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# PROCESSING OF EGG AND EGG PRODUCTS

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**Introduction:**

Eggs are a staple food worldwide, prized for their versatility, nutritional value, and culinary appeal. Beyond their traditional use as a breakfast staple or baking ingredient, eggs are increasingly processed into various convenient and shelf-stable forms to meet the demands of modern consumers and food manufacturers. Eggs play a vital role in the human diet and nutrition as an affordable nutrient-rich food commodity that contains highly digestible proteins, lipids, minerals, and vitamins. Processed eggs are a great source of high-quality protein that is widely used in sports and bodybuilding. The processing of egg products involves a range of techniques aimed at enhancing safety, extending shelf life, and maximizing utilization while preserving the nutritional integrity of eggs. From pasteurization to dehydration and beyond, these processing methods unlock new possibilities for incorporating eggs into a diverse array of culinary creations and food products.

**Processing of Egg Products:**

The processing of egg products includes:

- Receiving Shell Eggs.
- Washing/Sanitizing/Candling Eggs.
- Breaking Eggs.
- Handling Liquid Egg Products.
- Cooling.
- Pasteurization.
- Freezing.
- Packaging.
- Storage.
- Shipping.

**1] Receiving of Shell Eggs:**

Egg product processing systems are of two types:

a) In-line processing.

b) Off-line processing.

**a) In-line Processing:**

In this system, egg processing occurs at the same place where egg production is done. This processing method is most efficient as eggs are received directly from the egg production farms to processing plants via an enclosed refrigerated conveyor system. Here egg processing and handling are done with well-automated equipment and eggs are processed the same day they are laid.

**b) Off-line Processing:**

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In this system, egg processing occurs at a separate place away from the egg production facility. Hence eggs are to be collected from various chicken farms so, there may be a lot of variability (hours to days to weeks) in the age of the eggs and delivered to egg processing plants for further processing.

**2] Washing and Sanitizing of Eggs:**

At egg washing, eggs should not be kept too long to soak in water to avoid the possibility of bacterial penetration of shells. so, modern egg washers are designed to use pressure sprays, rotating brushes, and egg spinning devices that increase the contact between the eggs and brush and minimize the damage to eggs. This spray washers spray water containing a sanitizer along with a detergent. Washing water temperature should be maintained at 32.2 °C (90°F) or higher and needs to be at least 11°C (20°F) warmer than the internal temperature of eggs to prevent the wash water from being drawn into the eggs. The rinsing water contains a sanitizer, usually chlorine-based compounds such as sodium hypochlorite (not less than 50 ppm or more than 200 ppm of available chlorine or its equivalent). After washing and drying, eggs are oiled to seal the shell pores to prevent weight loss by evaporation and the escape of carbon dioxide, which slows down the increase in pH and air cell size, preserving egg quality.

**3] Candling of Eggs:**

It is a critical step in the processing of shell eggs. In the candling procedure, eggs are rotated mechanically several times to examine the internal quality of the egg. The primary function of the candling procedure is to remove the dirty cracked, and defective eggs before the breaking step. This helps to see the condition of the shell, the size of the air cell, and whether the yolk is well centered (a sign that the white is thick, as it holds the yolk in position). Thus, it makes air cells, egg white, yolk, bloodspots, and other contents easier to distinguish. Plant employees sort, classify, and segregate the eggs to ensure that only eggs eligible for breaking enter the breaking room.

**4] Breaking of Eggs:**

Shell eggs after washing and drying are sent for egg breaking for further processing of eggs into various egg products. The basic egg-breaking unit is composed of a cracker and a yolk-albumen separator. The crackhead cracks the shells at the center and pulls the two shells apart. The yolk albumen separator has two cups positioned one above the other. After cracking, the egg content falls into the top cup to retain only the yolk while the white slides to the bottom. Pasteurization, stabilization, or drying operations shall start as soon as practicable after breaking to prevent deterioration of the product, preferably within 72 hours from the time of breaking for the egg

products other than whites that are to be desugared.

**5] Handling of Liquid Egg Products:**

Liquid egg products include liquid egg white, liquid egg yolk, and Liquid whole egg. After breaking, liquid products are then filtered to remove eggshell pieces, membranes, and other solid particles.

**6] Pasteurization:**

After breaking, the liquid eggs should be pasteurized as soon as possible to reduce the possibility of food-borne pathogen contamination or proliferation. Pasteurization is the process of rapidly heating and maintaining a specific temperature for a set period.

Pasteurization eliminates Salmonella without altering the final egg product's characteristics.

**7] Freezing:**

Whole eggs, whole egg, and yolk blends, separated whites and yolks, and whole eggs with additional ingredients are all examples of frozen egg products. They are made using blast freezers set to temperatures between -10°F and -40°F, using pasteurized liquid egg products. Products made from frozen eggs can be stored for a long time below 10°F.

**8] Packaging and Storage:**

Eggs are fragile products. Eggs should be packed in such a way that they are exposed to a minimum of shaking, jerks, and pressure during transportation. Transport damage is 2-5%, which can be reduced to 1% by using appropriate packaging material. Rice husk, wheat chaff, and straw are used for packaging eggs in local transport. In modern systems, they are packed in cartons (6, 12, or 18 eggs) or filler flats (20 or 30 eggs), and then placed in cardboard cases or wire baskets. Cartons are usually made from recyclable corrugated fiberboard material, which is the most common packing material. Other materials include rigid plastic cases, polystyrene foam cartons, and moulded pulp cartoons for 6-12 eggs; the design and material used are important factors in reducing egg damage during storage and distribution. Grade and size should be mentioned on each package on the wrapping.

**Conclusion**

The processing of egg products plays a crucial role in ensuring the safety, versatility, and accessibility of eggs for consumers. Through various processing techniques such as pasteurization, dehydration, and freezing, eggs can be transformed into a wide range of convenient and shelf-stable products while preserving their nutritional value and culinary versatility. These processed egg products serve as key ingredients in numerous food products, catering to diverse consumer preferences and dietary needs. Moreover, stringent quality

control measures and regulatory standards ensure the safety and integrity of processed egg products, safeguarding public health. As consumer demand for convenient and nutritious food options continues to rise, the processing of egg products remains essential in meeting these evolving needs while promoting food security and sustainability.