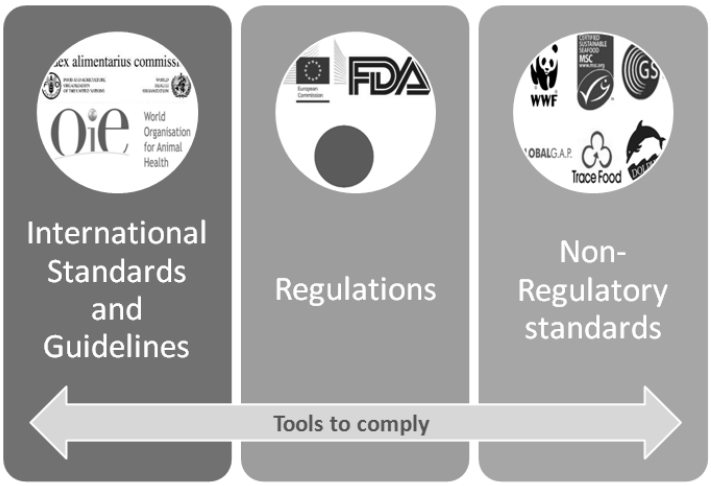


Fig 2: International, regulatory and non-regulatory standards

- International standards and guidelines are used as reference and are developed to define and/or to provide best practices in tracing food products through supply chains. These standards may be used a basis for implementing traceability.

  The Regional Fisheries Management Organizations (RFMOs) and other natural resource management inter-governmental organizations are included in this category. These standards are non-regulatory but may serve as guidelines for their member states about issues related to traceability through their attempts to deal with illegal, unreported and unregulated (IUU) fishing.

- Binding regulations that are set by particular countries are broadly applicable to food products and more specifically to fish products and are mandatory for export to the European Union EU), the United States of America (USA) and Japan. They include laws, regulations, and associated enforcement programs for traceability of fish products. Minimum traceability requirements are set for all trading of food products, as well as fish-specific requirements focused on preventing trade in illegally-caught fish.

- Non-regulatory standards developed by Non-governmental organizations (NGOs), the industry and others, such as the International Organization for Standardization (ISO) standards, include guidelines for auditing and other measures to ensure successful application of the standards. Major leading internationally established fishery/aquaculture certification programs have developed their own certification schemes and address the traceability issue. Each set of standards has its own focus (e.g. some emphasize assurance of minimal environmental impacts, whereas others certify entire operations as organic) and each set of standards has its own individual structure and presentation.

Some of the standards are also tools to comply with the requirements on traceability. In this case, the standards claim to provide methods on traceability implementation.

1.4 Common principles and components of traceability

Traceability definitions
The word 'traceability' (etymologically, trace-ability or the 'ability to trace') is widely employed and has slightly different meanings depending on who defines it. In the fields of animal health and food safety, there are several legal definitions and different terms for traceability, such as:

- the ability to trace the history, application or location of an entity by means of recorded identification
(ISO standard 9000:2000)

- the ability to follow the movement of a food through specified stage(s) of production, processing and distribution
(Codex Alimentarius Commission, CAC, 27th Session Report 2004)
- the ability to trace and follow a food, feed, food-producing animal or substance intended to be or expected to be incorporated into a food or feed through all stages of production, processing or distribution
(EU Law. Regulation No 2002/178 - Article 3. 15)
- the creation and maintenance of records needed to determine the immediate previous sources and the immediate subsequent recipients of food, (i.e., one up, one down)
(U.S. Food and Drug Administration, 2002. *Bioterrorism Act 2002* - Section 306)

Despite the differences in the terms used (track and trace, trace and follow, or more simply the need for creation and maintenance of records), these documents are all about the same system having a common core, whose principles are summarized in the following section.

What is Traceability?
Traceability of a product means that it is possible to follow back step by step all the input, handling and processes that were necessary for the formulation of the product, starting with raw materials, ingredients, packaging materials etc. and finishing with distribution of the product to the final consumer. In other words, traceability means that the history of making and distributing the food can be uncovered if necessary for a specified purpose.

There are some well-established methods and principles that underlie efficient implementation of traceability in the food industry; many of them described in published papers and in various guidelines. The most widely found principles and components of traceability are:

- ***Unique identification***: there are two steps in this identification: a) any traced unit must be uniquely identified. The unique identifier is the key factor to access all available data about the history, application or location of a product. Most products are traced by their lot or production batch, and by their transport/storage/distribution. The identifier must bear some meaning and be verifiable (e.g. on a 10 digit number, the first 2 digits are the origin, the next 6 digits are the date of reception/production *ddmmyy* and the last 2 digits are a running number) and must reflect the lot definition (e.g. 1 lot = raw material received in 1 delivery or 1 lot = quantity produced in 1 day); b) any actor in the supply chain that modifies the product or may have an impact on the product (e.g. mixing or splitting the lots, storage with a risk for the safety or quality of the product) must be uniquely identified. This identification may be a production license or any other kind of authorization. The unique identification of the actors in the supply chain is usually needed for the official control system and constitutes a good starting point for traceability.
- ***Data capture and management***: several product transformations, such as mixing and splitting lots or discarding a part of the lot, occur in the food supply chains. Data has to be captured and recorded between steps throughout the supply chain. The quality of the documentation of transformations in a supply chain will affect the potential precision of a *traceability system* and therefore will define its efficiency and robustness. The management of successive links and communication of data captured at each stage of every traceable unit of raw material and ingredient during processing is called the "*internal traceability system*". The links management and data communication between the steps of the supply chain is called "*external traceability system*". This is the minimum traceability the industry must maintain and it is the one required by the regulators of the main fish products markets. External traceability is also what is needed in case of product recall in food safety crises or regulation non-compliance. Usually the traceability system is organized in such a way that it can be verified and tested with simulated product recall. The ability to verify the internal and external system is part of the data management.
- ***Data communication***: the information between various actors in the supply chain has to be exchanged in a standardized format. The data captur*ed is transferred a*nd accompanies the physical flow of products. To ensure the continuity of the information flow, each supply chain actor must communicate captured traceability data to the next one, enabling continuity in traceability. The complexi*ty of the supply chain in a* globalized industry requires a high level of efficiency. The information required may be standar*dized by the regulation e.g*. labelling requirements, certificate of origin, catch certificate, certificate of analyses. In other cases, the actors in the supply chain may use manual information recording and traditional means for data exchange, such as telephone, fax and email. Modern technologies tend to replace such practices that are inefficient, where some data may be non-reusable and have a high risk of errors. It is worth noting that the food businesses are concerned about data

security because of the sensitive nature of information and do not want to share it unless this information is stored in protected repositories.

1.5 Report Scope and Structure

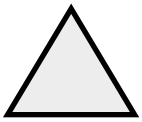
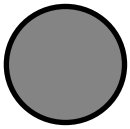
The regulations and standards examined in this report include food safety, suitable fishing, labelling and traceability standards.

The purpose of this study is to undertake a literature review of the traceability requirements to identify whether or not a common theoretical framework with respect to the implementation of food traceability exists. This report is organized as follows:

First, the results from the literature review are presented. The existing systems for identification and marking of food and in particular fish products as primary production, as well as the systems for their identification and labelling in the chain of distribution, have been consulted. The list of regulations and standards is non-exhaustive.

In these documents, traceability is treated in different ways depending on their objectives. The findings are discussed in detail in section 2.

Second, the findings from this study are compared with a table comparing the traceability principle as a reference point. The principles of traceability have been used in order to evaluate level of traceability requirements. The traffic light colours are used to evaluate the level of:

Traffic light[1]	Meaning
	**Square (red): traceability principle is defined and mandatory** The regulation or standard defines a traceability principle and the compliance is mandatory. *For example the Regulation (European Commission, EC) No **178/2002** defines **traceability** and requires the traceability of food, feed, food-producing animals, and any other substance intended to be, or expected to be, incorporated into a food or feed shall be established at all stages of production, processing and distribution..*
	**Triangle (yellow): Required** The regulation or standard does not define the traceability principle or component but the compliance is implied. *For example the Regulation (EC) No **178/2002** requires the food and feed business operators to have in place **systems and procedures** with which to identify the other businesses to which their products have been supplied.* ***Traceability system is not defined although the identification of lots/batches when split and combined within each step of production is required. It is essential for identifying the products to recall.***
	**Circle (green): not mentioned** The regulation or standard does not require a traceability component. *For example the Regulation (EC) No **178/2002** does not require an internal audit to check the effectiveness of such a system.* ***The traceability internal audit is not defined whereas it is commonly required in the implementation of traceability systems.***

These tables aim to highlight succinctly trends among and across the regulation standards with respect to suggested traceability principles as presented in section 1.4.

Third, general conclusions are presented at the end of this report.

1 The author's traffic light approach (red, yellow, green circles) was modified to facilitate black and white printing of the document. Namely, the red circle was replaced with a square and the yellow circle was replaced with a triangle.

2 Review of the main regulations and standards that mention traceability

2.1 International standards and guidelines

2.1.1 Codex Alimentarius

The first mention of traceability requirements by CODEX date back to 1985 and can be found in sections 4.5.1 & 4.5.2 of Codex Stan 1 – 1985 under the heading "the country of origin of food".

The definition of traceability in CODEX is actually from the 27th session in July 2004, where traceability was adopted and added into the Procedural Manual of the Codex Alimentarius Commission (CAC), Report of CAC 27th Session.

Several Codex Standards encompass key elements of traceability and these are adopted by most national Governments in their own legislation. It is also a reference in case of dispute among trade partners.

The CODEX CAC.GL 60-2006 or the *Principles for traceability/product tracing as a tool within a food inspection and certification system* develops a set of principles to assist competent authorities in recognizing traceability/product tracing as a tool within their food inspection and certification system.

The standards cover the context, rationale, design and application of traceability/product tracing to explain how it could be used as a tool by a competent authority within its food inspection and certification system. The standards are not specific with regard to minimum requirements for traceability but are more about how it should and should not be used as well as its limitations, thereby establishing principles that guide traceability implementation in the supply chain.

This Code applies to the growing, harvesting, handling, production, processing, storage, transportation and retail of fish, shellfish and aquatic invertebrates and products thereof from marine and freshwater sources that are intended for human consumption.

The system of tracking the origin and codes of fish, shellfish and their products should be established to facilitate product recall or public health investigations in the event of the failure of preventive health protection processes and measures. These systems exist for molluscan shellfish in some countries in the form of molluscan shellfish tagging requirements.

A prerequisite program is described in the Code covering technological guidelines and the essential requirements of hygiene in the production of fish, shellfish and their products that are safe for human consumption, and otherwise meets the requirements of the appropriate Codex product standards. The Code also contains guidance on the use of Hazard Analysis and Critical Control Points **(**HACCP), which is recommended to ensure the hygienic production of fish and fishery products to meet health and safety requirements. Principle 6: *Establish procedures for verification* to confirm that the HACCP system is working effectively and Principle 7: *Establish record keeping and documentation* concerning all procedures and records appropriate to these principles and their application are directly related to record keeping and traceability.

A system for recall of products is a necessary component of a prerequisite program because no process is fail-safe. Product tracing, which includes lot identification, is essential to an effective recall procedure. Managers should ensure effective procedures are in place to ensure complete product tracing and rapid recall of any lot of fishery product from the market. Appropriate records of processing, production and distribution should be kept and retained for a period that exceeds the shelf-life of the product. Each container of fish, shellfish and their products intended for the final consumer or for further processing should be clearly marked to ensure the identification of the producer and of the lot.

Where there is a health hazard, products produced under similar conditions, and likely to present a similar hazard to public health, may be withdrawn. The need for public warnings should be considered.

Recalled products should be held under supervision until they are destroyed, used for purposes other than human consumption, or reprocessed in a manner to ensure their safety.

The CODEX STAN 1-1985 or the *GENERAL STANDARD FOR THE LABELLING OF PREPACKAGED FOODS* contains the main principles applied to the labelling of all pre-packaged foods to be offered as such to the consumer or for catering purposes and to certain aspects relating to the presentation thereof.

The "Lot" is defined as a definitive quantity of a commodity produced essentially under the same conditions.

The CAC/RCP 1-1969, Rev. 4-2003 (Section V.5.8) contains principles for a recall procedure.

2.1.2 Office International des Epizooties (OIE)

The 2013 *Office International des Epizooties (OIE) Aquatic Animal Health Code* is designed to ensure the sanitary safety of international trade in aquatic animals (amphibians, crustaceans, fish and molluscs) and their products. This is achieved through the detailing of health measures to be used by Competent Authorities of importing and exporting countries to avoid the transfer of agents that are pathogenic to animals or humans, while avoiding unjustified sanitary barriers.

Certificates should be designed so as to recognize the potential for fraud including use of a unique identification number, or other appropriate means to ensure security.

The responsibilities and structure of the organizations in charge of traceability and control of aquatic animal movements, aquatic animal disease control and reporting systems, epidemiological surveillance and communication of epidemiological information should be defined and documented.

The *OIE Aquatic Animal Health Code* emphasizes that traceability should be a demonstration of Government Veterinary Services' capacity to exercise control over all animal health matters, and not a description of the responsibility of private stakeholders in the chain. The national competent authority is responsible for the control of traceability systems . It states that "*The Veterinary Services should be able to demonstrate that they have the capacity, supported by appropriate legislation, to exercise control over all animal health matters. These controls should include, where appropriate, compulsory notification of prescribed animal diseases, inspection, movement controls through systems which provide adequate traceability, registration of facilities, quarantine of infected premises/areas, testing, treatment, destruction of infected animals or contaminated materials, controls over the use of veterinary medicines,…" etc.*

Establishing and maintaining a disease free status throughout the country should be the final goal for OIE Member Countries. However, given the difficulty in doing so for an entire territory, especially for highly contagious diseases, there may be benefits to a Member Country in establishing and maintaining compartments for the purpose of disease control and/or international trade.
Compartmentalisation is a procedure implemented by a Member Country with a view to defining subpopulations of distinct health status within its territory primarily through management and husbandry practices related to biosecurity. Implementing compartmentalisation requires full compliance with the standards on compartmentalisation in the Terrestrial Code (Chapters 4.3 and 4.4.) and the Aquatic Code (Chapters 4.1. and 4.2.) for diseases of terrestrial and aquatic animals respectively, in addition to those in the specific disease chapter(s) relevant to the compartment.

A prerequisite for assessing the integrity of a compartment is the existence of a valid traceability system. Although individual identification of aquatic animals may not be feasible, the Competent Authority should provide sufficient assurance of traceability in such a way that their history and movements can be documented and audited.

2.1.3 FAO eco-labelling and sustainable fisheries

FAO has drawn up *Guidelines for the ecolabelling of fish and fishery products from marine capture fisheries* (FAO, 2009). This document summarises a number of principles that should be observed by ecolabelling schemes.

The ecolabelling guidelines cover the fishery management system, the status of the target stock and ecosystem considerations with the overarching purpose of identifying sustainable fisheries.

These guidelines are to be used in relevant certification schemes. The scheme should *ensure that labels communicate truthful information*. This implies that the claim(s) on the labels (usually that the fish are of a

particular species and come from a specifically identified sustainable source) should be accurate and verifiable, essentially through a traceable chain of custody. Unprocessed products, including fish, are required to be labelled with the product name and the place of origin.

2.1.4 FAO aquaculture certification

FAO's *Technical guidelines on aquaculture certification* provide guidance for the development, organization and implementation of credible aquaculture certification schemes. The guidelines consider a range of issues that should be considered as relevant for certification in aquaculture, including: a) animal health and welfare; b) food safety; c) environmental integrity and d) socio-economic aspects associated with aquaculture.

These guidelines are to be used in relevant certification schemes. The scheme *should include adequate procedures for maintaining chain of custody and traceability of certified aquaculture products and processes*.

2.1.5 RFMO catch/trade documentation schemes

Regional Fisheries Management Organizations (RFMOs) are international organizations formed by countries with fishing interests in a particular area. Some of them manage all the fish stocks found in a specific area while others focus on particular highly-migratory species, notably tuna, throughout vast geographical areas. The organisations are open both to countries in the region ("coastal states") and countries with interests in the fisheries concerned.

RFMOs are making efforts to deal with Illegal, Unreported and Unregulated (IUU) fishing. In developing a number of different systems, these organizations have progressed to varying degrees in establishing traceability for the products of their fisheries. The RFMOs' Catch Documentation Schemes (CDS) implies that the actors in the supply chain are identified, e.g. record of the name of the vessel and the origin of the catches are known. The regional initiatives usually focus on one particular species. Below are two examples of these schemes:

- The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) implements a Catch Documentation Scheme for toothfish species (*Dissostichus* spp.). It was developed to distinguish between legal and IUU products and to prevent IUU products from entering the market. It was also designed to track toothfish from the point of landing throughout the trade cycle. The traceability system includes vessel licensing and monitoring system.
- The International Commission for the Conservation of Atlantic Tunas (ICCAT) is a comprehensive catch documentation system that will track bluefin tuna products from the point of catch to the first point of sale.

2.2 European Union, United States of America and Japan regulatory standards

2.2.1 European Union

European Union legislation is covered in a large quantity of documents. It is formed by two concurrent systems: community law and national law. Community law is an independent legal system, which takes higher precedence than national legislation, even though the voluntary national legislations can set up more stringent requirements for the products that are marketed in their territory.

Community law encompasses directive, regulation and decree. European Union directives lay down certain end results that must be achieved by every Member State. It is up to each member state to adapt their laws to meet these goals. Regulations become immediately enforceable as law in all Member States simultaneously whereas decrees concern only some Member State or some type of operators in the European Union Member States.

There are some national laws in the countries of the European Union related to traceability that are not covered in this report.

2.2.1.1 The European Union food law and the hygiene package (food safety and labelling requirements)

The European Union has developed a "Farm to Fork" approach covering all sectors of the food and feed chain, with traceability as a basic concept.

The European Union's General Food Law came into force in 2002. Food law pursues one or more of the general objectives of a high level of protection of human life and health and the protection of consumers' interests, including fair practices in food trade, taking account of, where appropriate, the protection of animal health and welfare, plant health and the environment.

The **Regulation (EC) No.178/2002** laying down the general principles and requirements of European Union food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety has an article (18) that makes traceability compulsory for food and feed operators and requiring those businesses to implement traceability systems. This regulation relates to all stages of the production, processing and distribution of food, and also to feed produced for, or fed to, food-producing animals.

The information should be made available to the competent authorities upon request. It also lays down the principle of adequate labelling or identification to facilitate traceability.

The Regulation (EC) No.178/2002 is the first regulation making traceability compulsory.

All food products, including fishery products, have to be identified by lot, which is defined as "*a batch of sales units of a foodstuff produced, manufactured or packaged under practically the same conditions"* (**Directive 89/396/EEC** – Article 1(2)).

The Directive leaves the lot size to producers to decide according to the practical situation in their business. The information needed for the purpose of identification or labelling of a lot is not fixed in this Directive, but a date of minimum durability can be judged as satisfactory to the labelling.

The lot identification must be shown on the label in the case of pre-packaged food; or on the packaging, on the container, or the accompanying documents in other cases.

To all chilled, frozen, smoked fish/fillets and shellfish offered for retail sale to the final consumer, the following information must be shown:

- Species (common and Latin name),
- Method of production (whether caught at sea/inland water), or
- Farming area of capture (FAO defined marine/inland fishery areas), or the country in which fish are farmed.
  (**Regulation No 104/2000/EC** and **No 2065/2001/EC**).

The above information can be given by labelling, or being placed on packaging, or by means of commercial documents accompanying the product (Regulation No 2065/2001/EC, Article 8).

Withdrawal and recall requirements for goods in general apply to every product served for human consumption; the withdrawal system is set by the **Directive 2001/95/EC**.

Within the limits of their respective activities, producers must adopt measures commensurate with the characteristics of the products that they supply, enabling them to "*choose to take appropriate action including, if necessary to avoid these risks, withdrawal from the market, adequately and effectively warning consumers or recall from consumers*".
(**Directive 2001/95/EC** – Article 5(1)).

There are also many other legal requirements that regulate various components for traceability, although they are not specific to traceability:

- **Directive 91/493/EEC** specifies the health conditions for the production and placing on the market of fishery products.
- **Directive 91/492/EEC** specifies the health conditions for the production and the placing on the market of live bivalve molluscs.
- **Directive 96/23/EEC** provides measures to monitor certain substances and residues thereof in live animals and animal products.
- **Directive 93/43/EEC** requires the food businesses and food handlers to exercise due diligence with respect to food hygiene.
- **Directive 92/48** provides the hygiene rules applied to fish caught on certain vessels in accordance with Directive 91/493/EC.
- **Decision 94/356/EC** concerns the own-check system (HACCP).

2.2.1.2 The European Union rules to combat illegal, unreported and unregulated fishing (IUU)

The European Union has introduced a set of regulations pertaining to IUU fishing to close the loopholes that allow illegal operators to profit from their activities:

- Under recently adopted rules only marine fisheries products validated as legal by the relevant flag state or exporting state can be imported to or exported from the European Union.
- A European black list has been drawn up covering both IUU vessels and states that turn a blind eye to illegal fishing activities.
- European Union operators who fish illegally anywhere in the world, under any flag, face substantial penalties proportionate to the economic value of their catch, which will prevent them from obtaining any profit.
- The new European Union regulation to prevent, deter and eliminate IUU fishing entered into force on 1st January 2010. The Commission is working actively to inform all parties on how to apply the new rules.

The Council **Regulation (EC) No 1005/2008** provides a legal base to identify IUU fishing as a violation of applicable laws, rules or regulations of particular gravity, as it seriously undermines the attainment of the objectives of the violated rules and recognized the sustainability of the stocks concerned or the conservation of the marine environment.

In line with the definition of IUU fishing, the scope of this regulation should extend to fishing activities carried out on the high seas and in maritime waters under the jurisdiction or sovereignty of coastal countries, including maritime waters under the jurisdiction or sovereignty of the Member States.

The IUU regulation applies to all fishing vessels, under any flag, in all maritime waters, where derived products are traded with the Community or Community nationals are involved in IUU fishing. The IUU regulation also aims to improve and facilitate the control and compliance with conservation and management rules, in cooperation with third countries.

To achieve this, the Regulation seeks to ensure full traceability of all marine fishery products traded with the Community, by means of a catch certification scheme. A main element of the Regulation, the catch certification scheme has been introduced for all marine fishery products traded with the European Union, irrespective of means of transport, and at all stages of the supply chain. The catch certification scheme may also apply to catches from Community vessels that are exported, if the country of final destination requires a catch certificate.

The Commission **Regulation** (**EC) No 1010/2009** is the implementing regulation. It specifies the conditions to establish the catch certificate. It lays down technical details in the following areas:

- Prior notification of landings, transhipments and consignments (Articles 1, 2);
- Landing and transhipment declarations (Article 3);
- Benchmark criteria for port inspections (Articles 4, 5);
- Simplified catch certification scheme for fishery products with specific characteristics (catches obtained by small fishing vessels, Article 6);
- List of recognized catch documentation schemes in Regional Fisheries Management Organizations (Article 7);
- Deadlines for the submission of catch certificates (Article 8);
- Approved economic operators (Articles 9-30);
- Risk management criteria for verifications related to catch certificates (Articles 31, 32);
- Administrative cooperation with third countries concerning catch certificates (Article 33);
- Sighting reports (Article 34);
- Mutual assistance (Articles 35 – 52);
- Amendments to the list of excluded products (Article 53).

Technical supplements cover scope, trade flows, participating countries, enforcement, other applicable legislation, practical issues, and detailed procedures including checks and verification procedures.

Because the focus of the Regulation is IUU fishing in wild-capture marine fisheries, there are certain exclusions to the scope of the Regulation. Freshwater fishery products, aquaculture products obtained from fry or larvae, ornamental fish and shellfish are among those excluded from application of the regulation and catch certificate.

The Council **Regulation** (**EC) No 1224/2009** applies to all activities covered by the common fisheries policy carried out on the territory of Member States or in Community waters or by Community fishing vessels or, without prejudice to the primary responsibility of the flag Member State, by nationals of Member States. The implementing regulation **(EU) No 404/2011** establishes a Community control system for ensuring compliance with the rules of the Common Fisheries Policy.

The objective of the common fisheries policy, as set out in Council **Regulation (EC) No 2371/2002** on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy is to ensure exploitation of living aquatic resources that provides sustainable economic, environmental and social conditions.

In view of the scale of the depletion of marine aquatic resources, it is vital for the Community to adopt the necessary measures to develop a culture of compliance among all operators with the rules of the common fisheries policy, and with the objectives set out by the World Summit on Sustainable Development in 2002 as well as the European Council's Sustainable Development Strategy. To achieve this aim, the rules for control, inspection, and enforcement of conservation as well as resource management measures, structural measures and measures on the common organization of the market should be reinforced, organized and strengthened.

Detailed rules for the application of this Article, and in particular regarding: (a) registration of fishing vessels; (b) verification of the engine power of fishing vessels; (c) verification of the tonnage of fishing vessels; (d) verification of the type, number and characteristics of the fishing gear.

2.2.2 United States of America

The United States of America **Bioterrorism Act 2002** came into force following the events of 11 September 2001 to enhance the security of the United States of America. Congress responded by passing the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act). It set the fundamental rules concerning food traceability. Under the Act, the Food and Drug Administration (US FDA) enforces more detailed requirements on its area of jurisdiction and businesses are affected differently depending on their size.

It enhances and expands the capacity of the Animal and Plant Health Inspection Service to conduct reinforced control activities on animal and plant health. Record keeping is to be used as a means of providing reliable tracking information of animal and plant shipments, including those shipments on hold at ports of entry and customs.

The **Lacey Act** combats trafficking in "illegal" wildlife, fish and plants. Specifically, the Lacey Act (16 USC §3371-3378) makes it illegal for companies in the United States of America to trade in imported fish, wildlife and plant products that were obtained in contravention of any national or international laws. Although its implementation does include specific documentation requirements, it is considered a 'fact-based' rather than 'document-based' law because traders may be prosecuted for importing the illegal product regardless of documentation or whether the trader knew the product was illegal. Therefore, it effectively creates a requirement for due diligence to ensure that the products traded are legally sourced.

The **Farm Security and Rural Investment Act of 2002,** which sets a requirement of **Country of Origin Labelling** (COOL) on food products, is also one part of traceability. To implement the COOL requirement of the above Act, the US Department of Agriculture on 30 October 2003 published proposed rules on mandatory country-of-origin labelling.

The United States of America does not require the exporting countries to have in place an system in terms of food traceability. However, US legislation affects foreign operators, who are exporting products to the United States of America, by setting down many single requirements applied to imported products:

- The Act authorises the Secretary of the Department of Health and Human Services to have access to the records concerning the history of an article of food when there is a reasonable threat of serious adverse health consequences or death to humans or animals;
- Such records have to allow for the identification of the immediate previous sources and immediate subsequent recipients of a food article in question;
- The time for maintenance of records will be decided by the Secretary of Agriculture, but the record-keeping requirement must be limited to two years.

The **FDA Food Safety Modernization Act (FSMA)** is the first reform of the United States food safety laws in more than 70 years; it was signed in 2011. It aims to ensure the United States food supply is safe by shifting the focus from responding to contamination to preventing it.

FDA issued two proposed rules under the FSMA aimed at strengthening assurances that imported food meets the same safety standards as food produced domestically.

Operators (excluding farms and restaurants) who manufacture, process, pack, distribute, receive, hold, or import food must make all records relating to such articles available on demand.

The requirement applies to all records relating to the manufacture, processing, packing, distribution, receipt, holding, or importation of such articles that are kept.

2.2.3 Japan

The Japan Agriculture Standard (JAS) has labelling requirements under the **Law for Standardization and Proper Labelling of Agricultural and Forestry Products** (version 1970). Although it facilitates traceability, JAS does not require full documentation of the supply chain.

The Japan Ordinance for the **Enforcement of the Food Sanitation Act** (enforced in 2007) advocates labelling and traceability systems for food products to expand information available to consumers, foster consumer confidence in food safety and allow rapid containment of any contamination incidents. This is the first requirement for traceability recordkeeping. The main concern is the information required for labelling, and no full documentation of the supply chain is required. Some voluntary standards for third party certification for beef and cattle, fruit and vegetables, eggs, shellfish (scallops and oysters), cultured fish and edible seaweed have been developed. The only mandatory standards are those for beef and cattle, which were imposed in 2003 in response to widespread concerns regarding Bovine Spongiform Encephalopathy (BSE) outbreaks.

Fish products are an important component of the Japanese diet but there are no government-imposed traceability requirements and only basic labelling requirements for fish. There are however basic requirements of JAS for unprocessed products, including fish. They are required to be labelled with the product name and the place of origin, from catch or culture and if the product has been previously frozen. More recently government guidance documents indicate fresh seafood labels should show the product name, the place of origin (by country and fishing ground if imported, or by prefecture if domestically produced), the "best eaten by" date, the storage requirements (i.e. temperature) and the processor's name and address. Requirements for processed products, including fish (e.g. fillets), are slightly more detailed and differ for domestically produced and imported products. In addition to the requirements for fresh fish products, domestically produced processed products must be labelled with the ingredient list (by species and source country (if imported material) and including any additives and/or allergens), the weight of the contents, the “best eaten by” date, the preservation method to be used by the consumer, and the name of the processor. Labels for imported products additionally must display the country of origin.

The on-going crisis after the Fukushima Daiichi nuclear power incident in 2011 may be the impetus for new regulatory or voluntary standards.

2.3 Non-regulatory standards

2.3.1 International Standard Organization (ISO)

International Standard Organization (ISO) standards on traceability fall within a series of quality management standards, which at first defined traceability as the:

> *“ability to trace the history, application or location of an entity by means of recorded Identifications”*
> (ISO 8402:1994 - Definition 3.16)
>
> This definition later changed to the:
> *“ability to trace the history, application or location of that which is under consideration”*
> (ISO 9000:2000 - Part 3.4.2)

The main requirement related to product traceability is not considering only the origin of materials/parts and processing history, but also to the distribution and location of the product after delivery. This definition implies the responsibility of every entity in the production chain for ensuring traceability.

2.3.1.1 ISO 22000 standards

The ISO 22000 international standard specifies the requirements for a food safety management system that involves traceability in the following elements:

- ISO 22000 - Food safety management systems - Requirements for any organization in the food chain
- ISO 22005 - Traceability in the feed and food chain - General principles and basic requirements for system design and implementation.

In these ISO standards, ensured compliance with national regulatory standards is a prerequisite.

The ISO 22005 standard gives the principles and specifies basic requirements for the design and implementation of a feed and food traceability system. The standard can be applied by an organization operating at any step in the feed and food chain.

Food and feed business operators are able to achieve certification to demonstrate that they comply with a traceability standard. Therefore the ISO 22005 standard is usually part of a wider program that includes compliance evaluation and certification by an accredited third party.

2.3.1.2 ISO 12875:2011

This standard specifies the information to be recorded in marine-captured finfish supply chains in order to establish the traceability of products originating from captured finfish. It specifies how traded fishery products are to be identified, and the information to be generated and held on those products by each of the food businesses that physically trade them through the distribution chains. It is specific to the distribution for human consumption of marine-captured finfish and their products, from catch through to retailers or caterers.

2.3.2 GS1 Global Traceability Standards

The GS1 Global Traceability standard provides a single traceability process to comply with all quality and regulatory requirements. It ensures interoperability with trading partners, allowing for efficient recall or tracing of the origin of raw materials from upstream suppliers. It is a business process standard describing the traceability process independently from the choice of enabling technologies. It defines minimum requirements for companies of all sizes across industry sectors through the GS1 Global Traceability Standard (GTS) in relation to Traceability Standards and Best Manufacture Practices (BMP) Standards.

The scope of the US Seafood Traceability Implementation Guide (SEAFOOD_TRACEGUIDE_1.0), compiled by NFI and GS1 with contributions from various industry sources, establishes minimum requirements and best practices to share information between distribution channel participants. This guide:

- Addresses traceability practices from the processing facility to the point of consumer sale to support Critical Tracking Events (CTEs) such as product creation/repackaging, product shipping, product receipt, product consumer sale, and product depletion
- Considers traceability practices upstream from the processing facility, including guidance for source tracking for sustainability;
- Applies to all seafood products for human consumption;
- Applies to all levels of the product hierarchy, which may include shipping logistics unit information, lots, pallets, cases, consumer items with data elements, etc.; and
- Includes all US distribution channel participants including, farms, vessels, processors, suppliers, exporters, distributors, retailers, and foodservice operators.

Traceability is a business process that enables distribution channel participants to follow products as they move through the supply chain. Each traceability partner must be able to identify the direct source and direct recipient of product. Traceability as a business process can be utilized for a range of relevant business purposes.

2.3.3 TraceFish (EU)

TraceFish is the short title for the "Traceability of Fish Products", a concerted action research project which ran from 2000 to 2002, co-ordinated by the Norwegian Institute of Fisheries and Aquaculture (Fiskeriforskning). The main outcomes of TraceFish were three consensus-based standards for recording and exchange of traceability information in seafood chains. These standards now form the basis for traceability implementations in industry, both privately funded projects and pilot R&D projects with public funding.

The Tracefish project resulted in an output detailing a 'technical standard' for fish traceability. This standard is a set of programming instructions providing guidance on how to implement traceability in a standardized and structured way, by recording data needed to trace origin, process history, product properties and distribution route in an electronic system. The standard (for software) defines a trading unit and criteria are set out for monitoring trading units through handling until dispatch. There is no advocacy as to what the unit should consist of or how much mixing of units there should be.

Checking/auditing is not explicit in the Tracefish system but could be considered under the section of "traceability control mechanisms". These are defined as methods and instruments used for authentication and testing that what is received is what the documentation indicates.

2.3.4 Trace Register

The Trace Register™ system is the traceability solution for the global food industry. Its objective is to ensure integrity and quality by showing the life history of each product – from source to sale.

It is a traceability solution that enables all companies in the supply chain to capture and share vital information, helping manage risk and differentiate product.
The system focuses on the capture of data necessary to follow the product from one link in the supply chain to the next, such that traceability is established through all stages of production, processing and distribution. As it is web-based, there is no need for any special software or hardware or particular technical skills.

Although seafood is not the only food product targeted, the part of the system relating to seafood was developed by a team with extensive experience in the seafood industry. It meets the full traceability requirements of producers, processors, and distributors, as well as food service operators and retailers of wild and farmed seafood.

It is worth noting that Trace Register was mandated by the Aquaculture Certification Council (ACC) and endorsed by the Global Aquaculture Alliance (GAA), to be the traceability solution for their certification program (see section 2.3.11).

For the wild caught fish products, Trace Register is able to trace the products back to the fishing vessel and the location of capture, even showing the specific coordinates of where the fish was caught.

As product moves through the supply chain, both paper-based and electronic documentation are compiled in the system, e.g. official paperwork such as fishing licenses and quotas, mate's certificates, import documentation, and company-generated information such as lab reports, product certificates, and trans-shipment records.

This information may be easily loaded and stored in the Trace Register database and reviewed by authorized users at any stage of the supply chain.

2.3.5 CHINATRACE

ChinaTrace is a global information exchange for Chinese food products and ingredients. It enables trade partners to interact with critical information across Chinese and global supply chains and to effectively create 'food passports' that trace every stage of production, processing and distribution – from source to supermarket shelf.

ChinaTrace facilitates sourcing of ingredients and products by providing quality and safety assurance information linked to the physical flows of production batches made in China. Furthermore, it communicates assurances or corrective measures taken in the case of an investigation or recall of Chinese made ingredients or products.

The ChinaTrace service is an extension of the TraceTracker GTNet®, which is a web platform with a suite of solutions that enhance the value of products and brands while stimulating consumer dialogue. Shandong Institute of Standardization provides the foundation for this service through its reputable solutions and expertise in implementing traceability systems.

2.3.6 Environmental standard for sustainable fishing

The Marine Stewardship Council (MSC) environmental standard for sustainable fishing is a standard for ecolabelling. The MSC's certification program covers both certification of sustainable fisheries and the fish product supply chain. Once a fishery is certified, the fish and fish products originating from that fishery are eligible to enter the supply chain, which is certified thought the MSC's Chain of Custody procedure.
The organizations in the Chain of Custody must have a management system and operate a traceability system. This standard establishes a system for maintaining the chain of custody in the supply chain of products from fisheries certified against the MSC Principles and Criteria for Sustainable Fishing or other standards as approved by the MSC. It does not cover issues such as food safety or quality. To achieve the objective of chain of custody, a traceability and segregation system is required so products can be traced from their suppliers and tracked to their buyers.

2.3.7 NMFS Dolphin Safe Certification

In July 2013, the National Marine Fisheries Service (NMFS) has issued a final rule updating the requirements for voluntarily labelling tuna as dolphin-safe. Under the updated rule, tuna products intended for labelling as dolphin-safe must be accompanied by a certification from the captain of the vessel that harvested the tuna and a certified and qualified observer that no purse seine net was intentionally deployed on or used to encircle dolphins during the fishing trip in which the tuna were caught and that no dolphins were killed or seriously injured in the sets in which the tuna were caught. NMFS will announce determinations that an observer is qualified and authorized in future Federal

The identification of the vessel and status of the tuna has to be declared in a form (Fisheries Certificate of Origin).

2.3.8 AIPCE-CEP Expectations of Seafood Environmental Standards

The EU Fish Processors Association and EU Federation of National Organisations of Importers and Exporters of Fish (AIPCE-CEP) comprises 13 EU Member State Associations with Norway and Morocco as Associate Members. AIPCE works on behalf of industry, including key participants in the post-harvest sector, to address common objectives. It promotes voluntary industry initiatives to control IUU independent of legislation.

The AIPCE-CEP have expectations from seafood environmental standards that apply to certification standards making claims such as sustainable fishery or responsibly farmed fish, which are used for fisheries and aquaculture policies that follow a process of setting standards and undertaking an independent assessment.

These expectations apply to certification standards that make environmental claims such as 'Sustainable Fishery' or 'Responsibly Farmed Fish'. They apply equally to fisheries and aquaculture standards that follow a process of standard setting and independent assessment.

AIPCE-CEP approaches traceability by providing fishery-specific and general guidance. For some fisheries, AIPCE has developed a set of fishery-specific control instructions for use by importers and suppliers to ensure seafood legality. These instructions are effectively a standard which, if satisfactorily achieved, ensure only legally-caught fish product is handled. The fishery-specific standards cannot be applied to any other fishery or interpreted in a different way. A separate standard is required for each different fishery. AIPCE has developed such standards for traceability of Baltic and Barents Sea cod and haddock. The standard sets out mandatory protocol and instructions for implementation. The control instructions and associated procedures are voluntary but strongly recommended by AIPCE. Information that must appear on invoices, packing lists, health certificates or other relevant documentation includes:

- Name and registration number of fishing vessel and transport vessel
- Name of landing port
- Date and location of catch
- Date of discharging to port
- Total transhipped quantity

- Copy of Bill of Landing, Health Certificate and Cargo Manifest

AIPCE-CEP has also developed general seafood sourcing guidelines. These are published as AIPCE-CEP Recommendations entitled “Principles for Environmentally Responsible Fish Sourcing”, which include traceability recommendations. The guidelines state that wild caught fish should be traceable back to the catching vessel or a known group of vessels and their landing ports. Where required for legal compliance or certification, this must also include the specific catch area. Farmed fish products should be traceable back to the farm site and the records at the farm should show traceable movements and origins back to parent stocks.

For aquaculture, all inputs of feed and chemicals should be recorded.

2.3.9 WWF SFI

Through the Smart Fishing Initiative (SFI), a World Wildlife Fund´s (WWF) global fisheries programme, WWF tackles the many problems of overfishing as a contribution to a sustainable future for our global fisheries.

Traceability is part of the initiative in the commitment of the certified fisheries, and requested purchase and selling of seafood products that can be traced back to its origin.

2.3.10 GLOBALG.A.P. Integrated Farm Assurance Scheme and Produce Safety Standard

G.A.P. stands for Good Agricultural Practice. GLOBALG.A.P. is the worldwide standard that assures it. GLOBALG.A.P. is an affiliate organisation of a not-for-profit trade association with a crucial objective: safe, sustainable agricultural production worldwide. It sets voluntary standards for the certification of agricultural products around the globe, and more and more producers, suppliers and buyers are harmonizing their certification standards to match.

The GLOBALG.A.P. Aquaculture Standard applies to a diversity of fish, crustaceans and molluscs and extends to all hatchery-based farmed species, as well as the passive collection of seedlings in the planktonic phase.

The standard covers the entire production chain, from broodstock, seedlings and feed suppliers to farming, harvesting, processing and post-harvest handling operations. It serves as a practical manual for any aquaculture producer, ensuring food safety, minimal environmental impact and compliance with animal welfare and worker health and safety requirements.

The GLOBALG.A.P flagship standard is the Integrated Farm Assurance (IFA) standard, which covers crops, livestock and aquaculture and emphasizes a progressive, holistic approach to farm certification.

The Produce Safety Standard (PSS) only focuses on the Food Safety and Traceability elements of the IFA standard. This standard is a subset of the IFA standard that was developed for the North American market where the demand for compliance with the Food Safety elements of the IFA standard has priority above the non-food safety components.

2.3.11 Global Aquaculture Alliance Seafood Processing Standard

The Global Aquaculture Alliance (GAA) is an international, non-profit trade association dedicated to advancing environmentally and socially responsible aquaculture. Through the development of its Best Aquaculture Practices (BAP) certification standards, GAA has become the leading standards-setting organization for seafood from aquaculture. GAA recognizes that aquaculture is the only sustainable means of increasing seafood supply to meet the food needs of the world's growing population.

Traceability is an integral part of the BAP. Members of the GAA have to be registered and utilize Trace Register as the traceability solution for their operations. The system interconnects links in the aquaculture seafood production chain and allows each processed lot to be traced back to the pond and inputs of origin.

Traceability assures purchasers that all steps in the production process were taken in compliance with environmental, social and food safety standards.

All certified facilities must maintain internal electronic or paper-based records of the required data to document essential information and establish “one up, one down” traceability. Where facilities claim inputs from BAP-

certified farms, hatcheries, feed mills or processing plants, a chain of custody audit is required to verify proper product segregation and record keeping.

2.3.12 Global Food Safety Initiative

The Global Food Safety Initiative (GFSI) is a business-driven initiative for the continuous improvement of food safety management systems to ensure confidence in the delivery of safe food to consumers worldwide. GFSI provides a platform for collaboration between some of the world's leading food safety experts from retailer, manufacturer and food service companies, service providers associated with the food supply chain, international organizations, academia and government.

Although GFSI is now broader than just a benchmarking organisation, this remains a key activity that has recognised a number of food safety management schemes that fulfil the criteria identified by a group of multi-stakeholders in the GFSI Guidance Document as covering best food safety practice. GFSI is not a scheme in itself, and it does not carry out any accreditation or certification activities.

2.3.13 BRC Global Standard for Food Safety: Issue 6

This extensively revised Standard of the British Retail Consortium (BRC) covers food safety and management of product quality in food packing and processing operations. The BRC Food Standard was one of the original GFSI benchmarked schemes and is used around the world with certificates in over 100 countries and has in excess of 15 000 certificated sites. The Standard is owned by the BRC and written and managed with the input of an international multi-stakeholder group made up of food manufacturers, retailers, food service and certification body representatives.

BRC/IOP Global Standard for Packaging and Packaging Materials: ISSUE 4
This is revised edition of an established Standard for the manufacture and conversion of packaging materials for both food and non-food use. The standard covers the hygienic production of packaging materials and the management of quality and functional properties of the packaging to provide assurance to customers. The Standard is operated by the BRC in conjunction with the Packaging Society and an advisory committee of stakeholders.

The BRC has produced a series of Best Practice Guidelines aimed at manufacturing and storage businesses to provide practical advice on developing systems to fulfil obligations with regard to legal compliance, safety and quality criteria.

2.3.14 IFS FOOD VERSION 6

The International Featured Standard (IFS) Food is a standard for auditing food safety and quality of processes and products of food manufacturers. The standard has been in existence since 2003 and is current operating its sixth version.

IFS Food is a GFSI recognised standard for auditing food safety and quality of processes and products of food manufacturers. It concerns food processing companies or companies that pack loose food products.

IFS Food is applicable when products are “processed” or when there is a hazard for product contamination during primary packing. The IFS Food Standard is important for all food manufacturers, especially those producing private labels, because it contains many requirements related to specifications’ compliance.

It supports production and marketing efforts for brand safety and quality.

IFS Food standard version 6 has been developed with full and active involvement of certification bodies, retailers, industry and food service companies from all over the world.

3 Comparison of requirements on Traceability

3.1 International standards and guidelines

	Codex Alimentarius CAC.GL 60-2006 and CODEX STAN 1-1985	**OIE** OIE Aquatic Animal Health Code. Fourteenth Edition, 2011	**FAO Guidelines for the ecolabelling of fish and fishery products from marine capture fisheries**	**FAO Technical Guidelines on Aquaculture Certification**	**RFMO catch/trade documentation schemes**
Principle	Food safety / Anti-fraud	Animal health and food safety	Fisheries environmental integrity	Animal health and welfare, food safety, environmental integrity and socio-economic aspects in aquaculture	Sustainable management of fishery resources
Scope	Worldwide	Worldwide	Worldwide	Worldwide	Region/Worldwide
Objective	To contribute to the protection of consumers against food-borne hazards and deceptive marketing practices and the facilitation of trade on the basis of accurate product description.	To avoid the transfer of agents that are pathogenic for animals or humans, while avoiding unjustified sanitary barriers.	To provide guidance in the application of sustainable fisheries practices.	To provide guidance in the certification in Aquaculture.	To provide guidance in the application of sustainable fisheries practices.

	Codex Alimentarius CAC.GL 60-2006 and CODEX STAN 1-1985	**OIE** OIE Aquatic Animal Health Code. Fourteenth Edition, 2011	**FAO Guidelines for the ecolabelling of fish and fishery products from marine capture fisheries**	**FAO Technical Guidelines on Aquaculture Certification**	**RFMO catch/trade documentation schemes**
Unique identification requirements	 A system for tracing the origin and codes of fish, shellfish and their products should be established to facilitate product recall.	 A unique identification number is required.	 Unique identification of vessels and products are implied to identify sustainable fisheries.	 Unique identification is not mentioned.	 Identification of the vessel to be traced are required.
Data capture and management requirements	 Appropriate records of processing, production and distribution should be kept and retained for a period that exceeds the shelf-life of the product.	 Report on traceability and control of aquatic animal movements, aquatic animal disease control.	 Labelling information should come from a traceability system that is accurate and verifiable.	 Adequate procedures for maintaining chain of custody and traceability are required.	 Data record and a traceability system are implied.
Data communication requirements	 There is no mention of a standardized format for the data captured along the supply chain.	 Model for health certificate to accompany the goods.	 Rules on labelling of food products and fish products.	 No mention of standardized format.	 All records relating to catch certificate should be available on demand.

3.2 Regulatory standards

	EU regulation on Food Safety	EU regulation on IUU	US Regulation	Japan Food Sanitation Act
Principle	Food safety	Legal fishing	Food safety	Food sanitation
Scope	European Union and importing third countries	European Union and importing third countries	United States of America	Japan
Objective	To provide basis for the assurance of a high level of protection of human health and consumers in relation to food.	To ensure compliance with the rules of the common fisheries policy To prevent, deter and eliminate illegal, unreported and unregulated fishing.	To enhance and expand the capacity of the Animal and Plant Health Inspection Service To ensure the United States' food supply is safe by shifting the focus from responding to contamination to preventing it.	To prevent the occurrence of health hazards arising from human consumption of food, by making necessary regulations and taking any measure so as to work for the protection of the health of the people.
Unique identification	■ All food products, including fishery products, have to be identified by lot. The establishment authorized to supply the EU market must be licensed.	■ All the fishing vessels must be licensed and the fish products identified when entering the EU market.	△ Identification of the actors and the products to be traced are implied.	△ Traceability system must allow rapid containment of any contamination incidents.
Data capture and management	△ Required for the information to be made available to the competent authority on demand.	■ Required for all marine fishery products traded with the Community, by means of a catch certification scheme.	■ Data record and a traceability system are required.	△ Record keeping is for labelling requirements.
Data communication	■ Rules on labelling of food products and fish products.	■ Template of the catch certificate in the regulation.	■ All records relating to traceability should be available on demand.	■ Requirements for labelling.

3.3 Industry and NGO non-regulatory standards

3.3.1 Traceability standards

	ISO ISO 22005 ISO 12875	**GS1 Global Traceability Standards**	**TraceFish**	**Trace Register**	**ChinaTrace (TraceTracker)**
Principle	Traceability standards Information record and management	Traceability standards	Traceability standards for fisheries	Traceability computerized solution	Traceability solution to serve food safety and quality
Scope	Worldwide	Worldwide	Worldwide	Worldwide	Shandong Province and worldwide
Objective	To assist in the design and implementation of a feed and food traceability system.	To provide the industry operators a single traceability process to comply with all quality and regulatory requirements.	To electronically interchange food traceability information on fish products.	To electronically interchange information on integrity and quality of food by showing the life history of each product – from source to sale.	To facilitate sourcing of ingredients and products by providing quality and safety assurance information linked to the physical flows of production batches made in China.
Unique identification	■ A lot identification is defined as the process of assigning a unique code to a lot.	■ Identification is done with bar coding system.	▲ Identification of the actors and the products to be traced are implied.	■ Identification in the system.	■ Identification in the system.
Data capture and management	■ Data and operations that are capable of maintaining desired information about a product and its components through all or part of its production and utilization chain.	■ Single traceability process is needed.	■ How to implement traceability in a standardized and structured way.	■ Traceability solution.	■ Traceability solution.

	ISO ISO 22005 ISO 12875	GS1 Global Traceability Standards	TraceFish	Trace Register	ChinaTrace (TraceTracker)
Data communication	■ One of the objectives is to communicate information to relevant stakeholders and consumers.	△ Format of the data display is implied.	■ Multi-language lists of parameter values relevant for the seafood sector used when implementing electronic interchange of traceability information.	■ Traceability solution.	■ Provides traceability passport.

3.3.2 Sustainable seafood certification schemes

	Environmental standard for sustainable fishing	NMFS-Dolphin Safe Certification January 13, 2009	AIPCE-CEP Expectations of Seafood Environmental Standards June 2013	WWF Smart Fishing Initiatives
Principle	Eco-labelling from fishery sector	United States tuna canners related to dolphin conservation	Sustainable fishery and responsibly farmed Fish'	Sustainable fishery
Scope	Worldwide	US and worldwide	Worldwide	Worldwide
Objective	To facilitate the development of sustainable fisheries.	To reduce incidental dolphin mortalities in the tuna purse-seine fishery through the setting of annual limits.	To promote the sustainable fisheries (reduction of the IUU) through the delivery of traceable fish products.	To tackle the many problems of overfishing to contribute to a sustainable future for our global fisheries.
Unique identification	■ To serve the source of fisheries information.	■ Regulations governing the activities of any exporter, transhipper, importer, processor, or wholesaler/distributor of any tuna or tuna products have to be published in the US Federal Register.	■ Unique identification of vessels and products to identify sustainable fisheries.	△ Spurring fishers, processors, sellers, buyers and retailers to commit to certified fisheries, and to purchase and sell seafood products that can be traced back to its origin.

	Environmental standard for sustainable fishing	NMFS-Dolphin Safe Certification January 13, 2009	AIPCE-CEP Expectations of Seafood Environmental Standards June 2013	WWF Smart Fishing Initiatives
Data capture and management	■ Required. The format may depend on the users (retailers, farms, etc)	■ Tuna canners must submit a report of all tuna received at their facility in each calendar month. Data elements include the dolphin-safe status, species, condition, ocean area of capture, catcher vessel, gear type, trip dates and quantity.	■ The guidelines ("Principles for Environmentally Responsible Fish Sourcing") include traceability recommendations. For aquaculture, all inputs of feed and chemicals should be recorded	■ Traceability is part of the initiative in the commitment of the certified fisheries, and requested purchase and selling of seafood products that can be traced back to its origin.
Data communication	■ Trace all fish back to the farm or boat of origin	■ Tuna canners must submit a report of all tuna received at their facility in each calendar month.	■ The fishery-specific standards are supported by a 'letter of warranty' that the vessel owner provides to the importer or first buyer for each catch. The letter of warranty is a declaration from the supplier that the fish product was caught legally within the given quota for the specific vessel.	?

3.3.3 Other non-regulatory standards currently in use by the global food industry

	GLOBALG.A.P.	GAA BAP	BRC	IFS
Principle	Certification of agricultural products against safety and quality standards	Certification of operators against certification standards related to the quality and supply of aquacultured seafood	Certification of packed food and processing operations against food safety and quality requirements	Certification of processes and products of food manufacturers against food safety and quality requirements
Scope	Worldwide	Worldwide	Worldwide	Worldwide
Objective	To improve safe and sustainable agriculture.	To encourage the use of responsible production systems that are sustainable regarding environmental and community needs, and efficiently provide safe, wholesome aquaculture products.	To assist retailers in their fulfilment of legal obligations and protection of the consumer, by providing a common basis for the audit of companies supplying retailer branded food products.	To improve quality and food safety of processes/products of food manufacturers.
Unique identification	 Identification of the farm is implied. Products must be properly labelled.	 List of data needed for product traceability should be recorded. A star system is designed to evaluate the level of compliance with the standard for each operator in the supply chain.	 Identification of the operators and the products are implied through the legal obligation (licensing and labelling).	 Identification of the operators and the products are implied through the enforcement of food law.
Data capture and management	 A system is needed to know status of the product throughout the entire process, from farm to retailer. It lays out strict requirements for handling certified products and the proper segregation of certified and non-certified produce in the processing operation units.	 Farms can maintain paper records of the required data innotebooks or files. If possible, the information should also be transferred to computer database files, with the original files kept to allow verification of the electronic data.	 A comprehensive traceability system is required to ensure problems within the manufacturing process can be effectively identified and adequately managed, through tracing to the source of the problem and forward to facilitate effective withdrawal from customers.	 Traceability from the 'table to the stable' is needed for transparency.

	GLOBALG.A.P.	GAA BAP	BRC	IFS
Data communication	 Labelling is to guarantee the integrity of the product and to reassure the customers.	 The collecting of the data and is required and transferring it to a computer database is advised.	 Part of the traceability system requirements for product tracing.	 Part of the traceability system requirements related to labelling (GMO, formulation, etc.).

3.4 Conclusion of the comparison

The requirements on traceability vary with type of standard and the objectives of each standard.

The ability to trace and authenticate a food product is of major concern to the food industry for various reasons as explained in section 2. Looking at the application in practice as detailed in the above comparison, the justification of the traceability system may vary depending on the product requirements: the more extended the requirements, the more traceability is needed.

The requirements for safety play an important role to ensure that safety can be demonstrated and that the possibility of product recall exists.

The requirements on origin control (i.e. eco-labelling) play an important role to ensure the ability of tracing the product back to its source and proving its legality.

Traceability cannot be seen as a "stand-alone" requirement but has to be based on quality or safety or legal sourcing compliance conformity. The traceability chain has to be complete in order to trace the history of a product by means of unique identification procedures and at every level of the supply chain.

In order to be efficient, a traceability system has to provide:

- the identification of the operators, storage and preparation units and identification of the product and its registration along the whole chain
- an efficient traceability system inside and between the organizations that can be controlled to ensure the proper functioning of the traceability system among all the organizations
- a periodical verification of the traceability system to make sure that the data communicated are correct

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