perennia
ideas • innovation • success

FACT SHEET

DECEMBER 2022 | ©Perennia 2022

PROCESS GUIDELINES FOR SALTED SEAFOOD PRODUCTS

Definitions

Salting is a process of treating fish with salt of food-grade quality to lower water activity in fish flesh and to enhance the flavour by any appropriate salting technology (e.g., dry salting, brining, injection salting).

Salted fish is the product obtained from fish of the species belonging to the family *Gadidae* (Cod, Haddock, Pollock, Hake, Whiting) and that has been bled, gutted, beheaded, split, or filleted, washed, and salted.

Dried salted fish is salted fish than has been dried.

Process Guidelines for Curing in Brine

Curing in a brine solution, **wet salting**, **pickling**, or simply **brining** is the process whereby fish is mixed with salt and water and stored in watertight containers under the resultant brine.

i. Brining should be performed at temperatures < 3.3 °C, and fish must be at or < 3.3 °C when entering the brine solution to prevent its temperature from rising.

ii. Brine should be prepared from potable water and food-grade ingredients - the salt concentration should be verified using a salometer or refractometer.

iii. Brined fish should be rinsed in potable water after brining.

iv. Brine should never be reused for products of different species, but may be acceptable for products of the same species if the brine is returned to an acceptable microbiological level and production lots using the same brine are linked through records.

v. A scheduled process for brining should define:

   a. The minimum volume of brine

   b. Minimum concentration of salt and/or other ingredients affecting water-phase salt or water activity within the brine

   c. The maximum volume of fish

   d. The maximum size of fish/fish fillet/fish portion

   e. Minimum time in brine shall be predetermined for each batch and outlined in a scheduled process to achieve the required water-phase salt or water activity in the finished product

   f. Salted products intended for storage at room temperature must measure a water-phase salt of at least 20%

Process Guidelines for Dry-cured fish

Dry curing is the process of mixing fish with a dry curing mixture and stacking the fish so that the excess of the resulting brine drains away.

i. Dry curing should always be performed at temperatures < 3.3 °C.

ii. Components of the curing mixture should be food-grade and shall only be reused if microbiological levels are acceptable and with the same species.

iii. Dry curing should be performed with portions of uniform size and species.

iv. Air-drying at ambient temperatures should only be performed when water activity is < 0.85 and/or water phase salt is > 20%.

v. A scheduled process should define:

   a. The amount of salt, sugar, salt/sugar mixture, and/or other dry-curing mixture

   b. How the curing mixture will be distributed across all surfaces of the product to achieve the required water phase salt or water activity in the finished product.

Process Guidelines for Cured Fish in Oil

i. Cured fish to be packaged in oil must have a water phase salt of 5.0% or a water activity of < 0.97

ii. Cured fish must always be stored under refrigeration.

iii. Any additional ingredients in the product should have a water activity of < 0.85 or a pH of < 4.6.

Process Guidelines for Marinated Seafood Product

Marinating, or acidified curing, of fish involves preservation by a combination of acid and salt.

i. Any cured fish being packed in vinegar or any other acidic solution shall have a uniform pH of 4.6 or less, be acidified at 38 °F/3.33 °C or less, and be labelled 'keep refrigerated' at 38 °F/3.33 °C or less.

ii. A scheduled marinating process should define:

   a. The volume of acidic solution,

   b. The pH of acidic solution

   c. Type of acid(s)

   d. Volume of fish

   e. Size of fish/fish fillets/ fish portions

   f. Acidification time until a uniform pH of 4.6 or less is achieved

Process Guidelines for Fermented Seafood Products

Fermented Seafoods are prepared by mixing fish with salt and left in covered containers or tanks for not less than six months.

i. All raw fish to be fermented that are 5 inches in length or greater must be fully eviscerated, except for fish less than 5 inches, if they are processed in a safe fashion which eliminates a pre-formed toxin, prevents toxin formation during processing, and will contain a water phase salt level of at least 20%, a water activity below 0.85, or a pH of 4.6 or less.

ii. All measurements shall be taken when fish has been released from rigor mortis.

iii. All fermented fish shall have a uniform pH of 4.6 or less and be distributed and displayed at 38 °F/3.33 °C or less and labelled 'keep refrigerated at 38 °F/3.33 °C or less.

iv. Fish Sauce is a translucent, not turbid liquid product with a salty taste and fish flavour obtained from the fermentation of a mixture of fish and salt.

v. A scheduled process should define:

   a. The volume of fish

   b. Maximum size of fish and or fish portions

   c. Volume of salt

   d. Volume of liquid

   e. Minimum and maximum fermentation temperatures

   f. The maximum time for required pH reduction

   g. Specific controls for all significant pathogens of public health significance, biogenic amines (including but not limited to putrescine, cadaverine, histamine) and Clostridium botulinum

		Making up a Brine	Brine weights (grams) and volumes (litres)			Brine adjustments	
Brine Strength (°)	% salt (w/w) in brine	Salt (g) added to 1 L water	Brine Volume (1 L of water + salt) (L)	Mass of 1 L of brine (g)	Volume of 1 kg of brine (L)	Water content (g water/L of brine)	Salt content (g salt/L of brine)
10	2.64 %	27.07	1.01	1016.80	0.983	990	26.8
20	5.28 %	55.66	1.02	1035.60	0.966	981	54.6
30	7.92 %	86.01	1.03	1055.60	0.947	972	83.6
40	10.56 %	117.98	1.04	1075.50	0.930	962	113.5
50	13.20 %	151.95	1.05	1095.50	0.913	951	144.5
60	15.84 %	188.18	1.06	1115.70	0.896	939	176.7
70	18.48 %	226.78	1.08	1136.00	0.880	926	210.0
80	21.12 %	267.69	1.10	1157.40	0.864	913	244.4
90	23.75 %	311.57	1.11	1179.10	0.848	899	280.1
100	26.40 %	358.82	1.13	1201.20	0.833	884	317.2

Calculation: Water Phase Salt
Water Phase Salt = [(% Salt)/(% Salt + % Water)] x 100

References

Association of Food and Drug Controls. 2019. Cured, Salted, and Smoked Fish Establishments Good Manufacturing Practices. **https://www.afdo.org/wp-content/uploads/2020/11/Cured_salted_and_smoked_fish_establishments_good_manufacturing_practices_acc_updated_2019.pdf**

Bannerman, A. and Horne, J. 2001. Recommendations for the Preparation of Smoked Salmon. Torry Advisory Note No. 5. **https://www.fao.org/3/x5886e/x5886e00.htm**

Cann, D.C. 2001. Botulism and Fishery Products. Torry Advisory Note No. 22 **https://www.fao.org/3/x5902e/x5902e00.htm#Contents**

Codex Alimentarius. 2018. Standard for Fish Sauce. **https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXS%2B302-2011%252FCXS_302e.pdf**

Codex Alimentarius. 2018. Standard for Salted Fish and Dried Salted Fish of the Gadidae Family of Fishes. **https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXS%2B167-1989%252FCXS_167e.pdf**

Food and Drug Administration. 2022. Fish and Fishery Products Hazards and Control Guidance. **https://www.fda.gov/media/80637/download**

McLay, R. 2001. Marinades. Torry Advisory Note No. 56. **https://www.fao.org/3/x5932e/x5932e00.htm#Contents**

Seafood Academy. Salting or Brining of the Fish. **https://seafoodacademy.org/brining-activity.php**