Biotica Research Today Vol 4:3 2022

214/217

Commercial Methods for Pasteurizing Crab Meat in Cans

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Open Access

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Keywords

Cans, Crab meat, Pasteurization, Ready to eat

Article History

Received on: 28th February 2022

Revised on: 27th March 2022

Accepted on: 28th March 2022

E-mail: *bioticapublications@gmail.com*

How to cite this article?

Harini *et al.*, 2022. Commercial Methods for Pasteurizing Crab Meat in Cans. Biotica Research Today 4(3): 214-217.

Abstract

Crab meat industries are one of the seafood processing industries that have been successfully evolving currently. So, making crab meat available throughout the year with nominal cost range is the major aim for the crab processing sector. It is then achieved by packing cooked crab meat in cans and pasteurizing the packed crab meat at 85 °C. Pasteurization of crab meat in cans is a successful technique that has been followed in industries. In this study, the traditional method of crab meat pasteurizing, their conditions and their difficulties are discussed.

Introduction

The crab meat industry has relied on pasteurization to extend crab meat's shelf life and to make it as RTE product for the ease of consumer utility. The pasteurization process has given the crabmeat industry flexibility to inventory the product in times of abundance. Therefore, customer demand can be supported during the low harvest seasons. Pasteurization has also brought price stability to the industry as the processor is not forced to reduce the price of crabmeat during peak harvest seasons. Pasteurization of crabmeat in conventional cans has been quite successful. Pasteurization destroys most spoilage organisms, thereby extending shelf life under refrigerated storage conditions (Dickerson Jr and Berry Jr, 1974). According to (Flynn and Tatro, 1966), pasteurized crabmeat should have a shelf life of 6 months when stored at 32-36 °F (0-2.2 °C). A potential alternative method to pasteurization in cans is pasteurization in retort pouches. The retort pouch is an innovative packaging concept introduced in the 1950's. The crab meat is packed in tin cans that are hermetically sealed and then pasteurized (heat followed by cold). The entire process lasts for an average of 4 hours. Two hours at 85-89 °C of hot water until it reaches 85 °C and continuously, two hours in an ice water until the product reaches 10 °C. It is the rapid change in temperature that kills most bacteria since the product never boils. Pasteurization only eliminates the bacteria without affecting most of the attributes such as colour, flavour and texture. With a good pasteurization process, crabmeat can last up to 18 months under refrigeration and are safe to eat.

Materials Used in Crab Meat Pasteurization

1. Pasteurization Tank

Pasteurization tank is the main equipment that controls the whole processing conditions and decides the shelf life of the product. The equipments required for the construction of pasteurization tank are listed below.

• **Heating source:** Generally, boilers are used for heat generation in crab meat pasteurizing industry to meet the abundant heat requirement. Stainless steel pipes are used to carry steam, generated in the boiler to the pasteurizing tank.

• **Thermocouple:** Pasteurization tank usually consists of two thermocouples that are used to sense the inner temperature of the product as well as the water temperature in the pasteurizing tank.

• **Thermometer:** It is also a temperature measuring device.

• **Inner can holdings containers:** An additional support is given by this holder to hold the cans inside the tank in a proper position while processing.

2. Chilling Tank

Chilling is an important method in pasteurization that has to be carried out after the heating process. The crab meat has to be cooled immediately to 10 °C from 85 °C (pasteurizing temperature). To achieve this condition, a water tank which is filled with block ice is used or sometimes direct refrigeration support also given to cool the product.

3. Can Seaming Equipment

This equipment is used to seam the top and bottom of the can. It should be done with at most care because improper seaming may lead to can leakage whole batch process will be affected.

4. Coding Equipment

Coding is one of the major processes in crab meat pasteurizing why because the details of the product, its process details like date of manufacturing, expiry date, processed timing, batch number *etc*., all other details are noted in the coding operations.

5. Steam Cooker

For the initial pre-processing works crab meat is cooked in the steam cooker.

6. Chill Room

For temporary storage of crab meat chill room is used and maintain at 10-18 °C.

7. Cold Storage

After the entire processing, finished product is stored in cold storage at 0-4 °C until it get dispersed.

Process Flow

The process flow of the pasteurization of the crab meat was explained in flow chart in the Figure 1.

Crab Meat in Cans - Process Description

Crabs are caught and transported live to processing facilities by either boat or truck. On arrival, the crabs are inspected for physical damage, chemical contamination and mortality. Those crabs that are not immediately processed

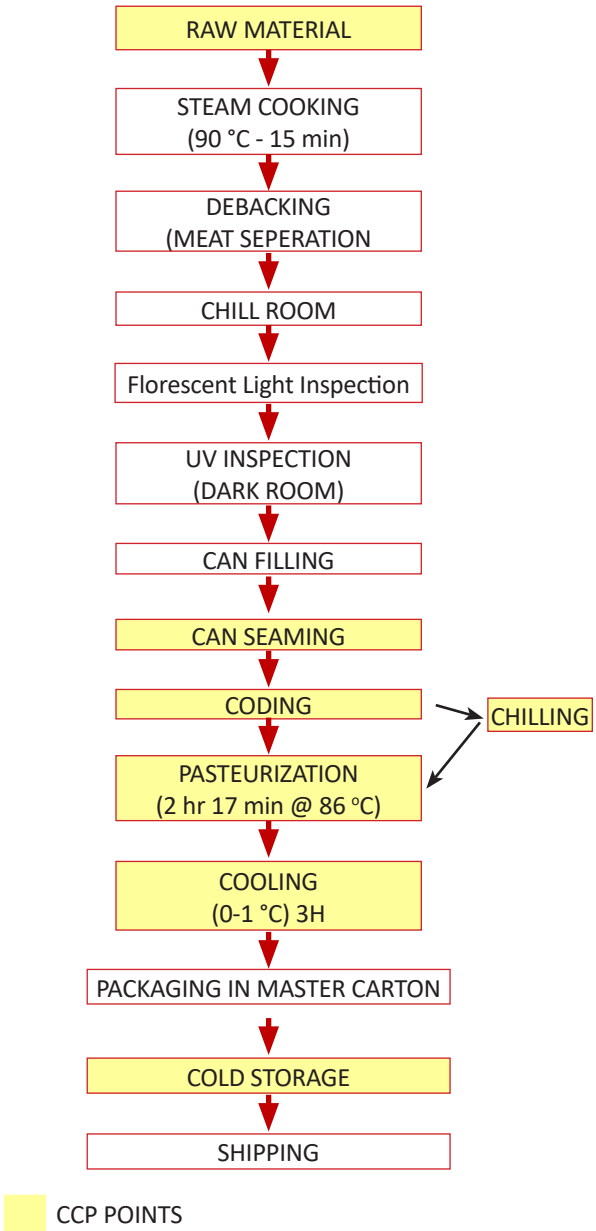


Figure 1: Flow Chart of Crab Pasteurization

are placed in a chill room (55-65 °F) for a maximum of 24 hours it may be optional based on the plant capacity. Then crabs are cooked in a retort for 15 minutes at 90 °C (15 psi). Cooked crabs are placed in an air cool room for a maximum of two hours or until steam is not visible from the crabs. The crabs are then placed in a chill room at 45 °F until processed.

• The cooled crabs are picked by hand using small tweezers like equipment for easy removal of crab meat from shells. Then crab meat is weighed and filled in cans (454 g). Usually in crab processing industry cans are used traditionally in same quantity of 454 g which is equal to 1 pound. This is because of exporting to foreign countries this quantity method is widely followed. It is also one sort of disadvantage in extending its

quantity in various options which is actually stopping the growth of crab industry.

• Crabs meat is sorted into 7 types Lump, Super, lump, Jumbo, Claw meat, Special, White meat, Back fin.

• Then the sorted meat is inspected under fluorescent light called dark room to remove the shells are other foreign materials in the meat.

• Then the sorted meat is packed in proper cans. While filling the can Sodium acid pyrophosphate/ sodium tri polyphosphate of 3 ml is added before and after filling to prevent struvite formation in the cans (Dickerson Jr and Berry Jr, 1974).

• In the packing rooms, cans are check-weighed and hermetically sealed with the can seamer. Within 48 hours of picking, meat is pasteurized. During the pasteurization process, the can of picked meat is heated in a water bath followed by cooling in ice slush. Finished product containers are stored under refrigeration.

• Recommended and commercially following Pasteurization conditions are to pasteurize the containers of crab until the geometric center of the containers reach at least 85 °C (185 °F) for at least 1 min. Cool to 37.8 °C (100 °F) or less within 50 min. Refrigerate at 0-4.4 °C (32-40 °F) within 1 hr. after processing (Anzulovic and Ready, 1954).

The critical control points for pasteurization of shellfish may include,

• Length of the pasteurization cycle.

• Temperature of the water bath.

• Water bath circulation.

• Product initial temperature (I.T.).

• Container size (*e.g.*, can dimensions, pouch thickness).

• Product formulation.

• Container integrity.

• Microbial quality of cooling water.

• Accuracy of thermometers, recorder thermometer charts, high temperature alarms, maximum indicating thermometers, and/or digital data loggers.

• Accuracy of other monitoring and timing instruments.

Commercially Available Crab Meat Categories

• Colassal - two largest muscles connected to the back swimming legs of the crab.

• Jumpo lump - muscles connected to the swimming leg.

• Lump - broken pieces of Jumbo Lump.

• Super lump - smaller than lump.

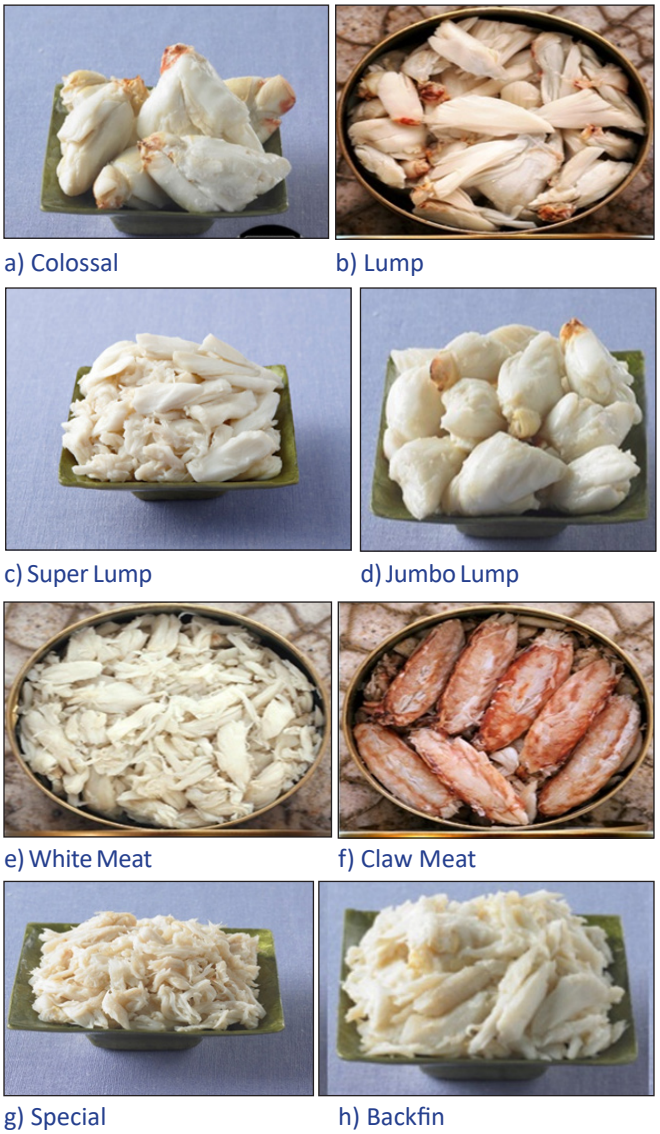
• Special - shredded white meat from the body cavity of crab.

• Claw - dark pink meat that comes from the swimming fins and claws of the crab.

• White meat - from the claws and legs of the crab.

• Back fin - flakes from the special meat and the jumbo lump.

All the categories of the available grades of the crab meat mentioned above is represented the Figure 2.



a) Colossal b) Lump c) Super Lump d) Jumbo Lump e) White Meat f) Claw Meat g) Special h) Backfin

Figure 2: Commercially available grades of crab meat

Problem Associated with Canned Fishery Products

• Struvite formation

• Sulphite blakening

• Curd & Adhesion

• Blue Discolouration

• Honeycombing

• Mush

• Retort burns

Conclusion

Crab meat is always having a high market value. This work explained about the one of the method called pasteurization of crab meat which is usually done to extend the shelf life of the product to some days to several months. These methods have been a successful method through fulfilling the customer needs till date. All the process step and conditions and problems occurring possibilities are detailed. On the other hand, the present invention can be variously modified for the benefit of consumer friendly usage like in packaging without much departing from the basic nominal process conditions of the present methods.

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