

Introduction to Egg Products

Objectives

1. List the important factors in egg functionality.
2. List the major developments in the egg industry.
3. Define egg products.
4. List and describe the egg product types.
5. Identify the food safety risks associated with egg products.

References

1. Egg Products Reference Guide
http://www.aeb.org/images/website/documents/food-manufacturers/order-aeb-resources/Egg_Products_Reference_Guide.pdf
2. Egg Solutions – The Complete Reference for Egg Products
http://www.aeb.org/images/website/documents/food-manufacturers/overview/advantages-and-usage-opportunities/man_resource.pdf

Egg Products

Eggs are a good source of low-cost, high-quality protein, providing 6.3 grams of protein (13% of the daily value for protein) in one egg for a caloric cost of only 68 calories. They are whole foods: prepackaged sources of carbohydrates, protein, fat, and micronutrients. Yet, the egg's nutritional value should not be surprising considering that an egg contains everything needed for the nourishment of a developing chick. The egg nutritional profile includes a full array of nutrients, including carbohydrates, sugar, soluble and insoluble fiber, sodium, vitamins, minerals, fatty acids, amino acids, and more (for more information on the nutritional value of eggs go to the "Egg Products Reference Guide").

Eggs are an important food in the United States for several reasons:

- Inexpensive source of protein
- Have been regarded around the world as a beneficial ingredient for health and nutrition; an excellent source of protein, essential vitamins and minerals
- Widely used as ingredients in many food products

In addition to their nutritional content, eggs hold a valued place in cooking since due to their food chemistry, they serve many unique functions in recipes, including coagulation, foaming, emulsification, and browning.

As mentioned, eggs perform multiple functions in food product formulation:

- Aeration or foaming – these are properties that can produce a light texture in a product such as an angel food cake.
- Emulsification – is a stable mixture of two immiscible liquids. An emulsion occurs when one liquid is dispersed in another. For example, egg yolks can be used to fortify whole egg blends to increase the emulsifying action.
- Coagulation – whipping or heating allows products that contain eggs to thicken and/or coagulate, converting the mixture from a liquid state to a solid (gel) or semi-solid state (sol).
- Retarding crystallization – aid in the control of small crystal formation (water molecules) and creating a smooth texture; used in confectionery products and ice creams.
- Flavoring and coloring – egg yolks impart rich color and are used to fortify whole egg blends for a deeper color in baked products.
- Humectancy and shelf life – eggs enable products to maintain structure during baking, thus reducing moisture loss from baked products. Egg proteins also bind water, making it less available for microorganisms to grow and cause spoilage.

Because eggs provide desirable functional attributes, the food companies have increased their demands for convenient protein sources (derived from eggs) to use in their operations. Therefore, the egg products industry has grown in the last century.

Before World War II, shell egg production in the Midwest originated from very small farm flocks. The egg products industry began as a salvage operation for the shell egg industry. Shell eggs used in egg products were those that were no longer eligible or desirable as table eggs (shell eggs). Consequently, the egg products industry provided an outlet for excess shell eggs in the marketplace and developed technology to maintain the nutritional value and functional attributes of eggs by using methods to preserve egg products for long periods. As we glance at the egg industry historical timeline (refer to Attachment 1), the egg products industry has been growing since 1900. The two major achievements that advanced the egg products industry were dehydration (dried egg products) and freezing (frozen egg products). Another breakthrough that advanced the egg products industry in the early 1950's was the development of the commercial egg-breaking machine, which automatically breaks and separates shells, yolks, and whites.

What Are “Egg Products”?

The term “Egg Products” refers to eggs that have been removed from their shells for processing. Egg products include whole eggs, whites, yolks, and various blends, with or without added non-egg ingredients. Egg products can be classified as liquid, frozen, and dried.

There are many benefits associated with egg products.

- Ease of use
- Preparation convenience
- Economy : reduced handling and minimal shipping cost; one of the most economical protein sources available
- Simple handling requirements: are easy to handle, both in distribution and food manufacturing processes.
- Safety: are pasteurized to destroy *Salmonella* and other bacteria.
- Minimal storage space
- Uniformity: can be produced to definite specifications to assure consistent performance in formulations.
- Stability: when properly stored according to their type, egg products will maintain their quality over several months.
- Quality: are practically the same as fresh eggs in nutritional value, flavor, and most functional properties. These qualities are well retained during proper storage.

Egg products are a valuable source for meeting diverse formulation requirements in the food industry. Following is a short description (refer to Reference #2) of the key egg products:

Refrigerated Liquid Egg Products

- Usage: ingredient for foodservice and commercial food processing
- Advantages: pasteurized, quick and easy to use
- Processing: custom blends (specified egg solids content or added ingredients) are available
- Standards of identity: whole eggs are a combination of pasteurized egg whites and egg yolks from the same production batch blended together in their entirety, in natural proportions. Otherwise, product must be identified with an ingredients statement.
- Examples of added ingredients: sugar or salt may be added to certain products. Refrigerated egg whites may have triethyl citrate added as a whipping aid.
- Products: whole eggs, whites, or yolks; sugared egg yolks; salted whole eggs or yolks.
- Storage: kept refrigerated at 40° to 45° F maximum at all times.

Frozen Egg Products

- Usage: ingredient for commercial food processing
- Advantages: pasteurized; long shelf life, stable, and mixable.
- Processing: egg yolks and whole eggs must be mixed with sugar or salt to prevent gelation (increased viscosity) during freezing. Some egg white product may contain an ester-type whipping agent.
- Added ingredients: Citric acid may be added to some yolk or whole egg products to prevent greening.
- Products: whole eggs, whites, or yolks; sugared egg yolks; salted whole eggs or yolks; whole eggs with yolks and corn syrup; whole eggs with citric acid; whole eggs with corn syrup; various blends.
- Storage: stored at 0⁰ to - 5⁰ F; frozen eggs can be held for years.

Dried Egg Products

- Usage: ingredient for foodservice and commercial food processing
- Advantages: pasteurized; long shelf life, stable, and easily mixable.
- Processing: glucose is removed from egg whites and sometimes removed from whole eggs and yolk products for long storage stability. Spray drying is generally used.
- Added ingredients: sugar (sucrose), glucose-free corn syrup, or sodium silicoaluminate are sometimes added as anti-caking agents to assure a free-flowing product. Whipping additives (sodium lauryl sulfate) may be added to egg whites; carbohydrates can be added to increase the egg's resistance to heat damage (improve stability and flow)
- Products: whole eggs or yolks solids; dried eggs or scrambled egg mix; egg whites; free flowing whole eggs or yolk solids; stabilized (glucose-free) whole eggs or yolk solids; blends of whole eggs and/or yolk with carbohydrates.
- Storage: store in a cool, dark place.

The further growth and development of the convenience foods and fast food breakfast markets contributed to the transition away from table or shell eggs to egg products and that trend continues even today. The egg products industry has moved the processing of egg products from what it was first a way to market unsound shell eggs, to an industry that breaks higher quality source material, then pasteurizes and packages the egg products, and has them on the grocer's shelf in a matter of days.

Food Safety in Egg Products

In the mid 1980's, when a strain of *Salmonella* bacteria called Enteritidis (SE) found its way into the ovaries of egg laying chickens, federal disease

detectives in the northeastern U.S. determined that bacteria that can be found on the outside of a shell egg can also be found inside an uncracked, intact shell egg, as well. The presence of SE does not make the hen sick.

Today, internally contaminated shell eggs are found coast to coast, but it was a surprise in 1986 when government scientists first linked human illness from SE to internally contaminated shell eggs. Consumption of raw and undercooked shell eggs was determined to be the cause of the illnesses. The Center for Disease Control (CDC) reported five times as many SE cases in 1995 as in 1980 and contaminated shell eggs caused at least 80% of the cases. Consumers have no way of knowing which shell eggs are contaminated with SE. Because of this concern, Food Safety and Inspection Service (FSIS) regulations (effective August 1999), require that shell eggs packed for the ultimate consumer (e.g., shell or table eggs in a carton at your grocery store) must be properly refrigerated (45°F or less ambient room temperature) as well as labeled to state "Keep Refrigerated." This concern with SE further provided a source of eggs for the growing egg products industry because inspected and pasteurized egg products pose little threat from SE.

Statutory Authority

In 1970, Congress enacted the Egg Products Inspection Act (EPIA), in part, to prevent the introduction of adulterated or misbranded egg products from entering into commerce. The need for the Act was triggered, in part, by the behavior of unscrupulous egg handlers, which resulted in **restricted eggs** (any check, dirty egg, incubator reject, inedible, leaker or loss) being used in food products. This unsafe practice was ultimately linked to subsequent outbreaks of salmonellosis. The egg industry petitioned Congress to enact a law to prevent and penalize this unethical behavior and better protect public health. As a result, the 1970 EPIA codified and made mandatory the once voluntary egg products inspection program.

Initially, the Agricultural Marketing Service (AMS) was responsible for inspecting egg products. In May 1995, the authority for administering the egg products inspection program was transferred from AMS to FSIS. The Agency does not inspect shell eggs destined for table use or products that contain just a small proportion of eggs or that have not historically been considered products of the egg industry, including egg substitute products.

Note: FSIS is responsible for temperature and labeling examination for shell eggs packed into containers destined for the ultimate consumer [9 CFR 590.50(a)(b)].

Today, AMS still plays a role in shell egg inspection, including the control of restricted eggs, both in commerce and in those diverted to breaking plants. Additionally, AMS is involved in:

- USDA's voluntary shell egg-grading program
- The issuance of export certificates for Food and Drug Administration (FDA)-regulated foods containing eggs or egg products
- The inspection of imported shell eggs for the ultimate consumer and for breaking at an official egg products plant

FDA is primarily involved with regulating "imitation" eggs, eggs used for non-food products, and further processed foods containing egg products.

Refer to Attachment 2 for more information about the agencies' jurisdictional responsibilities. In addition, there is a job aid, at the end of this module that defines the terms imitation of egg products and egg substitute to further clarify which agency has jurisdictional authority over these types of products.

FSIS Guidance

The authority for inspection program personnel to perform their inspection duties derives from the EPIA. The EPIA provides for mandatory continuous inspection of the processing of liquid, frozen, and dried egg products to ensure that they are wholesome, otherwise not adulterated, and properly labeled and packaged to protect the health and welfare of consumers.

The regulatory provisions and Agency issuances related to the performance of the inspector's duties include:

- 9CFR 590 – regulatory requirements for egg products inspection
- Directives and Notices

Course Overview

In this course, you will gain insight on how to inspect egg products to ensure that they are wholesome, not adulterated, and properly labeled and packaged to protect the health and welfare of consumers. Additionally, you will learn about critical aspects of in-plant safety, homeland food defense, and professionalism and ethics.

Specific course modules include the following:

- FSIS Statutes, Mission, and Authority
- Biology of the Egg
- Egg Products Processes and Plant Familiarization
- Inspection Verification
- Sanitation Requirements

- Egg Products Plant Operations
- Egg Products Sampling
- Labeling
- Documentation and Enforcement
- Import
- Homeland Food Defense
- In-Plant Safety
- Professionalism and Ethics

Attachment 1: History of Egg Products

- 1865 Patent for dried eggs was sought.
- 1878 Commercial drying operation – St. Louis, MO.
- 1900 Five companies in MO & IA competed for egg drying business.
- 1900's Dr. Pennington, USDA scientist, promoted improvements in sanitation & facilities to reduce bacterial counts.
- 1903 Commercial production of frozen egg began.
- 1912 Equipment developed to separate yolks/whites during breaking.
- 1944 Industry peaked – 680 million Kg liquid egg broken.
- 1900 –1950 Liquid & Frozen Egg Industry developed in the Midwest. With World War II (WWII) came the need to produce foods that could withstand variable temperatures and no refrigeration, therefore, the production of dried whole eggs expanded greatly during the 1940's for use by US Armed Forces.
- 1946 Congress enacted the Agricultural Marketing Act that, among other things, identified the need for standardization of many egg products, because of the post WWII commodity boom. Food standards of identity and composition ensure that products are marketed on a level playing field. For example, a product identified as a whole egg product must have yolks and whites in natural proportions, regardless of who markets that product. A voluntary egg products inspection program evolved from the need for a government service to evaluate and ensure that egg products meet the appropriate standard of identity.
- 1951 First commercial egg breaking machine introduced. The invention of the first mechanical egg-breaking machine in the 1950's allowed for an expansion in the variety of egg products produced. In addition to an evolution in technology and products, farm operations also have undergone significant changes— with farm flock operations of about 400 hens concentrated in the north-central states giving way to company-owned operations with tens of thousands of hens predominantly located in mid-western and southeast states.

- 1966 Salmonellae – regulations promulgated by the USDA and FDA regarding the pasteurization of egg products made pasteurization virtually mandatory requirement.
- 1970 Congress enacted the Egg Product Inspection Act (EPIA).
- 1974 Demographics of the egg products industry had changed dramatically from earlier in the century. By this time, small farm flocks accounted for less than 0.2% of the total egg laying capacity in the U.S. Also, larger egg production facilities, which represented less than 0.2% of all poultry farms, accounted for 30% of the total U.S. egg laying capacity. Most of these eggs were marketed as shell eggs, but by 1993, over 25% of eggs were formulated, further processed, and sold as egg products.
- Late 1970's Routine *Salmonella* surveillance showed an increase in proportion to human *Salmonella* isolates that are serotype Enteritidis (SE).
- 1986 – 1988 Outbreak of SE infections linked to food containing undercooked eggs. Surveillance and outbreak data from previous years identified association between infection with SE and consumption of foods containing raw and undercooked eggs. Research on SE began as a result of the discussions between CDC, FDA, USDA, industry, and university scientists.
- 1989 USDA APHIS restricted imports of eggs and started voluntary SE testing on breeder hens as part of National Poultry Improvement Plan.
- 1991 Interagency Meeting (APHIS, AMS, FDA?) – APHIS announced determination that SE in shell eggs was not a disease issue, and jurisdiction over testing shell eggs for flocks was given back to FDA. APHIS stopped testing individual shell eggs.
- 1995 APHIS group that conducted shell egg and unpasteurized egg products studies was transferred in January 1995 to FSIS. Group under FSIS was named Animal Production Food Safety staff. On May 28, 1995, regulatory authority to administer the egg products inspection program transferred from AMS to FSIS.
- 1999 FSIS shell egg refrigeration and labeling regulation became effective.
- 2001 FDA's final rule on labeling and refrigeration of eggs at retail became effective.

2009 FDA published its final rule to prevent SE in shell eggs during production, storage, and transportation.

Attachment 2: Jurisdictional Responsibilities for Eggs and Egg Products

1. Food Safety and Inspection Services (FSIS)

- a. Inspection of the processing of dried, frozen, and liquid egg products

2. Food and Drug Administration (FDA) - FDA exercises jurisdiction from the laying houses through processing and packaging, and up until the finished product enters the cooler at the shell egg packing plant. FDA also has jurisdiction over shell eggs in commerce, including those moving to an egg products plant for breaking. Specific elements of FDA's jurisdiction include:

- a. Shell egg processing and shell egg transportation
- b. Joint jurisdiction with FSIS over egg products while in commerce; otherwise has jurisdiction over egg products at retail and wholesale, and in restaurants and institutions
- c. Food products containing eggs or egg products as an ingredient and other egg products exempted under 9 CFR §590.5 and 590.100(g) as not being egg products (food manufacturing under FDA)
- d. Labeling of shell eggs (in addition to the EPIA's requirement that shell eggs destined for the ultimate consumer contain labeling that indicates that refrigeration is required).
- e. Egg laying and production hen houses (partners with State Departments of Health)
- f. *Salmonella* Enteritidis testing in shell eggs for flocks
- g. The standards of identity for egg products – 21 CFR Part 160
- h. FDA recalls adulterated egg products from commerce.

3. Agricultural Marketing Services (AMS)

- a. Application of the USDA Grademark (shield) and the Organic Certification Logo on cartons of shell eggs - voluntary programs and fee for service
- b. Approval of labels for shell eggs produced under the voluntary grading program
- c. Enforcement of FDA's labeling requirements
- d. Administration of the Shell Egg Surveillance Program (under the authority of EPIA) – mandatory function

<http://www.ams.usda.gov/rules-regulations/eggs>

- e. Routine inspection of imported shell eggs for compliance with U.S.

quality standards, including storage and transportation requirements. The importer of record needs to submit an application to AMS (Form LPS-222) to import shell eggs into the U.S. and be accompanied by a foreign health certificate. Shell eggs imported for breaking at an official egg products plant must meet the regulatory requirements of 7 CFR 57.900 – 970. For more information go to:

<http://www.ams.usda.gov/services/imports-exports/breaking-stock>

- f. Issuance of export certificates, on a fee for service basis, of FDA-regulated food products that contain eggs or egg products as an ingredient produced under voluntary inspection. AMS instituted the Processed Eggs and Egg Products Export Verification Program; for more information go to the web page at:

<http://www.ams.usda.gov/services/imports-exports/eggs-egg-products>

4. Animal and Plant Health Inspection Service (APHIS) – APHIS’s Veterinary Services protects and improves the health, quality, and marketability of our nation’s animals, animal products, and veterinary biologics by preventing, controlling and/or eliminating animal diseases, and monitoring and promoting animal health and productivity.

- a. Breeding flock farms – chick breeding and *Salmonella*-free flock certification.
- b. Participation in the National Poultry Improvement Plan (NPIP) – is a cooperative Federal-State-Industry mechanism for controlling certain poultry diseases through a variety of programs and is voluntary. Breeding flocks, hatcheries, and dealers must first qualify as “U.S. Pullorum-Typhoid Clean” before participating in the NPIP programs. The Plan identifies states, flocks, hatcheries, dealers, etc., that meet certain disease control standards specified in the Plan’s various programs. As a result, customers can buy poultry that has tested clean of certain diseases or that has been produced under disease prevention conditions.

5. State Departments of Agriculture

- a. Shell Egg Packers that do not participate in AMS’s voluntary Grading Program
- b. Shell eggs sold in farmers’ markets

6. Outbreak of Foodborne Illness

- a. The Center for Disease Control and Prevention (CDC)
State Departments of Health

Job Aid – Definitions of the terms “Imitation Egg Products” and “Egg Substitute”

The purpose of this job aid is to define the meaning of the terms imitation and substitute, to further clarify which agency has jurisdictional authority over the production of egg substitutes and imitation egg products, and to explain how those jurisdictional lines are determined.

Definitions:

The term “egg product” is defined under the EPIA, FSIS’s regulations, and FDA’s Food Code, as follows:

- EPIA [21 U.S.C. 1033(f)] and FSIS (9 CFR 590.5) – means any dried, frozen, or liquid eggs, with or without added ingredients, excepting products which contain eggs only in a relatively small proportion or historically have not been, in the judgement of the Secretary, considered by consumers as products of the egg food industry, and which may be exempted by the Secretary under such conditions as he may prescribe to assure that the egg ingredients are not adulterated and such products are not represented as egg products.
 - In addition, an egg product manufactured where nutrients are added to the product or when a nutritional claim or information is presented on the labeling must meet the regulatory requirements of 9 CFR 590.411(e).
- *FDA [Food Code 2013]* – means all, or a portion of, the contents found inside eggs separated from the shell and pasteurized in a food processing plant, with or without added ingredients, intended for human consumption, such as dried, frozen, or liquid eggs.
 - Under the FDA definition, egg products do not include food which contains eggs only in a relatively small proportion such as cake mixes.

In addition, 9 CFR 590.5 states, under the *egg product* definition, “For the purposes of this part, the following products, among others, are exempted as not being egg products: Freeze dried products, imitation egg products, egg substitutes, dietary foods, dried no-bake custard mixes, egg nog mixes, acidic dressings, noodles, milk and egg dip, cake mixes, French toast, and sandwiches containing eggs or egg products, provided, such products are prepared from inspected egg products or eggs containing no more restricted eggs than are allowed in the official standards for U.S. Consumer Grade B shell eggs.” These items are regulated by FDA.

(<http://www.fda.gov/food/newsevents/constituentupdates/ucm419483.htm>).

Our focus is on the terms “imitation” and “substitute,” with the goal of understanding them in the context of FSIS’s egg products regulatory scheme. Notice that FSIS does not define these terms. Only FDA define the term “imitation” and “substitute” in 21 CFR Part 101.3 Identity Labeling of Food in Packaged Form, which is discussed below. In addition, we need to find these definitions through other sources. According to the Webster’s New World Dictionary of the American Language (College Edition), these terms are defined as follows:

- *Imitation* – the result or product of imitating; artificial likeness; copy; a counterfeit; **adj.** made to resemble something else; not real.
- *Substitute* – to put instead of, a thing used in place of another; **v.t.** [substituted (-id), substituting], to put or use in place of another, to take the place of.

Because of the growth in consumer demand for products associated with a healthy life style, as well as health concerns involving eggs, the food industry is producing a myriad of other egg-type items to satisfy these demands. Such products include imitation egg products and egg substitutes. This brings us to define these egg-type items from an industry and academic perspective.

- *Imitation eggs* (or egg products) – These egg-type items are regularly used by people who need to control their cholesterol levels, do not consume animal products, or who are allergic to eggs. Imitation eggs may use egg whites or can be egg-free (for example, powdered egg substitute). The imitation eggs can also be made from starch sources like tofu and tapioca, as well as from other ingredients. (Google search; http://www.ehow.com/info_8550622_imitation-eggs.html)
- *Egg substitutes* – these low-cholesterol products are characterized by yolk replacement by other non-egg ingredients such as vegetable oil, nonfat dry milk, soy protein, gums, food coloring, artificial flavors, and vitamins and minerals (for nutritional fortification). The fundamental ingredient in these products is egg white, but they may also include added egg-white solids or a small amount of yolk. (Egg Science and Technology, Fourth Edition; W.J. Stadelman and O.J. Cotterill, Editors).
 - **Note:** Under FSIS policy egg substitute cannot contain egg yolks.

As stated above, the FDA definition of “imitation” and substitute” of any food items from a regulatory perspective:

- *Imitation of a food* – 21 CFR 101.3(e)(1): A food shall be deemed to be an imitation and thus subject to the requirements of section 403(c) of the Federal Food, Drug, and Cosmetic Act (FFDCA) if it is a substitute for and resembles another food but is nutritionally inferior to that food.

- *Food substitute – 21 CFR 101.3(e)(2)*: A food that is a substitute for and resembles another food shall not be deemed an imitation provided it meets each of the following requirements of §101.3(e)(2)(i)(ii) – i.e., it's not nutritionally inferior and label is not false or misleading.

To summarize, most foods identified as imitation egg products do not contain any egg components – that is why they are imitations (resemble egg products). Egg substitutes, on the other hand, usually contain egg white, but not yolk under FSIS policy – hence the word “substitute,” rather than imitation.

What separates an imitation egg from an egg substitute or egg product is that an imitation is nutritionally inferior to the food it looks like and for which it is substituting, according to Title 21 CFR part 101.3(e)(1). Conversely, a substitute is not nutritionally inferior to the food for which it substitutes and resembles (§101.3(e)(2)), and its label bears a common or usual name that complies with the provisions of 21 CFR part 102.5 – that is, it is not false or misleading, or in the absence of an existing common or usual name, it is an appropriately descriptive term that is not false or misleading.

Therefore, based on the FDA's statutory provisions mentioned above, an imitation is usually not going to contain enough egg that the Agency will be able to assert jurisdiction over this type of product. Even though there is no upper or lower limit on what constitutes an egg product; when looking at the ingredients of imitations, the non-egg ingredients constitute almost all the composition of the product (for example, 99% soy bean oil and 1% egg white). If there are questions about whether a particular imitation egg product should fall under USDA inspection, the decision would have to be made based on the information of that specific situation. Generally, however, and in almost all cases, FSIS does NOT have jurisdiction over imitation egg products.

Egg Substitutes – Jurisdictional Lines

As mentioned earlier, “egg substitutes” are products that are among the specific items that have been exempted as not being an egg product as defined in 9 CFR 590.5 – Egg product. When the EPIA and the regulations pertaining to egg products were written, the production of egg substitutes was done infrequently, as the technology for making them had not yet been perfected. In addition, egg substitutes, consisting of egg whites with added ingredients such as yellow food coloring, spices, and vitamins and minerals, had not been, in the judgment of the Secretary of Agriculture, considered by consumers as products of the egg food industry. As such, their production was exempted from USDA inspection in the egg products inspection regulations. Over time however, the consuming public began seeking healthier food choices and the egg products industry started producing egg substitutes in official plants. The following delineates when an egg substitute is an FDA food product and when the egg substitute is amenable

to FSIS inspection.

1. Egg substitutes produced using FSIS fully inspected and passed egg whites as the foundational ingredient are exempt from FSIS inspection. An egg substitute produced in this manner is amenable to FDA jurisdictional authority.

Who can produce a product of this type?

- a. An FDA food processing plant. The finished egg substitute product does not bear the FSIS mark of inspection.
 - b. An official egg products plant. Production of the egg substitute is done outside of the plant's established tour of duty hours. There must be separation of time and space, and procedures in place to ensure that the integrity of amenable product is maintained. The plant designates silo of egg white product to be used for the egg substitute product. The plant would be considered a Dual Jurisdiction Establishment (DJE), and the product would be produced when FSIS IPP were not on the premises. Product produced in this manner does not bear the FSIS mark of inspection.
 - c. An official egg products plant. When production of an egg substitute takes place during the plant's official hours of operation, from a fully inspected and passed egg white as the foundational ingredient, the plant may or may not choose to label the product with the mark of inspection. Regardless of whether the finished product label bears the FSIS mark of inspection or not, all processing operations must be verified by FSIS IPP throughout the entire process and a final condition examination conducted and determined acceptable before the product is eligible to move in commerce.
2. Egg substitutes produced using unpasteurized egg whites must be done under FSIS inspection.
 - a. Production of an egg substitute must be conducted in an official egg products plant whenever the plant starts with unpasteurized egg white as its foundational ingredient. All processing operations must be verified by FSIS IPP throughout the entire process and a final condition examination conducted and determined acceptable before the product is eligible to move in commerce.
 - b. The egg substitute product may be labeled with or without the FSIS mark of inspection.