

CODE OF HYGIENIC PRACTICE FOR EGGS AND EGG PRODUCTS*CAC/RCP 15 – 1976***TABLE OF CONTENTS**

| | |
|---|-----------|
| INTRODUCTION | 2 |
| 1 OBJECTIVES..... | 2 |
| 2 SCOPE AND USE OF THE DOCUMENT | 2 |
| 2.1 SCOPE | 2 |
| 2.2 USE OF THE DOCUMENT | 2 |
| 2.3 PRINCIPLES APPLYING TO THE PRODUCTION, HANDLING AND PROCESSING OF ALL EGGS AND EGG PRODUCTS | 3 |
| 2.4 RELATIVE ROLES OF EGG PRODUCERS, PROCESSORS AND TRANSPORTERS | 4 |
| 2.5 DEFINITIONS | 5 |
| 3 PRIMARY PRODUCTION..... | 5 |
| 3.1 ENVIRONMENTAL HYGIENE | 6 |
| 3.2 HYGIENIC PRODUCTION OF EGGS | 7 |
| 3.2.1 Flock Management and Animal Health | 7 |
| 3.2.2 Areas and Establishments for Egg Laying Systems | 9 |
| 3.2.3 General Hygienic Practice..... | 9 |
| 3.3 COLLECTION, HANDLING, STORAGE AND TRANSPORT OF EGGS | 12 |
| 3.3.1 Egg collection equipment | 12 |
| 3.3.2 Packaging and storage | 13 |
| 3.3.3 Transport, Delivery Procedures and Equipment..... | 13 |
| 3.4 CLEANING, MAINTENANCE AND PERSONNEL HYGIENE AT PRIMARY PRODUCTION | 13 |
| 3.4.1 Cleaning and maintenance of egg laying establishments | 13 |
| 3.4.2 Personnel hygiene, health, and sanitary facilities | 13 |
| 3.5 DOCUMENTATION AND RECORD KEEPING..... | 14 |
| 4 ESTABLISHMENT: DESIGN AND FACILITIES | 15 |
| 5 CONTROL OF OPERATION | 15 |
| 5.1 CONTROL OF FOOD HAZARDS | 15 |
| 5.2 KEY ASPECTS OF HYGIENE CONTROL SYSTEMS | 16 |
| 5.2.1 Temperature and Time Issues..... | 16 |
| 5.2.2 Specific Process Steps | 17 |
| 5.2.3 Microbiological and Other Specifications | 20 |
| 5.3 INCOMING MATERIAL REQUIREMENTS | 20 |
| 5.4 PACKAGING | 20 |
| 5.5 WATER | 20 |
| 5.6 MANAGEMENT AND SUPERVISION..... | 20 |
| 5.7 DOCUMENTATION AND RECORDS | 20 |
| 5.8 RECALL PROCEDURES | 21 |
| 6 ESTABLISHMENT: MAINTENANCE AND SANITATION | 21 |
| 6.1 MAINTENANCE AND CLEANING..... | 21 |
| 6.2 CLEANING PROGRAMS | 21 |
| 6.3 PEST CONTROL SYSTEMS | 21 |
| 6.4 WASTE MANAGEMENT | 21 |
| 6.5 MONITORING EFFECTIVENESS | 21 |
| 7 ESTABLISHMENT: PERSONAL HYGIENE..... | 21 |
| 8 TRANSPORTATION | 21 |
| 9 PRODUCT INFORMATION AND CONSUMER AWARENESS | 21 |
| 9.1 LOT IDENTIFICATION | 22 |
| 9.2 PRODUCT INFORMATION | 22 |
| 9.3 LABELLING | 22 |
| 9.4 CONSUMER EDUCATION | 22 |
| 10 TRAINING..... | 22 |

INTRODUCTION

This *Code of Hygienic Practice for Eggs and Egg Products* is intended to provide guidance for the safe production of eggs and egg products. A hazard analysis approach was used in determining the controls presented in this Code. The FAO/WHO document below was used to provide a risk-based foundation for the revised Code.

- Risk assessments of *Salmonella* in eggs and broiler chickens. Microbiological Risk Assessment Series 1. FAO/WHO 2002 (ISBN 92-5-104873-8). <http://www.fao.org/DOCREP/005/Y4393E/Y4393E00.HTM>

This Code of Hygienic Practice for Eggs and Egg Products takes into consideration, to the extent possible, the differing egg and egg product production systems and processing procedures used by countries. This code focuses primarily on eggs produced from domesticated chickens. The principles may also be applied to the hygienic practices for egg production from other domesticated egg producing bird species (e.g. duck, quail and goose). Therefore, the code is, of necessity, a flexible one to allow for different systems of control and prevention of contamination of eggs and egg products.

This Code addresses the two main sources of contamination of eggs:

1. internally during egg formation, and
2. externally, at any point at or after laying.

It takes into consideration the possibility of illness in the general population due to the consumption of eggs or egg products contaminated by *Salmonella* species, other enteric pathogens or other contaminants, as well as the susceptibility to illness of sectors of the population such as the elderly, children, and immunocompromised individuals. For microbiological contamination, this approach is consistent with the approach identified by the Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards in Foods (Rome, Italy, 30 April – 4 May 2001).

1 OBJECTIVES

The objective of this Code is to ensure the safety and suitability¹ of eggs and egg products by applying the *Recommended International Code of Practice-General Principles of Food Hygiene* (CAC/RCP 1- 1969) to the particular case of eggs and egg products. The document describes the specific considerations for food hygiene and safety associated with all methods of primary production and processing of eggs and egg products, including the adequate measures for small-scale producers and processors.

2 SCOPE AND USE OF THE DOCUMENT

2.1 SCOPE

This Code applies to the primary production, sorting, grading, storing, transport, processing, and distribution of eggs in shell and egg products of such eggs produced by domesticated birds and intended for human consumption. Traditional delicacy eggs (e.g. Balut, 1000 year old eggs) are not within the scope of this code.

2.2 USE OF THE DOCUMENT

The provisions of this document are supplemental to and should be used in conjunction with, the *Recommended International Code of Practice-General Principles of Food Hygiene* (CAC/RCP 1- 1969).

The Code also references other Codex Standards, Codes or Guidelines, including the labelling standards and the *Codex Code of Hygienic Practice for the Transport of Foods in Bulk and Semi-Packed Food* (CAC/RCP 47-2001), when they apply to the hygienic production of eggs and egg products.

This document consists of a series of principles, explanatory narratives and guidelines.

Principles, shown in **bold text**, are a statement of the goal or objective that is to be achieved. *Explanatory narratives*, shown in *italicized text*, serve to explain the purpose of the stated principle. Additional information to assist in the application of the stated principle is shown in normal text.

¹ Safety and suitability as defined in the *Recommended International Code of Practice-General Principles of Food Hygiene* (CAC/RCP 1- 1969).

Principles that are applicable to all phases of production, handling and processing of eggs and egg products are given in Section 2.3.

This Code is flexible to allow for different production systems, size of operation and different systems of control of hazards during production, handling and processing of eggs and egg products.

Recognition of the Production and Processing of Eggs by Small-Scale/Less Developed Egg Producers/Businesses

In the context of this Code, the expression “small-scale egg producer” refers to production systems based on the number of birds, or where automated collecting and sorting/grading machines are not generally used, or where water and other requirements are in poor supply thus limiting the number of birds that can be kept. The maximum number of birds permitted in small-scale establishments may be set down in national legislation, codes of practice or other guidelines.

Flexibility in the application of these requirements in this Code may apply to less developed egg producers, i.e. those producers with larger flocks that have less developed systems, and/or economic, water and/or power supply constraints, preventing investment in modern grading and packaging processes and infrastructure.

Flexibility in the application of requirements on the primary production of eggs by small-scale and/or less developed egg producers can be exercised, where necessary. However, any microbiological or other control measures used should be sufficient to obtain safe and suitable eggs and egg products.

Such flexibility is indicated throughout the Code by the use of a parenthetical statement “where practicable” placed next to the particular provision where the flexibility is needed.

Further guidance on the issues facing small and less developed businesses, particularly in relation to implementing HACCP is under development and can be found in *FAO/WHO Guidance to Governments on the Application of HACCP in Small and/or Less Developed Businesses* (FAO/WHO, October 2006)

2.3 PRINCIPLES APPLYING TO THE PRODUCTION, HANDLING AND PROCESSING OF ALL EGGS AND EGG PRODUCTS

The following principles should apply, where appropriate and practicable, to the production, handling and processing of all eggs and egg products.

- **From primary production to the point of consumption, eggs and egg products should be subject to control measures intended to achieve the appropriate level of public health protection.**

The Code is aimed at encouraging the safe production of eggs and egg products for human consumption, and gives relevant guidance to producers and processors, large and small, on the application of control measures throughout the entire food chain. It recognizes that there is a need for continuous, effective effort or controls, which should be applied, by primary producers in addition to processors, in assuring the safety and suitability of eggs and egg products.

Good hygienic, agricultural and manufacturing practices should be identified during primary production, shell egg processing and egg product processing. Such practices should be applied throughout the food production chain so that eggs and egg products are safe and suitable for their intended use.

Both the relationship and impact of one part of the food production chain on another part should be identified to ensure that potential gaps in the chain are dealt with through communication and interaction between those in the production chain. Information should be obtained to cover one step forward and one step back through to final food preparation.

No part of this Code should be used without consideration of what takes place in the production chain prior to the particular measure being applied or what will take place subsequent to a particular step. The Code should only be used within the context of an understanding that there is a continuous system of controls that are applied from the breeding flock and sourcing of the laying flock to consumption of the end product. Good hygienic practice should also apply when handling eggs during food preparation.

- **Wherever appropriate, hygienic practices for eggs and egg products should be implemented within the context of HACCP systems as described in the Annex to the *Recommended International Code of Practice – General Principles of Food Hygiene*.**

There should be an understanding of the hazards associated with eggs, at each stage in egg production, handling, grading, packaging, transporting and processing so as to minimize contamination. It is principally the responsibility of the producer, where practicable, to conduct a hazard analysis within the context of developing a control system based on HACCP and thus to identify and control hazards associated with flock management and egg production. Similarly it is principally the responsibility of the processor to conduct a hazard analysis to identify and control hazards associated with egg processing.

This principle is presented with the recognition that there are limitations to the full application of HACCP principles at the primary production level of eggs. In the case where HACCP is not implemented at the producer level, good hygienic, agricultural and animal husbandry practices should be followed.

- **Control measures should be effective and validated, where practicable.**

The overall effectiveness of the control measures should be validated according to the prevalence of hazards in the egg, taking into consideration the characteristics of the individual hazards(s) of concern, established Food Safety Objectives/Performance Objectives and level of risk to the consumer.

Small and less developed businesses that do not have resources to validate the effectiveness of their control measures should implement appropriate control measures required by their country. Where there are no legal requirements, such businesses should follow recommendations in industry-recognised guidelines or follow practices established as safe, where practicable.

2.4 RELATIVE ROLES OF EGG PRODUCERS, PROCESSORS AND TRANSPORTERS

All parties involved in the egg production chain share responsibility for food safety. This can include those involved in primary production, handling, grading, packaging, processing, supplying, distributing and commercial cooking of eggs and egg products for human consumption. In order to achieve this common goal, respective parties should pay attention to the following responsibilities:

- Good communication and interaction should exist between egg producers, processors and others in the chain so that an effective chain of controls is maintained from breeding of the laying flock to production of eggs to consumption. This can help to ensure that appropriate and complementary hygiene practices are applied at each stage of the chain and that appropriate and timely action is taken to resolve any food safety problems that may arise.
- Primary producers should apply good hygienic, agricultural and animal husbandry practices consistent with food safety, and adapt their operations as appropriate and practicable to meet any specifications for specific hygiene controls to be applied and/or any standards to be achieved as may be agreed with the processor, distributor, transporter or warehouser.
- Processors should follow good manufacturing and good hygienic practices, especially those presented in this Code and in the *Recommended International Code of Practice-General Principles of Food Hygiene* (CAC/RCP 1-1969) or those required by the competent authority. The processor may have to implement controls, or adapt their manufacturing processes, based on the ability of the egg producer to minimize or prevent associated hazards.
- Producers and/or processors should communicate any recommendations for safe handling and storage of eggs and egg products during distribution and transportation, and their subsequent use by food businesses.

- Distributors and transporters, wholesalers, retailers and those involved in food preparation at any facility should ensure that eggs and egg products under their control are handled and stored properly and according to the producers and/or processors instructions.
- Information to consumers should include advice on safe handling, storage and preparation of eggs.

2.5 DEFINITIONS

Definitions of general expressions are included in the *Recommended International Code of Practice-General Principles of Food Hygiene* (CAC/RCP 1-1969). For the purpose of this code, the following terms have the definition stated:

Breaking – the process of intentionally cracking the egg shell and separating its pieces to remove the egg contents.

Breeding flock – a group of birds kept for the purpose of production of the laying flock.

Broken/leaker egg – an egg showing breaks of both the shell and the membrane, resulting in the exposure of its contents.

Candling – examining the interior condition of an egg and the integrity of the shell by rotating or causing the egg to rotate in front of or over a light source that illuminates the contents of the egg.

Cracked egg – an egg with a damaged shell, but with intact membrane

Dirty egg – an egg with foreign matter on the shell surface, including egg yolk, manure or soil.

Domesticated birds – members of the Class Aves that are kept for the production of eggs intended for human consumption.

Egg laying establishment – the facilities and the surrounding area where primary production of eggs takes place.

Egg product – all, or a portion of, the contents found inside eggs separated from the shell, with or without added ingredients, intended for human consumption.

Incubator egg – an egg that has been set in an incubator.

Microbiocidal treatment is a control measure that practically eliminates the number of microorganisms, including pathogenic microorganisms present in a food or reduces them to a level at which they do not constitute a health hazard.

Pasteurization – a microbiocidal control measure where eggs or egg products are subjected to a process, using heat to reduce the load of pathogenic microorganisms to an acceptable level to ensure safety.

Shelf life – the period during which the egg or egg product maintains its safety and suitability.

Table egg – an egg destined to be sold to the end consumer in its shell and without having received any treatment significantly modifying its properties.

3 PRIMARY PRODUCTION

It is recognised that some of the provisions in this Code may be difficult to implement in areas where primary production is conducted in small holdings in both developed and developing countries and also in areas where traditional farming is practised. Therefore, the Code is, of necessity, a flexible one to allow for different systems of control and prevention of contamination of eggs during primary production.

These principles and narratives supplement those contained in Section 3 of the *Recommended International Code of Practice-General Principles of Food Hygiene* (CAC/RCP 1-1969) and the general principles presented in Section 2.3 above.

Egg producers should take all reasonable measures to reduce the likelihood of hazards occurring in or on eggs during primary production.

Primary production activities can significantly impact on the safety of eggs and egg products. Bacterial contamination of eggs can occur during formation, thus the practices used at this phase of production are a key factor in reducing the potential for microorganisms to be present in or on eggs.

It is recognised that microbiological hazards can be introduced both from the primary production environment and from the breeding and laying flocks themselves. Pathogens such as Salmonella Enteritidis (SE) can be transmitted vertically from breeder flocks to commercial laying flocks, and horizontally from other layers, feed and/or environment and hence to eggs. Importantly, the presence of Salmonella in the laying and/or breeding flock increases the possibility of Salmonella in the egg.

Thus the preventative role of good hygienic and agricultural practice in the primary production of eggs is critically important. Appropriate animal husbandry practices should be respected and care should be taken to assure that proper health of the breeding and laying flocks is maintained. Further, lack of good agricultural, animal feeding and veterinary practices and inadequate general hygiene by personnel and equipment during egg handling, and/or collection may lead to unacceptable levels of bacterial and other contamination (such as physical and chemical) during primary production.

The focus for primary producers is to reduce the likelihood that such hazards will occur during the primary production phase of the chain. Likewise, in certain primary production situations, the occurrence of food safety hazards may be less avoidable which may result in the application of more stringent control measures during subsequent processing in order to ensure safety and suitability of the finished product. The degree to which primary production practices control the likelihood of occurrence of a food safety hazard in or on eggs will have an impact on the nature of controls needed during the subsequent processing of eggs.

Contamination of eggs during primary production should be minimized.

Producers should obtain domesticated birds from breeding stock that have been subject to control measures to reduce and, if possible eliminate, the risk of introducing into laying flocks, poultry diseases and pathogenic organisms transmissible to humans. The breeding flock should be subject to a programme which will monitor the effect of the control measures.

Laying flock management is key to safe primary production of eggs. Laying flocks are managed under a wide range of climatic conditions using various agricultural inputs and technologies, and on farms of various sizes. However in backyard poultry farms and small scale producers, the number of birds maintained is very small and, accordingly, the systems and hygienic conditions of production may vary. Hazards may vary between one type of production system and another. In each egg laying establishment, it is necessary to consider the particular agricultural practices that promote the safe production of eggs, the type of products (e.g., unsorted eggs, eggs for the table egg market, eggs strictly for breaking) and production methods used.

The microbial load of eggs should be as low as achievable, using good egg production practices, taking into account the requirements for subsequent processing. Measures should be implemented at the primary production level to reduce as far as possible the initial load of pathogenic microorganisms affecting safety and suitability. Such measures would permit the application of microbiological control measures of lesser stringency and still ensure product safety and suitability.

3.1 ENVIRONMENTAL HYGIENE

The egg laying establishment should be appropriate for the primary production of eggs such that sources of potentially harmful substances are minimized and are not present at unacceptable levels in or on eggs.

Where practicable, producers could identify and evaluate the immediate surroundings and previous use (indoor and outdoor) of the egg laying establishment in order to identify hazards. Potential sources of contamination from the egg laying establishment including the immediate environment should be identified. This could include contamination associated with previous uses of the land, presence of contaminants, polluted surface water, potential microbial and chemical hazards from contamination by faeces, and other organic waste that could be introduced into the egg laying establishment. This is particularly relevant in the case of free range foraging by domesticated birds.

Primary production should not be carried out in areas where the presence of potentially harmful substances in the egg laying establishment would lead to an unacceptable level of such substances in or on eggs. The potential for contamination from, for example, agricultural chemicals, hazardous wastes, etc. should be considered. The potential for the introduction of disease from wild birds and animals should also be considered.

The evaluation process could include the following:

- Identification of previous and present usage of the primary production area and the adjoining sites to determine potential microbial, chemical and physical hazards and determine sources of environmental contamination, for example by faeces or other organic waste, that could be introduced into the egg laying establishment.
 - Sites/uses of concern can include crops grown, feed lot, animal production, hazardous waste site, sewage treatment site, and mining extraction site.
- Identification of points of access to the site by domesticated and wild animals, including access to water sources used in primary production, to determine potential faecal and other contamination of the soils and water and the likelihood of contamination of eggs.
 - Existing practices should be reviewed to assess the prevalence and likelihood of uncontrolled deposits of animal faeces coming into contact with eggs.
 - As much as possible, domestic and wild animals, including wild birds as well as rodents should be prevented from entering egg laying establishments.
- Identification of the potential for contamination of egg laying establishments by leaking, leaching or overflowing manure storage sites and flooding from polluted surface waters.

If previous uses cannot be identified, or the evaluation leads to the conclusion that hazards exist, where practicable, the sites should be tested for contaminants of concern. Additionally, periodic monitoring of the environment and forage, and judicious selection and use of fertilizers and agricultural chemicals should occur.

If contaminants are present at levels which may result in the egg or egg product being harmful to human health, and corrective or preventive actions have not been taken to minimize identified hazards, the sites should not be used until such actions have been applied.

Care should be taken to minimize access to contaminated water or to environmental contaminants to the extent practicable in order to avoid diseases transmissible to birds or to humans or the likelihood of contamination of eggs.

3.2 HYGIENIC PRODUCTION OF EGGS

Provisions in this section are equally relevant to all egg producers.

3.2.1 Flock Management and Animal Health

Eggs should come from flocks (both breeding and laying) in good health so that flock health does not adversely affect the safety and suitability of the eggs.

Good animal husbandry practices should be used to help maintain flock health and resistance to colonization by pathogenic organisms. These practices should include timely treatment for parasites, minimizing stress through proper management of human access and environmental conditions and use of appropriate preventive measures for example, veterinary medicines and vaccines.

The Salmonella Enteritidis Risk Assessment has shown that reducing the prevalence of Salmonella Enteritidis infected flocks is anticipated to result in a reduction in the risk of human illness from the consumption of Salmonella Enteritidis positive eggs².

Flock management is critical in reducing the risk of human illness from the consumption of eggs. Good husbandry practices should also be used to reduce the likelihood of pathogens (i.e. avian disease) and thus reduce the use of veterinary drugs. Where drug treatment occurs, its use should be appropriate and should consider possible antimicrobial resistance³. In particular, measures to prevent disease could include:

- Evaluating the health status of domesticated birds relative to avian diseases and where practicable, colonization by pathogenic organisms transmissible to humans and always taking action to ensure only healthy birds are used.
- Taking preventive measures, including managing human access, to reduce the risk of transferring micro-organisms that may impact on food safety to, or from, or between, flocks.
- Using, where permitted, appropriate vaccines as part of an overall flock management program, including as measures when introducing new birds.
- Regularly checking the flock and removing dead and diseased birds, isolating sick birds, and investigating suspicious or unknown causes of illness or death to prevent further cases.
- Disposing of dead birds in a manner that prevents recycling of diseases to the laying flock by either pests or handlers.
- Treating birds only with veterinary drugs where permitted, prescribed by a veterinarian and in a manner that will not adversely impact on the safety and suitability of eggs, including adhering to the withdrawal period specified by the manufacturer or veterinarian.
 - Only those medicinal products and medicinal premixes that have been authorized by the relevant authority for inclusion in animal feed should be used.
 - Where birds/flocks have been treated with veterinary drugs that can be transferred to eggs, their eggs should be discarded until the withholding period for the particular veterinary drug has been achieved. Established maximum residue levels (MRLs), including those established by Codex, for residues of veterinary drugs in eggs, may be used to verify such measures.
 - The veterinarian and/or the producer/layer establishment owner/manager or the collection center should keep a record of the products used, including the quantity, the date of administration, the identity of the flock and withdrawal period.
 - Appropriate sampling schemes and testing protocols should be used to verify the effectiveness of on-farm controls of veterinary drug use and in meeting established MRLs.
 - Veterinary drugs should be stored appropriately and according to manufacturer's instructions.
- Particularly for countries where *Salmonella* Enteritidis has been associated with poultry or eggs, monitoring for SE through faecal testing and the use of a vaccination protocol may reduce the risk of human illness⁴. If a vaccine is used, it should be approved by the competent authority. Monitoring for SE can also include environmental testing of litter, dust, ventilation fans etc.
- Disposing of eggs from infected flocks still in production that represent a risk to human or flock health, in a safe manner or specifically diverting them to a process that ensures elimination of a hazard.
- Where practicable, destruction of *Salmonella* Enteritidis positive flocks or slaughter in accordance with country requirements.

² Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards in Foods, FAO Headquarters, Rome, Italy 30 April – 4 May 2001, page 13.

³ Code of Practice to Minimize and Contain Antimicrobial Resistance (CAC/RCP 61-2005).

⁴ Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards in Foods, FAO Headquarters, Rome, Italy 30 April – 4 May 2001, page 17.

- Ensuring visitors, where necessary, wear appropriate protective clothing, footwear and head covering to reduce the risk of introducing hazards or spreading hazards between flocks. Visitor movement should be controlled to minimize likelihood of transfer of pathogens from other sources.

3.2.2 Areas and Establishments for Egg Laying Systems

Egg laying areas and establishments should, to the extent practicable, be designed, constructed, maintained and used in a manner that minimizes exposure of domesticated birds or their eggs to hazards and pests.

Improperly protected and maintained areas and premises for the housing of flocks and laying of eggs, particularly for free range and barn production systems may contribute to the contamination of eggs.

Taking into account climatic conditions, production systems including those used to provide feed, water, shelter, control temperature and predators and manage interactions between birds should be designed, constructed, maintained and used in a manner to minimize the likelihood of transfer of foodborne pathogens to the egg, either directly or indirectly⁵.

The following should be considered, where practicable, in the assessment of areas and establishments used for egg laying:

- The internal design and layout of housing should not adversely affect the health of the birds and should permit compliance with good hygienic practices.
- The facilities used to house flocks should be cleaned and disinfected in a way that reduces the risk of transfer of pathogens to the next flock. An 'all-in, all-out' step for each poultry house should be followed, where feasible, taking into consideration multi-aged poultry houses. Such a process would give the opportunity to eliminate rodents and insects before the next flock is introduced.
- A plan should be in place to detect any failure in cleaning and disinfection programs and ensure that corrective actions are taken.
- Use of litter should be managed to reduce the risk of introducing or spreading hazards.
- Water delivery systems should be protected, maintained and cleaned, as appropriate, to prevent microbial contamination of water.
- Drainage systems and systems for storing and removal of manure should be designed, constructed and maintained so as to prevent the likelihood of contaminating the water supply or eggs.

Access to egg laying establishments by other animal species (i.e. dogs, cat, wild animals and other birds) that may adversely affect the safety of the eggs should be minimized.

The egg laying establishments should, as far as practicable, be kept clean. Accumulations of broken eggs, manure, or any other objectionable materials should be minimized in order to reduce the likelihood of contact with eggs and to minimize attracting pests into the establishment.

3.2.3 General Hygienic Practice

3.2.3.1 WATERING

Water should be managed in a way that minimizes the potential for the transmission of hazards, directly or indirectly, into or on the egg.

Water used in primary production operations should be suitable for its intended purpose and should not contribute to the introduction of microbiological or chemical hazards into or on eggs.

Contaminated water may contaminate feed, equipment or laying birds leading to the potential introduction of hazards in or on eggs.

⁵ Although evaluation of the importance of such interventions for reducing the risk of human illness based on existing data was inconclusive. Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards in Foods, FAO Headquarters, Rome, Italy 30 April – 4 May 2001, page 17.

As water can be a source of contamination, treatment of drinking water to reduce or eliminate pathogens including *Salmonella* should be considered.

- Potable water should be used, or if potable water is not available for some or all purposes, water should be of a quality that does not introduce hazards to humans consuming the eggs⁶. Access to surface water, where it introduces hazards, should be denied.
- Potential sources of contamination of water from chemical runoff or improperly managed faeces should be identified and controlled to the extent practicable to minimize the likelihood of contaminating eggs.
- Appropriate safety and suitability criteria that meet the intended outcomes should be established for any water used in egg production.
- Where practicable, good purchasing practices for water could be used to minimize the risk associated with hazards in the water and may include using vendor assurances or contractual agreements.
- Where possible, water should be regularly tested to ensure that water supplied to the birds is of a quality that does not introduce hazards in or on the egg.

Any reuse of water should be subject to a hazard analysis including assessment of whether it is appropriate for reconditioning. Critical control point(s) should be identified, as appropriate, and critical limit(s) established and monitored to verify compliance.

- Water recirculated or recycled for reuse should be treated and maintained in such a condition that no risk to the safety and suitability of eggs results from its use.
- Reconditioning of water for reuse and use of reclaimed, recirculated and recycled water should be managed in accordance with HACCP principles.

3.2.3.2 Feeding⁷

Feed for the laying and/or breeding flock should not introduce, directly or indirectly, microbiological or chemical contaminants into eggs that present an unacceptable health risk to the consumer or adversely affect the suitability of eggs and egg products.

The improper procurement, manufacturing and handling of animal feed may result in the introduction of pathogens and spoilage organisms to the breeding and laying flock and the introduction of chemical hazards, such as pesticide residues and other contaminants, which can affect the safety and suitability of eggs and egg products.

Producers should take care where appropriate, during production, transportation, preparation, processing, procurement, storage, and delivery of feed to reduce the likelihood of introducing hazards into the production system.

- To minimize the risk associated with hazards in the feed, good purchasing practices for feed and feed ingredients should be employed. This may include using vendor assurances, contractual agreements and/or purchasing batches of feed that have had microbiological and chemical analysis and are accompanied by certificates of analysis.
- Feed should be managed so that it does not become moldy or contaminated from waste including faeces.
- As feed can be a source of contamination, heat or other treatment of feed to reduce or eliminate pathogens including *Salmonella* should be considered.
- When the egg producer processes their own feed, information should be kept about its composition, the origin of the ingredients, relevant processing parameters and where practicable, the results of any analyses of the finished feed.
- The owner should keep a record of relevant information concerning feed.

⁶ Safe Use of Wastewater, Excreta and Greywater. Volume II, Wastewater Use in Agriculture. WHO/FAO/UNEP, 2006 and The Code of Hygienic Practice for Meat (CAC/RCP 58-2005).

⁷ Codex Recommended Code of Practice on Good Animal Feeding (CAC/RCP 54 – 2004).

3.2.3.3 PEST CONTROL

Pests should be controlled using a properly designed pest control program as they are recognized as vectors for pathogenic organisms.

Any pest control measures should not result in unacceptable levels of residues, such as pesticides, in or on eggs.

Pests such as insects and rodents are known vectors for the introduction of human and animal pathogens into the production environment. Improper application of chemicals used to control these pests may introduce chemical hazards into the production environment.

A properly designed pest control program should be used, that considers the following:

- Before pesticides or rodenticides are used, all efforts should be made to minimize the presence of insects, rats and mice and reduce or remove places which could harbour pests.
 - As cages/pens/enclosures/coops (if used) attract such pests, measures such as proper design, construction and maintenance of buildings (if applicable), effective cleaning procedures and removal of faecal waste should be used to minimize pests.
 - Mice, rats and wild birds are attracted to stored feed. Any feed stores should be located, designed, constructed and maintained so as to be, where practicable, inaccessible to pests. Feed should be kept in pest proof containers.
- Bait should always be placed in “bait stations” so that they are obvious, cannot be accessed by animals or insects they are not intended for and can be identifiable and found easily for checking.
- If it is necessary to resort to chemical pest control measures, the chemicals should be approved for use in food premises and used in accordance with the manufacturer’s instructions.
- Any pest control chemicals should be stored in a manner that will not contaminate the laying environment. Such chemicals should be stored in a safe manner. They should not be stored in wet areas or close to feed stores or be accessible by birds. It is preferable to use solid baits, wherever possible.

3.2.3.4 Agricultural and Veterinary Chemicals

Procurement, transport, storage and use of agricultural and veterinary chemicals should be undertaken in such a way that they do not pose a risk of contaminating the eggs, flock or the egg-laying establishment.

- Transport, storage and use of agricultural and veterinary chemicals should be in accordance with the manufacturer’s instructions.
- Storage and use of agricultural and veterinary chemicals on the egg laying establishment should be evaluated and managed, as they may represent a direct or indirect hazard for the eggs and flock.
- Agricultural and veterinary chemical residues should not exceed limits established by the Codex Alimentarius Commission or as per national legislation.
- Workers that apply agricultural and veterinary chemicals should receive training in the proper application procedures.
- Agricultural and veterinary chemicals should be kept in their original containers. Labels should have the name of the chemical substances and the instructions for their application.
- Equipment used to apply or administer agricultural and veterinary chemicals should be stored or disposed of in a manner that does not represent a direct or indirect hazard for the eggs and flock
- Empty agricultural and veterinary containers should be disposed of according to applicable regulation and/or the manufacturer’s directions and should not be used for other purposes.

- Where possible and practicable, producers should keep records of agricultural and veterinary chemical applications. Records should include information on the date of application, the chemical used, the concentration, method and frequency of application, the purpose for using the chemical applications and where it was applied.

3.3 COLLECTION, HANDLING, STORAGE AND TRANSPORT OF EGGS

Eggs should be collected, handled, stored and transported in a manner that minimizes contamination and/or damage to the egg or egg shell, and with appropriate attention to time-temperature considerations, particularly temperature fluctuations.

Appropriate measures should be implemented during disposal of unsafe and unsuitable eggs to protect other eggs from contamination.

Proper collection, whether using manual or automated methods, handling, storage and transport of eggs are important elements of the system of controls necessary to produce safe and suitable eggs and egg products. Contact with unsanitary equipment and foreign materials or methods that cause damage to the shell, may contribute to egg contamination.

Whether manual or automated methods are used to collect eggs, producers should minimize the time between egg laying and further handling or processing. In particular, the time between egg laying and controlled temperature storage should be minimized.

Methods used to collect, handle, store and transport eggs should minimize damage to the shell, and avoid contamination and practices should reflect the following points:

- Cracked and/or dirty eggs should be excluded from the table egg trade.
- Cracked and/or dirty eggs should be directed to a processing or packing establishment, as appropriate, as soon as possible after collection (see Section 5.1).
- Hygienic practices, which take into account time and temperature factors, should be used to protect the egg from surface moisture in order to minimize microbial growth.
- Where appropriate, broken and/or dirty eggs should be segregated from clean and intact eggs.
- Broken eggs and incubator eggs should not be used for human consumption and be disposed of in a safe manner.

Egg processors should communicate any specific requirements at farm level (i.e. time/temperature controls) to the egg producer.

Selection

Eggs from different species of poultry and/or farm production systems (e.g. free range, barn and caged eggs) should be segregated as appropriate.

3.3.1 Egg collection equipment

Collection equipment should be made of materials that are non-toxic and be designed, constructed, installed, maintained and used in a manner to facilitate good hygiene practices.

It is important to prevent any damage to the eggshells by collecting equipment since such damage can lead to contamination and consequently adversely affects the safety and suitability of eggs and egg products. It is also important that the equipment is maintained to a standard of cleanliness adequate to prevent contamination of the eggs.

Where used, egg collecting equipment and containers should be cleaned and disinfected regularly, or if necessary replaced, and with sufficient frequency to minimize or prevent contamination of eggs.

Single use containers should not be reused.

Egg collecting equipment should be maintained in proper working condition and this should be periodically verified.

3.3.2 Packaging and storage

Egg packaging and packaging equipment should be designed, constructed, maintained and used in a manner that will minimize damage to the eggshell and avoid the introduction of contaminants in or on eggs.

Wherever eggs are stored, it should be in a manner that minimizes damage to the eggshell and avoids the introduction of contaminants, or growth of existing microorganisms in or on eggs, giving consideration to time and temperature conditions.

Any egg packaging, storage or associated equipment should not transfer substances to eggs that will present a health risk to the consumer.

Where permanent equipment is used, it should be corrosion resistant and easy to clean and disinfect or if necessary able to be dismantled and reassembled.

Storage temperatures, times and humidity should not have a detrimental effect on the safety and suitability of eggs. The time and temperature conditions and humidity for egg storage at the farm should be established taking into account the hygienic condition of the eggs, the hazards that are reasonably likely to occur, the end use of the eggs, and the intended duration of storage.

3.3.3 Transport, Delivery Procedures and Equipment

Whenever eggs are transported, it should be in a manner that minimizes damage to the egg or eggshell and avoids the introduction of contaminants in or on eggs.

Personnel and vehicular access should be adequate for the hygienic handling of eggs, such that contamination is not introduced onto the farm and thus in or on eggs.

Lorries, trucks or other vehicles or equipment, which carry the eggs, should be cleaned at a frequency necessary to prevent contamination flow between farms or premises and thus of eggs.

The time and temperature conditions for the transport and delivery of eggs from the producer should be established taking into account the hygienic condition of the eggs, the hazards that are reasonably likely to occur, the end use of the eggs, and the intended duration of storage.

- These conditions may be specified in legislation, in codes of practice, or by the processor receiving the eggs in collaboration with the egg producer and transporter and the relevant authority.

Delivery procedures should be adequate for the hygienic handling of eggs.

3.4 CLEANING, MAINTENANCE AND PERSONNEL HYGIENE AT PRIMARY PRODUCTION

3.4.1 Cleaning and maintenance of egg laying establishments

Egg laying establishments should be cleaned and maintained in a manner that ensures the health of flocks and safety and suitability of eggs.

Cleaning and disinfection programs should be in place, and their efficacy should be periodically verified and an environmental monitoring program implemented where possible and practicable.

These programs should include procedures for routine cleaning while birds are in the poultry house. Full cleaning and disinfection programmes should be applied when poultry houses are empty.

De-populated poultry house cleaning procedures should cover cleaning and/or sanitising nest boxes/cages, poultry houses, disposing of contaminated litter, nesting materials and faeces from diseased birds and, where necessary, safe disposal of eggs from infected flocks and dead or diseased birds.

The egg-laying establishment should be safe for the re-entry of new stock.

3.4.2 Personnel hygiene, health, and sanitary facilities

3.4.2.1 PERSONNEL HYGIENE

Hygiene and health requirements should be followed to ensure that personnel who come directly into contact with eggs are not likely to contaminate them.

Hygiene and health requirements should be followed to ensure that personnel who come directly into contact with birds are not likely to transmit illness between birds.

Personnel should understand and follow preventative measures specifically relating to the handling of birds and/or eggs, so as to prevent introducing hazards from one to the other, from other facilities or from cross contamination of birds from personnel.

Personnel should be adequately instructed and/or trained to handle eggs and domesticated birds to ensure the use of good hygienic practices that will minimize the risk of egg or flock contamination.

3.4.2.2 HEALTH STATUS

Personnel should be in good health and not introduce diseases or illness likely to affect flock health or the safety and suitability of eggs.

People known, or suspected, to be suffering from, or to be a carrier of a disease or illness likely to be transmitted to birds or through eggs should not be allowed to enter any bird facility or egg collection or handling area, if there is a likelihood of their contaminating the birds or the eggs. Any person so affected should immediately report illness or symptoms of illness to the management.

3.4.2.3 PERSONAL CLEANLINESS

Personnel who have direct contact with eggs should maintain a high degree of personal cleanliness and, where appropriate, wear suitable protective clothing, footwear and head covering that is not likely to introduce contamination into egg laying areas.

Personnel should wash their hands before starting work that involves the handling of eggs, each time they return to handling areas after a break, immediately after using the toilet, and after handling anything which may contaminate eggs.

3.4.2.4 SANITARY FACILITIES

Facilities should be available to ensure that an appropriate degree of personal hygiene can be maintained.

Facilities should:

- Be located in close proximity to wherever eggs or domesticated birds are handled;
- Be constructed to facilitate hygienic removal of wastes and avoid contamination of facilities, equipment, raw materials and the immediate environment;
- Have adequate means for hygienically washing and drying hands and disinfecting footwear; and
- Be maintained under sanitary conditions and in good repair at all times.

3.5 DOCUMENTATION AND RECORD KEEPING

Records should be kept, as necessary and where practicable, to enhance the ability to verify the effectiveness of the control systems. Documentation of procedures can enhance the credibility and effectiveness of the food safety control system.

With respect to food safety, records should be kept on:

- Prevention and control of avian diseases with an impact on public health;
- Identification and movement of birds and eggs;
- Use of agricultural and pest control chemicals;
- Nature and source of feed, feed ingredients and water;
- Use of veterinary drugs/medicines;
- Results of testing where testing is performed;
- Health status of personnel;
- Cleaning and disinfection; and

- Traceability/product tracing⁸ and recall.

4 ESTABLISHMENT: DESIGN AND FACILITIES

Section 4 of the *Recommended International Code of Practice: General Principles of Food Hygiene* applies to both the processing of eggs for the table egg market and the processing of egg products.

The following guidelines are supplemental to Section 4 of the *Recommended International Code of Practice: General Principles of Food Hygiene* for establishments that produce egg products.

Where practicable, separate areas should be allocated for:

- Storage of egg and untreated egg product;
- Breaking and microbiocidal treatment of eggs;
- Packing of microbiocidally treated egg product;
- Storage of microbiocidally treated liquid and frozen egg products and other liquid or frozen ingredients as appropriate;
- Storage of microbiocidally treated dried egg product and other dry ingredients as appropriate; and
- Storage of cleaning and sanitising materials

Work areas for raw and treated product should be separated via physical barriers.

5 CONTROL OF OPERATION

These guidelines are supplemental to those set forth in Section 5 of the *Recommended International Code of Practice: General Principles of Food Hygiene*.

This section refers to control measures that should be taken to prevent, eliminate or reduce hazards when processing eggs for the shell egg market (i.e. table eggs) and when producing egg products. These measures should be used in conjunction with good hygienic and animal husbandry practices for the primary production of eggs as per Section 3 in order to provide an effective system of control of microbiological and other hazards that can occur in or on eggs and egg products.

These principles are also intended to enhance and supplement those aspects of the *Recommended International Code of Practice-General Principles of Food Hygiene* HACCP Annex (CAC/RCP 1- 1969), which are essential to the successful design of a system of food safety controls for shell eggs and egg products. The users of this document are encouraged to implement the guidelines contained in the HACCP Annex when designing a HACCP system.

5.1 CONTROL OF FOOD HAZARDS

Eggs and egg products should be safe and suitable.

Table egg

Unsafe or unsuitable eggs⁹ include:

- Incubator eggs
- Broken/leaker eggs
- Eggs with bacterial or fungal rots
- Eggs contaminated with faeces.
- Eggs stored for hatching for sufficient time to adversely affect the safety and suitability.

Table eggs should be clean and intact.

⁸ Refer to Principles for Traceability/Product Tracing as a Tool within a Food Inspection and Certification System (CAC/GL 60-2006)

⁹ Refer to definition of food safety and food suitability in the Recommended Code of Practice-General Principles of Food Hygiene (CAC/RCP 1-1969) Section 2.3 Definitions.

All efforts should be made to avoid production of dirty eggs. However, dirty eggs may be used for table eggs if permitted by the relevant authorities, in accordance with country requirements, and if cleaned appropriately.

Egg Products

- *Cracked or dirty eggs that are not suitable for human consumption as table eggs should be directed to processing (e.g. washing and breaking followed by a microbiocidal treatment) or be disposed of in a safe manner.*
- *Broken/leaker eggs should not be used to produce egg products and should be disposed of in a safe manner.*
- *Cracked eggs may be used in egg products, but should be processed with minimum delay.*
- *Dirty eggs should be visibly clean prior to breaking and processing.*
- *Other unsafe or unsuitable eggs should not be used for egg products and should be disposed of in a safe manner.*

Control measures based on risk should be in place to ensure that process and product specifications are met and the hazards in or on eggs and egg products are effectively identified and controlled.

Control measures used should achieve an appropriate level of public health protection. Where possible, measures should be based on HACCP principles.

These measures should allow the identification and removal of eggs and egg products that are not suitable for human consumption. They should also address the need to control pathogen growth throughout handling, cleaning, sorting and grading, packaging, processing, storage and distribution and have a sound basis in good hygiene practice. It is important that control measures are applied during primary production and processing to minimize or prevent the microbiological, chemical or physical contamination of eggs.

Processors should only use eggs that have been produced in accordance with the Code.

5.2 KEY ASPECTS OF HYGIENE CONTROL SYSTEMS

5.2.1 Temperature and Time Issues

From receipt of eggs, through handling, sorting and grading, washing, drying, treatment, packing, storage and distribution to point of consumption, consideration should be given to time and temperature and humidity conditions for eggs such that the growth of pathogenic microorganisms will be minimized and the safety and suitability of the eggs will not be adversely affected.

Temperature fluctuations should be minimized as much as possible.

Storage and handling conditions, including those during cleaning, grading and packaging should be such that moisture on the shell surface is minimized.

As eggs are perishable products, particular attention should be paid to temperature conditions throughout storage and distribution, noting that lower storage and distribution temperatures lend themselves to longer shelf life and minimize microbial growth, for example of *Salmonella* Enteritidis.

From receipt of raw/untreated egg product, through processing, treatment, packaging, storage and distribution to point of consumption, consideration should be given to time and temperature conditions for egg products such that the growth of pathogenic microorganisms will be minimized and the safety and suitability of the egg products will not be adversely affected.

Storage conditions should be such that the potential for microbial contamination, the growth of microbial pathogens and the risk to human health is minimized.

5.2.2 Specific Process Steps

5.2.2.1 HANDLING OF TABLE EGGS

Eggs should be handled during all stages of cleaning, sorting, grading, packing, storing and distribution in a manner that avoids damage, minimizes moisture on the shell surface and prevents contamination.

Handling of shell eggs can result in damage to eggs. Eggs should be handled in a manner that avoids damage and contamination, including minimising moisture on the egg shell surface.

Activities involved in shell eggs handling may be done by the primary producer, the processor or others involved in the egg production chain. Wherever in the production chain these activities are done, they should be done in accordance with this code.

Eggs intended for the table egg market should be visibly clean prior to grading and packing.

Sorting, grading, and where appropriate, washing processes should result in clean eggs.

(i) Sorting, Grading and Packing

Sorting, grading and packing of the egg refers to the stage between primary production and retail or further processing, where the whole egg may undergo one or more activities to prepare it for either the table egg market or for processing into egg products.

Cracked, dirty, and unsafe/unsuitable eggs should be segregated from clean and intact eggs.

Cracked eggs should be segregated (for example, by candling) and sent for processing (see Section 5.2.2) or disposed of in a safe manner.

Dirty eggs may be cleaned and if appropriately cleaned, used for the table egg market or the egg product industry in accordance with country requirements. Dirty eggs sent for processing should be clearly labelled that they are not suitable as table eggs,.

The cleaning process used should not damage or contaminate the eggs. Incorrect cleaning of eggs can result in a higher level of contamination of eggs than existed prior to cleaning.

Broken/leaker and other unsuitable eggs should be segregated from eggs suitable for human consumption.

Broken/leaker and other unsuitable eggs should be identified in such a way that they cannot be used for human consumption, for example, by appropriate labelling or the use of a de-characterising agent (an additive that makes it clearly visible that the eggs should not be processed into human food, e.g. a denaturing agent).

Cleaning

- Where permitted by the relevant authority, a cleaning process may be used to remove foreign matter from the shell surface, but this should be carried out under carefully controlled conditions so as to minimize damage to the shell surface.
- Cleaning can be used to reduce the bacterial load on the outside of the shell.
- If dry cleaning is undertaken, the methods used should minimize damage to the protective cuticle and, where appropriate, be followed by oiling of the shell using a suitable food grade oil.

Washing, disinfection and drying

Where washing is permitted by the relevant authority, it should be carried out under carefully controlled conditions so as to minimize damage to the shell and prevent contamination of the egg contents.

- Eggs should not be soaked prior to or during washing.
- Water used for washing should be suitable and not adversely affect the safety and suitability of the egg, giving consideration to appropriate water temperature, pH, and quality, and egg temperature.
- If cleaning compounds such as detergents and sanitizers are used, they should be suitable for use on eggs and not adversely affect the safety of the egg.
- If eggs are washed, they should be dried to minimize moisture on the surface of the shell that can lead to contamination or growth of mold.
- Washing should be followed by effective sanitising of the shell and, where appropriate, with subsequent oiling of the shell using a suitable food grade oil.

(ii) In shell treatment

Where table eggs are treated to eliminate pathogens (e.g. in-shell pasteurization) the treatment should not adversely affect the safety or suitability of the egg.

(iii) Storage and distribution

Eggs should be stored and transported under conditions that will not adversely affect the safety and suitability of the egg.

Eggs are perishable products.

- Storage conditions should minimize moisture on the shell surface.
- Lower temperatures minimize microbial growth and extend shelf life of the eggs.
- Temperature fluctuations during storage and distribution should be minimized.

(iv) Shelf life for table eggs¹⁰

The growth of pathogenic and/or spoilage microorganisms to unacceptable levels may affect the shelf life of eggs.

The shelf life of eggs is influenced by a number of factors, such as:

- Storage conditions including temperature, temperature fluctuation and humidity
- Methods and treatments
- Type of packaging

Shelf life of table eggs should be established by the grader/packer, consistent with requirements of relevant authorities, based on:

- information from the producer on the time since lay, time and temperature in storage and transport;
- type of packaging;
- likelihood of microbial growth, due to reasonably anticipated temperature abuse during storage, distribution, retail, sale and handling by the consumer under reasonably foreseeable conditions of distribution, storage and use.

Where processors clearly advise on egg packaging that eggs are to be refrigerated, others in the food chain, including retailers should follow the processors' advice, unless it is expressly made as a recommendation to the consumer (e.g. that the conditions of refrigeration should be fulfilled after purchasing).

¹⁰ Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards in Foods, FAO Headquarters, Rome, Italy 30 April – 4 May 2001, page 14.

5.2.2.2 EGG PRODUCT PROCESSING

Processors should be satisfied that the egg products they produce are safe and suitable for human consumption.

Eggs for processing should be visibly clean prior to breaking and separating.

Cracked eggs may be processed. Broken eggs should not be processed and should be disposed of in a safe manner.

Dirty eggs should be disposed of in a safe manner or may be cleaned in accordance with 5.2.2.1.

Separating the egg contents from the shell should be done in a manner that will, as far as possible, avoid cross-contamination between the shell and egg contents, avoid contamination by personnel or from equipment, and that permits examination of egg contents.

(i) Treatments

Egg products should be subjected to a microbiocidal treatment to ensure the products are safe and suitable.

All operations subsequent to the treatment should ensure that the treated product does not become contaminated.

Hygienic manufacturing and personnel practices should be in place to manage the risk of contamination from the food contact surfaces, equipment, and personnel, packaging material and between raw egg and processed egg products.

Microbiocidal treatments, including heat treatment, should be validated to show they achieve the desired reduction in the number of pathogenic microorganisms and result in a safe and suitable product.

Where heat treatment is used, consideration should be given to time and temperature combinations.

Pasteurized liquid egg products should be cooled rapidly immediately after pasteurization and maintained under refrigeration.

(ii) Untreated Egg Products

Egg products that have not had a microbiocidal treatment should only be directed to further processing to ensure their safety and suitability.

Where untreated egg products leave a grading/processing premises, they should be labeled that the product has not been treated.

(iii) Storage and distribution

Egg products should be stored and transported under conditions that will not adversely affect the safety and suitability of the product.

Egg products, including those that can be stored at ambient temperatures, should be protected against external agents and contamination, e.g. direct sun light, excessive heating, moisture, external contaminants, and from rapid temperature changes which could adversely affect the integrity of the product packaging or the safety and suitability of the product.

(iv) Shelf life for egg products

The shelf life of egg products is influenced by a number of factors, such as:

- Storage conditions including temperature, temperature fluctuation and humidity
- Processing methods and treatments
- Type of packaging

Shelf life of egg products should be established by the processor, consistent with requirements of relevant authorities, based on:

- Applied microbiological control measures, including storage temperatures, e.g. storage under refrigeration, freezing or ambient;
- Methods and treatments applied to product;
- Type of packaging;
- Likelihood of post process contamination and type of potential contamination under reasonably foreseeable conditions.

The safety and suitability of the egg product should be assured and, where necessary, demonstrated that it would be retained throughout the maximum period specified.

Shelf life determination may be done at the plant level by testing products subjected to the storage conditions specified or by predicting microbial growth in the product under the specified storage conditions. Reasonably anticipated temperature abuse should be integrated into the study or be taken into account by applying an appropriate safety factor (e.g., by shortening the maximum durability specified in the labeling or by requiring lower storage temperatures).

5.2.3 Microbiological and Other Specifications

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene, (Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997))*.

Information that may be useful for establishing specifications could include:

- Flock health status (including pathogen status);
- Pathogen load in/on eggs;
- Agricultural and veterinary chemical status;
- Age of eggs;
- Handling methods; and
- Microbiocidal treatments.

Particular attention should be given to specific indicating control of pathogens such as *Salmonella* Enteritidis.

5.3 INCOMING MATERIAL REQUIREMENTS

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene (CAC/RCP 1-1969)* .

Depending upon the end use of the egg, certain specific microbiological criteria for incoming ingredients may be appropriate to verify that the control systems have been implemented correctly.

5.4 PACKAGING

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene (CAC/RCP 1-1969)*.

5.5 WATER

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene (CAC/RCP 1-1969)*.

5.6 MANAGEMENT AND SUPERVISION

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene (CAC/RCP 1-1969)*.

5.7 DOCUMENTATION AND RECORDS

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene (CAC/RCP 1-1969)*.

5.8 RECALL PROCEDURES

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

6 ESTABLISHMENT: MAINTENANCE AND SANITATION

These guidelines are supplemental to those set forth in Section 6 of the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

6.1 MAINTENANCE AND CLEANING

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

6.2 CLEANING PROGRAMS

Handling, packaging and processing of eggs uses a variety of equipment with sensitive electronic controls. Where wet cleaning may damage or result in the contamination of the equipment, alternative cleaning programs should be considered.

6.3 PEST CONTROL SYSTEMS

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

6.4 WASTE MANAGEMENT

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

6.5 MONITORING EFFECTIVENESS

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

7 ESTABLISHMENT: PERSONAL HYGIENE

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

8 TRANSPORTATION

These principles and guidelines are supplemental to those set forth in Section 8 of the *Recommended International Code of Practice: General Principles of Food Hygiene* and, as appropriate, those set forth in *Code of Hygienic Practice for the Transport of Food in Bulk and Semi-Packed Food* (CAC/RCP 47 – 2001).

Eggs and egg products should be transported in a manner that will minimize breakage, damage and contamination.

Mobile containers and tankers should be cleaned and disinfected prior to being refilled.

Egg haulers (driver or individual in charge of transport to and from packing facility) should use vehicles suitable for transporting eggs, which permit easy and thorough cleaning.

Piping, connectors and valves used for filling and discharge of liquid egg should be of a suitable design and be cleaned, disinfected and stored as appropriate.

Eggs should be transferred between establishments promptly. Eggs should be maintained at an appropriate temperature, including avoiding fluctuations in temperatures that will result in condensation of water on the shell surface.

9 PRODUCT INFORMATION AND CONSUMER AWARENESS

These principles and guidelines are supplemental to those contained in Section 9 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969).

9.1 LOT IDENTIFICATION

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).

Documentation can enhance the credibility and effectiveness of the food safety control system, especially when it includes measures that permit a client to refer to their supplier on the history of a product. Labelling and record keeping also aid in the implementation of other emergency and corrective actions.

Where appropriate and practicable, a system should be in place that allows the identification of the egg layer establishment, transporter, grading/packing premises and processor where eggs and egg products were produced..

The system should be easy to audit. Records should be kept for a period of time sufficient to permit efficient traceback investigations of the eggs and/or egg products. It is important to ensure that all parties involved in this system are adequately informed and trained in its implementation.

9.2 PRODUCT INFORMATION

Refer to the *Recommended International Code of Practice-General Principles of Food Hygiene* (CAC/RCP 1-1969).

9.3 LABELLING

Egg and egg products should be labelled in accordance with the *Codex General Standard for the Labelling of Prepackaged Foods* (CODEX STAN 1-1985).

Processors and food manufacturers awareness

Processors and food manufacturers that use egg products should follow labelling instructions.

9.4 CONSUMER EDUCATION

Where appropriate, advice should be made available to consumers on the safe handling, use, preparation and consumption of eggs.

10 TRAINING

Refer to the *Recommended International Code of Practice- General Principles of Food Hygiene* (CAC/RCP 1-1969).