

# CODEX ALIMENTARIUS COMMISSION



Food and Agriculture  
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Agenda 3

FFP/34 CRD/6

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

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### REVISED DRAFT CODE OF PRACTICE FOR PROCESSING OF FISH SAUCE

(Prepared by Thailand)

*This CRD has been prepared by Thailand (as Chair of the current electronic working group (eWG)). It reflects changes identified by country comments received in response to CL 2014/25-FFP (CX/FFP 15/34/4 and CX/FFP 15/34/4 Add.1). It will be used as the working document for the discussion on Agenda Item 3 of the Provisional Agenda. Clarifications and responses to the significant aspects raised from the comments are presented in Annex I of this document.*

### REVISED PROPOSED DRAFT CODE OF PRACTICE FOR PROCESSING OF FISH SAUCE

This Code of practice for processing of fish sauce has been developed primarily to be used as a guideline to improve the processing practices of fish sauce to meet international requirements. The application of GMP, HACCP and DAP for this traditional product should be promoted to ensure consumer health and safety as well as fish sauce quality. Fish sauce is a translucent, ~~and~~ not turbid liquid product with salty taste and fish flavour obtained from the fermentation of a mixture of fish and salt at an appropriate ratio, and the optional addition of other ingredients. In general, the size of fish used as raw material in fish sauce processing is small, not greater than 12 cm in length. Traditional fish sauce fermentation relies on endogenous enzymes and indigenous bacteria of raw materials. For non-traditional fermentation other ingredients may be added to assist the fermentation process. Salt is an essential ingredient in fish sauce production in order to control the types of microorganisms support the growth of halophilic microorganism and prevent defective fermentation that produce an effective fermentation, prevent growth of bacterial pathogens and other undesirable microbial activity, yielding a high quality, safe fish sauce product. The quality characteristics of colour, clarity, aroma (odour) and taste are used to determine the end of the fermentation process.

This Code will address the general processing steps and technical guidance to be employed by fish sauce manufacturers, which could vary from country to country. Potential hazards and defects at each processing step starting from reception of raw material and ending with final product distribution will also be identified. In addition, each processing step will include technical guidance for controlling the identified hazards and defects that help ensure consumer safety and product quality. Nevertheless, consistent with HACCP principles, each processor should conduct a hazard analysis of its own operations and product to ensure all hazards are identified and properly controlled.

#### General considerations of hazards and defects

##### Hazards

Fish sauce is the product obtained from the fermentation of a mixture of fish and salt. The raw material used in the fermentation to make fish sauce could be both freshwater and marine fish. Some marine fish, such as mackerel, sardines or anchovies, are one of the fish type most preferably used to make high quality fish sauce with the characteristic aroma and reddish brown colour. However, the use of those mentioned marine fish might pose a risk of histaminescombotoxin formation. Some marine fish might may be contaminated by bacteria with undersirable microorganisms, especially including pathogenic bacteria (Clostridium botulinum), which depend on their type, size and harvest area. Pelagic and small marine fish would have a slight chance of contamination. In fish sauce producing process, it is therefore necessary to have Code of Practices for controlling of raw material quality after on the harvest vessel in compliance with Sections 3 and 4 of the Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003) in place.

Harvest vessel quality control of fish could be achieved either by controlling fish temperature or by delaying fish decomposition. Practically, salt is commonly used to maintain fish quality and freshness for delaying the

~~decomposition after the harvest rather than temperature control. The reason is if the fish temperature is too low, the salt will be slowly absorbed and resulted in the extension of fermentation period.~~

~~Icing or refrigeration shortly after death of the fish is a common means of preventing undesirable microbial growth and activity on harvest vessels and prior to achieving adequate salt penetration and concentration in the fish at the processing facility. However, immediate salting of fish on board the harvest vessel may be used as an alternative to icing or refrigeration for the control of microbiological contamination and decomposition.~~

~~In fish sauce processing, a large amount of salt are is used in fish sauce processing. Fish sauce therefore has the salt content higher than 20% (Water Phase Salt > 10%) which could inhibit and delay the growth of bacteria concentrations of 10% or higher should be achieved and maintained throughout the fermentation to prevent growth and activity of undesirable microorganisms, including pathogens.~~

### **Defects**

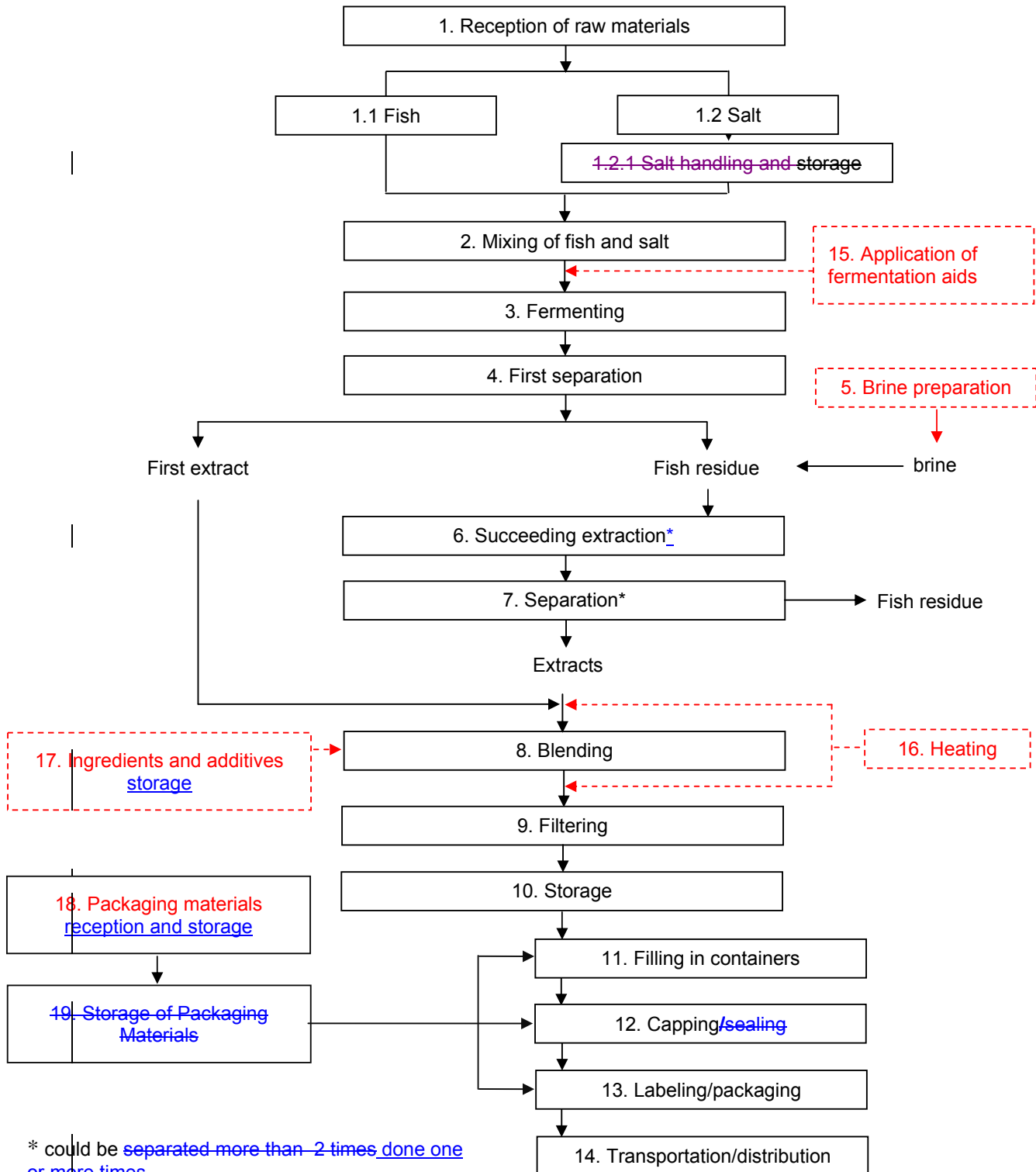
~~The Odour and taste of fish sauce depends on the free amino acids generated from the fermentation process, and the optional addition of extracts that contain water with fewer amino acids. The level of free amino acids generated from the fermentation process varies according to type of fish used in the fermentation, ratio of fish to salt, temperatures during the fermentation, and the appropriate fermentation time. Hence, the controls of these factors, and proper blending of brine extracts and other ingredients, are necessary in order to obtain fish sauce products with desirable odour and taste.~~

~~This Code will address the general processing steps and technical guidance to be employed by fish sauce manufacturers which could vary from country to country. Potential hazards and defects at each processing step starting from raw material reception and ending with final product distribution will also be identified. In addition, each processing step will include technical guidance for controlling the identified hazards and defects that help ensuring consumer safety and product quality.~~

### Example of a flow chart of fish sauce processing

This flow chart is for illustrative purpose only. For in-factory implementation of HACCP principles, a complete and comprehensive flow chart has to be drawn up for each product.

References correspond to relevant Sections of the Code.



\* could be separated more than 2 times done one or more times

For optional Dashed lines indicate an optional step

## 1. Reception of raw materials

### 1.1 Fish

Potential hazards: combrotoxin (histamine), microbiological contamination biotoxins, chemical contamination (including pesticides and veterinary drug residues), physical contamination

Potential defects: decomposition, physical contamination

Technical Guidance:

- ~~For fish or parts of fish,~~ Raw materials receiving specifications could controls should include the following characteristics where applicable to the identified hazards and defects:
  - For the control of microbial pathogens, scombrotoxin fish poisoning, and decomposition:-
    - As appropriate, harvest vessel, transportation and storage records documenting that the fish were rapidly chilled and maintained at 4 °C or below;
      - o As appropriate, harvest vessel and transportation records documenting that the fish were adequately salted to achieve the target water activity, or water phase salt, within the target time;
      - o Histamine analysis.
    - Organoleptic characteristics, such as (e.g. appearance, odour, texture) and chemical criteria (e.g. total volatile basic nitrogen (TVB-N));
      - o Chemical contaminant criteria, such as indicators of decomposition and/or contamination, for example, total volatile basic nitrogen (TVBN), histamine, heavy metals, pesticide residues, and nitrates;
      - o microbiological Natural biotoxin criteria (to prevent the processing of raw material containing microbiological toxins e.g., domoic acid, ciguatera toxin) for fish with risk;
      - o Veterinary drug residues criteria (when the raw fish material is from aquaculture);
      - o Foreign matters.
- Skills should be acquired by fish handlers and appropriate personnel in sensory evaluation techniques to ensure that raw fish meet essential quality provisions of the appropriate Codex Standard and sorting of fish species that pose a risk of biotoxins such as ciguatoxin in large carnivorous tropical and subtropical reef fish.
- To control the Clostridium botulinum hazard, in addition to the chilling or salting controls above, unviscerated Fish greater than 12 cm in length that ~~required~~ have not been gutted on the harvest vessel, should be gutteding on arrival at the processing facility:-
  - Fish should be gutted efficiently, without undue delay and with care to avoid contamination:-
  - Gutting is considered complete when the intestinal tract and internal organs have been removed:-
  - Clean seawater or potable water should be used.
- Fish should be rejected if there is an evidence that they may it is known to contain harmful, decomposed or extraneous substances unable to be reduced or eliminated to an acceptable level by normal procedures of sorting or preparation.
- Information about the harvesting area should be recorded.

### 1.2 Salt requirements

Potential hazards: chemical and physical contamination

Potential defects: incorrect composition

Technical guidance:

- Salt used should be food grade as indicated in the *Standard for Food Grade Salt* (CODEX STAN 150-1985)."
- The composition of salt differs according to the origin. Mine salt and solar salt of marine origin contain several other salts such as calcium sulphate, magnesium sulphate and chloride as impurities. Solar salt may be stored at least 2 months before using to obtain a good taste of fish sauce.

- Salt used should be inspected to ensure that it is clean, not ~~previously used~~~~used before~~, free from foreign matter and foreign crystals, and shows no visible sign of contamination with dirt, oil, bilge or other extraneous materials.
- ~~The size of the salt granules used should be carefully considered. Medium size salt crystals should be used. Use clean salt without contaminants. If the crystal small size salt is used is too small, the outer skin of fish will rapidly lose moisture and salt burn can occur which will prevent salt penetration into the fish. Consequently, inner the inside of fish can become spoiled decomposed. In case of If the crystal size is too large salt crystal, it salt can slowly penetrate too slowly, thus and fish might become spoiled decomposed before the preservation effect of salt occurs.~~
- Salt should be transported and stored dry and hygienically covered in salt bins, storerooms, containers or in plastic sacks.

#### 1.2.1 Salt handling and storage

*Potential hazards:* chemical and physical contamination

*Potential defects:* unlikely

*Technical guidance:*

- ~~Salt should be transported and stored dry and hygienically covered in salt bins, storerooms, containers or in plastic sacks.~~

### 2. Mixing of fish and salt

*Potential hazards:* histamine, microbiological contamination (*Clostridium botulinum* and *Staphylococcus aureus* toxins), metal inclusion

*Potential defects:* -decomposition, physical contamination

*Technical Guidance:*

- Fish and salt should be mixed thoroughly by trained personal or machines to ensure the proper contact of salt to fish so as to prevent the growth of pathogens and decomposition during fermentation.
- All the apparatus used to mix fish and salt should be easily cleanable, rust-free and resistant to salt. Mechanical mixers should not introduce unapproved substances, or metal fragments.
- In order to prevent spoilage and growth of pathogenic bacteria, the concentration of salt should not be less than 20% by weight. The common ratios of fish to salt by weight are 3:1, 5:2 and 3:2.
- Fish should attain ~~10 percent~~ 10% water phase salt, or  $\leq 0.85$  water activity ~~below 0.85, within 24 hours of mixing, as measured~~ in the centres of the largest fish within the appropriate time period for the target pathogen and ambient temperature.
- ~~Salt burn should be avoided by using right type of salt. Refer to Section 11 for further information about salting fish.~~

### 3. Fermenting

*Potential hazards:* physical and chemical contamination

*Potential defects:* undesirable odour and taste, incomplete fermentation

*Technical Guidance:*

- Care should be taken to ensure the cleanliness of the fermentation area and tanks.
- Fermenting tanks should be made from non-hazardous material and be able to prevent product contamination.
- ~~—~~ Fermentation period at ambient, or controlled, temperature, should typically range from 6-18 months to achieve good quality of fish sauce from natural fermentation in a tropical zone. When fermentation aids are used, the period can be varied may be shorter.
- Colour, clarity, aroma (odour) and taste criteria, along with chemical criteria may be monitored to determine the end of the fermentation process.

#### 4. First separation

Potential hazards: ~~-unlikely~~

Potential defects: ~~-incorrect separation (e.g. objectionable matter, turbidity)~~

Technical Guidance:

- All utensils should be clean
- Liquid and solid (fish residue) should be completely separated.
- ~~First~~The extract (liquid) should be translucent, ~~not turbid solution~~

#### 5. Brine preparation

Potential hazards: ~~-unlikely~~

Potential defects: ~~-undesirable odour and taste~~

Technical Guidance:

- Brine ~~used for brine extractions of, preferably saturated, added to~~ fish residues should be prepared from potable water and food grade salt ~~for succeeding extraction,~~ and should be saturated.

#### 6. Succeeding extraction

Potential hazards: ~~-unlikely~~

Potential defects: ~~-undesirable odour and taste~~

Technical Guidance:

- ~~Succeeding-Succeeding~~ brine extraction of the fish residues could be carried on as long as desirable extracts are obtained according to a standard operating procedure.

#### 7. Separation

Refer to Step 4: First Separation

#### 8. Blending

Potential hazards: ~~-~~microbiological contamination, scombrotoxin (histamine), unsafe unauthorized additives, unlabelled allergens

Potential defects: ~~-~~ingredient measurement errors, unauthorized food additives, incorrect pH.

Technical Guidance:

- Total Nitrogen (TN) of fermentation and extract batches should be analyzed before blending. Total nitrogen, and amino acid nitrogen content and pH in the final product must be in compliance with the *Standard for Fish Sauce* (CODEX STAN 302-2011).
- To achieve good quality fish sauce, ingredients should meet the required characteristics and appropriated concentrations.
- All utensils should be clean.
- Food additives and levels used need to be in compliance with the *Standard for Fish Sauce* (CODEX STAN 302-2011). Food additives used need to be identified with names and identification numbers which comply to *Class Names and the International Numbering System for Food Additives* (CAC/GL 36-1989).
- Before ~~mixing-blending~~, chemical properties, and essential quality factors should be monitored according to the Standard for Fish Sauce (CODEX STAN 302-211) ~~Standard for Fish Sauce~~, and the results should be recorded.
- Any allergenic ingredients should be properly labeled.

#### 9. Filtering

Potential hazards: *chemical contamination from a cleaning or disinfection agent*

Potential defects: *foreign matter and turbidity*

Technical Guidance:

- Filtering system should be cleaned and kept in an appropriate environment to prevent contamination.

- An appropriate filtering system should be checked regularly.

## 10. Storage

*Potential hazards: physical and chemical contamination*

*Potential defects: ~~unlikely foreign matter~~*

*Technical Guidance:*

- The storage tanks with lid should be clean, resistant to rust and salt, located in an appropriated area.
- The product should be ~~stored properly and~~ kept from any source of contamination.
- The batches, or lots, in storage should be identified for trace back purposes.

## 11. Filling ~~in~~ containers

*Potential hazards: residual chemical cleaning agent, physical contamination such as glass fragments.*

*Potential defects: -foreign matters, incorrect volume, defective and unclean bottles and containers*

*Technical Guidance:*

- Containers should be randomly and regularly checked for defects and cleanliness.
- Filling machines should be kept clean to prevent contamination.
- Filling machines should be regularly checked to prevent failure in the filling of container.
- Defective containers should not be used.

The containers should be made with material that is high salt content resistant and will not release any harmful substances for human health.

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## 12. Capping

*Potential hazards: ~~unlikely~~*

*Potential defects: - loose plastic matters, broken caps, foreign matters, leaking containers*

*Technical Guidance:*

- ~~Caps should be checked before capping.~~ Caps should be randomly and regularly checked for defects and cleanliness before capping.
- ~~After capping foreign matters should be checked.~~ After capping containers should be checked for proper seal and leakage.

## 13. Labelling/packaging

*Potential hazards: ~~unlikely~~ incorrect allergen labelling*

*Potential defects: -incorrect labelling*

*Technical Guidance:*

- Refer to Sections 8.2.3
- If the ingredients include one or more allergens, the labels should be checked to assure that the proper label is used with the allergenic ingredient(s) displayed.

## 14. Transportation/distribution

*Potential hazards: ~~unlikely~~*

*Potential defects: -contaminated and damage containers and cartons*

*Technical Guidance:*

- Cartons should be cleaned, dry, durable and suitable for the intended use and avoid the damage of the packaging materials.
- Cartons should be applied to avoid the damage of containers.
- Also refer to Section 17.4.

## 15. Application of fermentation aids

*Potential hazards: microbiological contamination*

*Potential defects: ~~unlikely~~ improper fermentation, undesirable flavor/odour*

*Technical Guidance:*

- Fermentation aids should be stored at appropriate temperature in order to avoid deactivation of fermentation aids.
- When enzymes and bacterial cultures are used as fermentation aids, they should be handled to minimize the microbiological contamination.

## 16. Heating

*Potential hazards: -unlikely*

*Potential defects: over heating*

*Technical Guidance:*

- Adequate temperature and time combination should be applied.
- ~~The temperature and heating time should be monitored and recorded.~~

## 17. Ingredients and additives **storage**

*Potential hazards: chemical, physical and microbiological contamination*

*Potential defects: depends on ingredient, loss of quality characteristics*

*Technical guidance:*

- ~~Refer to Sections 8.5.1 and 8.5.2~~ Ingredients and additives should be stored appropriately in terms of temperature and humidity.
- Ingredients and additives should be stored in a dry and clean place under hygienic conditions.
- ~~Ingredients and additives should be properly protected and segregated to prevent cross-contamination.~~
- ~~Defective ingredients and additives should not be used.~~

## 18. Packaging materials **reception and storage**

*Potential hazards: chemical and physical contamination*

*Potential defects: ~~unlikely~~ misdescription, loss of packaging integrity*

*Technical guidance:*

- Refer to Sections 8.5.1 and 8.5.2
- Labels should be verified to ensure that all information declared meets, where applicable, the *General Standard for the Labelling of Prepackaged Foods* (CODEX STAN 1-1985) and labeling provisions of the ~~Codex~~ Standard for Fish Sauce (CODEX STAN 302-211) ~~and/or other relevant national legislative requirements.~~
- Packaging materials should be examined to ensure that they are intact and not contaminated.

## ~~19. Storage of packaging materials~~

~~*Potential hazards: chemical and physical contamination*~~

~~*Potential defects: unlikely*~~

~~*Technical guidance*~~

- Packaging materials should be stored in a dry and clean place under hygienic conditions.
- ~~Packaging materials should be properly protected and segregated to prevent cross-contamination.~~
- ~~Defective ingredients and packaging materials should not be used.~~



**[19 (bis) Salting on harvest Vessel (optional)]**

*Potential hazards: Scombrototoxin (histamine), Microbiological, chemical and physical contamination*

*Potential defects: Decomposition*

*Technical guidance:*

- Refer to Step 2
- If fish less than 12 cm are intended to be salted rather than chilled on the harvest vessel in order to control pathogen growth, they should be layered with salt shortly after death (e.g., removal from fishing net.)
- The vessel salting process should be validated to attain  $\geq 10\%$  Water Phase Salt or  $\leq 0.85$  Water Activity in the centers of the largest fish within the appropriate time period for the target pathogen and ambient temperature.
- Adequate salt should be on board the vessel for the size of the fish catch
- Records should be kept of the critical times, weights/volumes, temperatures and/or other criteria used for the validated salting procedure.
- The containers and lids for holding fish and salt should be in good condition, cleaned and sanitized, and appropriate for the purpose of holding fish, salt, and resultant liquid in a sanitary manner.]

**CLARIFICATIONS AND RESPONSES TO SIGNIFICANT COMMENTS FROM MEMBERS**

- **Introduction**

**1<sup>st</sup> paragraph**

Minor amendments were made in this paragraph.

**2<sup>nd</sup> paragraph**

As recommended by one member country, the 2<sup>nd</sup> paragraph of subsection: "Defect" was moved to make this new paragraph, as it is concerned the scope of document, not the defects.

In addition, it is confirmed to remain the term "reception", because the processing of fish sauce starts from the step of raw materials reception, not include practices on the vessel. Nevertheless, the controls of raw material reception are employed by the manufacturers that are described as technical guidance in this step to ensure the safety and quality of raw materials and fish sauce production.

- **Example of a Flow Chart of Fish Sauce Processing**

**Step 1: Reception of raw materials and Step 2: Mixing of fish and salt**

*One member country recommended to insert heating as an optional step between step 1 and step 2*

Heating step should not be inserted between step 1 and step 2, because heating before or after the reception of raw materials will destroy enzymes in fish and then the fermentations do not occur.

**Step 4: First separation**

*One member country recommended changing the title to "Separation after fermentation".*

The title of this step should be remained as it was, because fermentations can occur one or more times in the processing of fish sauce.

**Step 5: Brine preparation**

It is agreed that this step should be an optional step because fish sauce may be made without added brine.

**Step 6: Succeeding extraction**

*One member country recommended changing the title to "Brine extraction (optional step)".*

According to Section 2.2 Process Definition of a *Standard for Fish Sauce* (CODEX STAN 302-2011), this step should be included in the processing of fish sauce, not an optional step. And, it is agreed that the title of the step should be remained as it was.

We would like to make clarifications that the term "succeeding extractions" means the following fermentations that could be done after the first extract is obtained. The "succeeding extractions" that could be done one or more times in the fish sauce processing are carried out by adding brine to fish residues for a period of time (e.g. at least 1 month) to extract the remaining protein fish, flavour and odour (refer to Section 2.2 of the *Standard for Fish Sauce*, CODEX STAND 302-2011). The extraction is not just adding added water to obtain fish sauce.

**Step 7: Separation**

*One member country recommended to change to title to "Separation extraction (optional step)"*

This step should be included in the processing steps of fish sauce, because it is a significant step in every production. Therefore, it is not an optional step and, its title should be remained as it was.

Our clarification is that the term "separation" means the separation of fish sauce (liquid) from fish residues as filtration after the "succeeding extraction" as described above.

**Step 8: Blending**

*One member country recommended to change the title to "Mixing of Ingredients (optional step)"*

We are in the opinions that the title of this step should be remained as it was. And, the step should not be an optional step of fish sauce processing, because this step describes the blending of fish sauce which is not just for the purpose of mixing of ingredients, since traditional fish sauce does not need any mixing of ingredients.

**Step 17: Ingredients and additives**

It is agreed that this step should be an optional step in the processing of fish sauce. And, the step should be revised as follows:

**“Step 17: Ingredients and additives storage”**

**Step 18: Packaging materials**

It is agreed to combine “Step 18: Packaging materials” and “Step 19: Storage of packaging materials”. So, the title of the combined step should be as follows:

**“Step 18: Packaging materials reception and storage”**

**Step 19 (bis): Salting on Harvest Vessel**

Step 19 (bis): Salting on Harvest Vessel should not be incorporated in the flow chart of fish sauce processing, but may be added as an optional step which is not included in the processing as a step or starting step. However, CCFFP may consider to revise “Section 4 : General Considerations for the Handling of Fresh Fish, Shellfish and Other Aquatic Invertebrates of a *Code of Practices for Fish and Fishery Product* (CAC/RCP 52-2003) to include *the* handling of fish by salt in addition to the control of time and temperature.

**1. Reception of raw materials****1.1 Fish****1<sup>st</sup> bullet**

***One member recommended that the temperatures for maintaining the quality of raw materials should be  $\leq 3.3$  °C instead of  $\leq 4$  °C.***

We would like to confirm that the temperatures for maintaining the quality of raw materials should be  $\leq 4$  °C in accordance with section 8.1.2 of the *Code of Practices for Fish and Fishery Products* (CAC/RCP 52-2003).

**3<sup>rd</sup> bullet**

Fish greater than 12 cm should be eviscerated to eliminate pathogenic microorganisms that could be in their intestines. And, the use of portable water could be an optional practice that is practical for manufactures. Therefore, it is agreed to revise the bullet as appear in Annex II.

***One member recommended adding a new bullet regarding histamine levels.***

The new bullet regarding histamine levels should not be added in this step, because the temperature of  $\leq 4$  °C is sufficient to maintain the quality of raw materials appropriate for fish sauce production. Moreover, the controls of histamine levels are conducted by the use of high salt concentration that is a fermentation process to decompose protein into amino acids and histidine. And, subsequently histamine will be derived from the histidine. However, the histamine levels in the final products will not be higher than the provision of the *Standard for Fish Sauce* (CODEX STAND 302-2011) which is 40 mg histamine /100g of fish sauce in any sample unit tested. Meanwhile there is no provision for the histamine levels during the processing.

Therefore, it is suggested that the levels of histamine during the processing of fish sauce should not be elaborated in this code of practice. Nevertheless, the final products will be tested for the histamine levels to determine their compliance to the provision in accordance with the *Standard for Fish Sauce* (CODEX STAND 302-2011).

***One member country recommended adding a new bullet regarding temperatures for maintaining the quality of raw materials on harvest vessel.***

This proposed new bullet should not be added in this step. And, we would like to confirm that the temperatures for maintaining the quality of raw materials should be  $\leq 4$  °C as described above.

**1.2 Salt requirement**

It is agreed to have this section remained as follows: **“1.2 Salt ~~requirement~~”**.

**1.2.1 Salt handling and storage**

The bullet on this section should be moved to be included in **“Section 1.2 Salt”**.

## 2. Mixing of fish and salt

***Some member countries recommended that Water Phase Salt (WPS)  $\geq$  20% is needed to inhibit pathogens, including *Staphylococcus aureus*.***

It is suggested that “Water Phase Salt” should be  $\geq$  10% instead  $\geq$  20% in order to be consistent and in accordance with the existing Codex standards e.g. *Standard for Smoked Fish, Smoke-Flavored Fish and Smoked-Dried Fish* (CODEX STAN 311-2013) which has similar potential hazards on microbiological contaminations. And the WPS at  $\geq$  10% should be applied for all relevant sections and steps of fish sauce processing through the whole document. From histories, problems on *Staphylococcus aureus* have never occurred in fish sauce. And, *Staphylococcus aureus* can be controlled by *Good Manufacturing Practices (GMPs)*.

It is agreed that the last bullet should be deleted, as it was already mentioned in the introduction.

It is agreed to add the new bullet to this section to refer to Section 11 of the *Code of Practice for Fish and Fishery Products* (CAC/RCP 52-2003).

## 3. Fermenting

***One member recommended to include scombrototoxin (histamine) and microbiological contamination as potential hazards.***

In our point of view, the text should be maintained as it was, because the histamine and microbiological contamination can be controlled by salt in the previous steps of processing. The effective controls of histamine and microbiological contamination can control the mentioned hazards through the entire processing. So, they are not potential hazards on this step. However, it is agreed to add “*incomplete fermentation*” to potential defects of this section.

## 6. Succeeding extraction

***One member recommended to include scombrototoxin (histamine) and microbiological contamination as potential hazards.***

We are in the opinions that saturated brine that can control the formation of scombrototoxin (histamine) and microbiological contamination are used in the extraction. So, the mentioned hazards cannot occur in this step. Therefore, the potential hazards should be remained as it was.

***One member recommended to include monitoring Percent Water Phase Salt during extractions.***

The saturated brine is used that does not cause the decrease of “Water Phase Salt”. Moreover, there is no adding added water in the processing, so the “Water Phase Salt” cannot change. Therefore, the additional new bullet addressing the “monitoring of Percent Water Phase Salt” is not needed.

## 8. Blending

***One member country recommended to include *Clostridium botulinum* as potential hazards***

In our point of view, the sufficient controls of *Clostridium botulinum* are implemented in the previous steps, so the risk of *Clostridium botulinum* toxin does not occur in this step.

***Some member countries recommended to include Incorrect pH as potential defect.***

Since, the *Standard for Fish Sauce* (CODEX STAN 302-2011) includes a requirement for pH under a provision of Chemical Properties, so it is agreed to add “Incorrect pH” as an additional potential defect of this step.

***One member recommended to add a new bullet regarding water phase salt and water activity, histamine levels and Clostridium botulinum toxin by boiling of fish sauce.***

A proposed new bullet concerning “water phase salt and water activity” should not be inserted to this step, because there is no adding added water in the fish sauce processing.

A proposed new bullet regarding histamine levels should not be added in this step, because bullet 5 already mentions that essential quality factors including histamine should be monitored according to the *Standard for Fish Sauce* (CODEX STAN 302-2011).

As, described above, the *Clostridium botulinum* toxins are not potential hazards in this step, because the sufficient controls are implemented. Meanwhile, boiling will make fish sauce lose its desirable flavors. So, a proposed new bullet that concerns *Clostridium botulinum* toxin by boiling should not be inserted to this step.

## **10. Storage**

***One member country recommended to include microbiological contamination, scombrotoxin (histamine) and heavy metals as potential hazards***

We are in the opinions that the potential hazards should be remained as it was for the following reasons.

- According to the *Standard for Fish Sauce* (CODEX STAN 302-2011), the salt content of the products in this step should not be less than 200 g/l (calculated as NaCl) that can inhibit pathogen growths, so the risk of microbiological contamination does not occur in this step.
- An analysis of scombrotoxin (histamine) levels is already done in a blending step to ensure that the products are complied with the *Standard for Fish Sauce* (CODEX STAN 302-2011), so the risk of scombrotoxin (histamine) does not occur in this step.
- In practices, the storage tanks made of concrete, fiber glass or plastic are used; meanwhile stainless steel tanks are not used. So, the risk of heavy metal does not occur in this step.

Moreover, a proposed new bullet regarding the salinity of product should not be added, because according to the *Standard for Fish Sauce* (CODEX STAN 302-2011), the products in this step contain salt not less than 200 g/l (calculated as NaCl) and the analysis of scombrotoxin (histamine) levels is already done in the blending step to ensure that the products are complied with the standard.

## **12. Capping**

***One member recommended to include residual and chemical cleaning agents as potential hazards***

In our point of views, this step uses new caps from a production source, no need for cleaning, so there is no risk on residual and chemical cleaning agents. The potential hazards should be remained as it was.

## **13. Labelling/packaging**

A new bullet regarding the inclusion of a "best before date" to the label should not be added, since the provision is already indicated in a *General Standard for the Labelling of Prepackaged Foods* (CODEX STAN 1-1985).

## **16. Heating**

***One member recommended to add a new bullet regarding boiling fish sauce for a minimum of 10 minutes.***

We are of the views that the proposed bullet should not be added to this step, because the meaning of the first bullet is considered sufficient and comprehensive. In addition, the controls of *Clostridium Botulinum* toxin are implemented in the previous steps, so there is no risk of *Clostridium Botulinum* toxin in this step.

Besides, boiling will make fish sauce lose its desirable flavor as mentioned before.