Pasteurization of Egg

A unique step for good health

Clevan Deekshith Cordeiro

Student

Dept. of Food Nutrition and Dietetics, Milagres College, Mangalore, India

Abstract: The article "Pasteurization of Egg" emphasizes the significance of egg pasteurization; it is vital to maintain their freshness and nutritional value. Various methods such as refrigeration, freezing, cold storage, coating with mineral oil (FDA-approved white mineral oil, Food Grade Mineral Oil), or using specialized egg containers like egg crates and in egg keeping compartment all these helps to maintain the quality of the egg. Refrigeration slows down bacterial growth, extending freshness for several weeks. Coating eggs with mineral oil forms a protective barrier, preventing air and bacteria from penetrating the shell. Proper handling and storage ensure that eggs remain nutritious and its safe for cooking as well as consumption.

Index terms: Egg, composition, pasteurization process, impact on egg quality.

I. INTRODUCTION

Pasteurization in simple terms is defined as it is a process that involves heating a food product at certain temperature followed by rapid cooling without affecting eggs quality. Here in case of egg pasteurization, it is a process that **involves heating eggs at a temperature to eliminate harmful bacteria like Salmonella spp, Escherichia coli, and Listeria monocytogenes and many others.** Pasteurization of egg is a step in freezing an egg that is in preservation of eggs for a long time effectively reducing microbial contamination and focusing on the nutritional composition of raw egg. Pasteurized eggs are commonly used in recipes that require raw or lightly cooked eggs, such as mayonnaise, mousse, or salad dressings. Eggs are pasteurized for preservation purpose; the eggs are pasteurized in order to reduce the risk of food borne illness by consuming the dishes which is prepared out of raw and mainly contaminated egg which leads to health risks.

II. OBJECTIVES

- **To study about pasteurization of egg:** Pasteurizing the egg is a process to make it microorganisms and disease free as to give a good health for society.

- **Importance of pasteurization:** Pasteurization is a unique process of extension of shelf life as well as making it microorganisms and disease free.

• **U.S pasteurization method:** Understanding the pasteurization of egg process with shell adapted in United States.

• **Impact on egg quality:** Learning the overall impact of pasteurization on egg how it enhances the quality making it less contaminated.

III. METHODOLOGY

THE STUDY IS BASED ON JOURNALS, ARTICLES AND FOOD SCIENCE TEXTBOOK

IV. EGG

Egg is a food product which is obtained by a hen. Egg is considered as a complete protein because of its nutritional composition. Egg contains protein such as Albumen, globulin, livetin, Apo-lipoproteins and many more, egg shell consists of calcium carbonate. It consists of nine essential amino acids which are important for body growth and metabolism. By consuming eggs there are several health benefits such as eggs do not raise blood cholesterol, eggs are an excellent source of protein, eggs have high levels of Omega-3 fatty acids they can lower risk of a Stroke.

4.2 NOTE ON PASTEURIZATION IN U.S

➢ The Pasteurization of egg is a process which consists of several steps in it. The UNITED STATES FOOD AND DRUG ADMINISTRATION unit of 2013 defines that “the shelled eggs are potentially hazardous food”. The egg should be treated with heat before consuming it.

➢ Consuming raw eggs is not preferable as it contains various bacteria, microorganisms in it which is harmful for the human body which might result in illness.

➢ So the United States food and drug administration association stated that the eggs should be pasteurized which means it should be treated with heat by exposure to high temperature in a proper time that is of required timings by being aware of egg composition, egg white, egg yolk texture, nutrients and proteins so that these things should not be disturbed because it makes an egg as complete source of protein in food.

➢ The eggs in U.S are firstly pasteurized and then sold in the market. Most about 90-95% of the eggs in U.S are primarily treated with pasteurization process by maintaining a certain time and temperature and then after checking the quality it is distributed to markets for sale. This whole process is performed according to the guidelines and instructions of U.S DEPARTMENT OF AGRICULTURE, they won’t allow any of egg to be sold without pasteurization process.

4.3 PASTEURIZATION OF EGG PROCESS:

As pasteurization is a step in freezing of egg for preservation, it is a key step and considered as important part/ process in U.S. country.

Pasteurization of an egg is a preservation technique performed in two ways such as

1. **With the shell**
2. **Without the shell.**

Pasteurization of egg with the shell is a technique achieved by marking out of temperature and time in an egg pasteurizer machine.

4.3.1 With the shell

The Pasteurization process for whole liquid egg. It involves of treating the egg within **water baths at temperature of 60 – 62°C for not less than 3½ minutes. And at 57°C for few minutes.** Pasteurizing the egg is a good process in sight of health and nutrition but it also has some defects where the method should not exceed a certain temperature and time. The temperature is inversely proportional to the time where two each should be balanced like if you increase temperature then time should be decreased, or else there is huge impact on the egg's composition & nutrients.

Fig 1. Egg pasteurizer machine

- Exposure of egg to high temperature for a longer time will affect the nutritional benefits and value. So therefore, maintaining a temperature is essential.
- The aim of the Pasteurization of egg is mainly to destroy the bacteria present in egg such as Salmonella, Escherichia, yeasts and molds and many as it is hazardous for our health when it is consumed raw to **decrease the food borne illness.**
- There are different temperature and times for pasteurization of egg in various countries. Though heating affects the egg quality and proteins present in it but it is advisable and important to expose eggs for this condition. The acidity of the egg whites is increased before pasteurization to protect proteins to denature due to heat.

- Once the eggs are pasteurized at high temperature at certain time egg is coated with mineral oil or food grade wax to maintain freshness and to avoid contamination of eggs internal quality. After this the eggs are stamped with red or blue color as letter P to differentiate between pasteurized eggs and non-pasteurized eggs.

4.3.2 Pasteurizing Eggs After Opening Egg:

- It can be pasteurized after opening means without the shell.
- First, choose the eggs which are fresh and of less days. Make sure that egg shell is clean without the presence of dirt.
- After that take a sauce pan and boil the amount of water set it on your stove over high heat. Allow it to reach a steady simmer and steam and at that time break open the eggs and let it fall directly into the stainless-steel bowl.
- Whisk egg white and yolk by adding little liquid, using 30 ml (2 tsp.) of liquid for each complete egg, egg white, or egg yolk. Whisk the ingredients together thoroughly until the egg starts to look foamy.
- Place the bowl inside the saucepan once the water starts simmering and the heat is turned off place the bowl at the bottom of saucepan using tongs or pliers if necessary.
- Whisk continuously until the temperature of water cools. As soon as placing using a fork or whisk. Whisk around 2-3 minutes or until the temperature of water comes down.
- After the temperature drops take out the egg mix and use those eggs immediately in your recipe, don't attempt to refrigerate or freeze because those eggs without shell won't have longer shelf life so you have to use it instantly.

4.4 OVERALL IMPACT OF PASTEURIZATION ON EGG

Pasteurization on egg is a wonderful and interesting process where how a raw egg is pasteurized and the benefits and effects of pasteurization on egg than the raw egg which is not undergone the processing. Egg is treated under high temperature at required timings to get pasteurized and result in a safe and hygiene food. Pasteurizing the egg gives various benefits such as enhancing the storage time and it is safe to consume than having health issues by using raw egg.

The importance of pasteurization of eggs laid in its significant impact on food safety and public health. Here are some key points on importance of pasteurization.

- **Reducing Foodborne Illness:** Pasteurization of eggs helps to lower the risk of illness caused by bacteria such as Salmonella and Escherichia coli. Consuming raw or undercooked eggs results in inducing to infection and health issues.
- **Protecting Vulnerable Populations:** By pasteurizing egg, it helps in protecting vulnerable populations includes certain groups, such as young children, pregnant women, the elderly, and individuals with weakened immune systems, and who are at higher risk of severe illnesses. Pasteurization helps protect these vulnerable populations by making eggs safer to consume and hygienic food.
- **Consumer Confidence for purchasing:** Pasteurized eggs provide consumers to purchase those eggs and consume without having high risks of illness.
- **Nutrition and quality:** pasteurization of egg helps in longer shelf life when it is undergone freezing the continued preservation process. It avoids the loss of carbon dioxide and decrease the depth of air cell. It maintains a pH around 6.0- 7.6.and prevent the deterioration egg white and egg yolk.

➢ But in case of break open egg it should be consumed within instant after treating it with heat because it will stale soon and also can't be refrigerated or freezed.

4.5 EFFECT OF HEAT ON EGG PROTEINS

Egg is a vital source of protein, but when it is exposed to high heat denaturation of egg proteins takes place. So, by increasing the acidity of egg whites results in prevention of protein denaturation and the temperature and time also should be noticed during pasteurization. Albumen proteins are heat sensitive than yolk proteins so they are pasteurized under low temperature to prevent protein coagulation and to get a required protein nutrition while consuming after pasteurization.

Table1. Difference between pasteurized and non pasteurized egg

Pasteurized egg	Non-pasteurized egg
Pasteurized eggs are heat treated to kill harmful bacteria	Unpasteurized eggs are not heat treated and can still hold bacteria, such as Salmonella
Safe for consumption with less traces of bacteria	This egg is also consumed but contains more bacteria
Undergoes waterbath at high temperature for few minutes	It doesn't undergo any processes
The pasteurization process affects the ability of the proteins in the eggs to get firm	Protein structures are not affected

V. CONCLUSION

In this way, "Pasteurization of Egg "helps in prevention on risks of foodborne illness by the unique process of pasteurization which involves of water bath at a range of temperature and time reducing Salmonella bacteria content in egg making it suitable to consume often raw or cooked when it undergoes pasteurization process. How U.S have adapted this method and making their citizens to gain nutritious and contamination free eggs which is safe and suitable for consumption.

VI. ACKNOWLEDGMENT

I like to express my heartfelt gratitude to the research guide, Ms. Shaila Moras, lecturer, FND Department, for her guidance for developing an article on "Pasteurization of Egg" a unique step in preservation of eggs and special thanks to Rev. Fr. Michael L Santhumayor Principal, Milagres College for giving this opportunity and my deepest gratitude to all who helped me in completion of this paper.

REFERENCE

1. https://ift.onlinelibrary.wiley.com/doi/full/10.1111/1541-4337.13088
2. https://www.debralynndadd.com/q-a/mineral-oil-on-eggs.
3. https://www.simplyrecipes.com/how-to-pasteurize-eggs-at-home-84039644.
4. https://www.slideshare.net/slideshow/egg-pasteurization-manualpdf/264856563.
5. https://www.researchgate.net/publication/308958257_Pasteurisation_of_liquid_whole_egg_Optimal_heat_treatments_in_relation_to_its_functional_nutritional_and_allergenic_properties.
6. https://www.wikihow.com/Pasteurize-Eggs
7. https://egg-breakers.com/products/pasteurizers/m-350-egg-pasteurizer/
8. https://www.thespruceeats.com/where-to-buy-pasteurized-eggs-995504#:~:text=Pasteurized%20eggs%20are%20gently%20heated,special%20concerns%20about%20food%20safety.
9. https://www.webstaurantstore.com/blog/4542/are-all-eggs-pasteurized.html#:~:text=The%20difference%20between%20pasteurized%20eggs,this%20bacteria%2C%20such%20as%20Salmonella.
10. https://www.healthline.com/nutrition/pasteurized-vs-unpasteurized
11. Food Science Book Seventh Edition – B Srilakshmi.