

codex alimentarius commission



FOOD AND AGRICULTURE
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Agenda Item 3b

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD HYGIENE

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MATTERS ARISING FROM THE WORK OF FAO AND WHO AND OTHER INTERNATIONAL INTERGOVERNMENTAL ORGANIZATIONS

Information from the World Organisation for Animal Health (OIE)

Prepared by OIE

The World Organisation for Animal Health (OIE) would like to thank the Codex Alimentarius Commission (CAC) and the Codex Committee on Food Hygiene for the opportunity to contribute to its standards development process.

The OIE and the CAC are two of the three international standard setting organizations recognized under the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement). In the context of the SPS Agreement, the OIE is responsible for setting standards in the domain of animal health (including zoonotic diseases) and the CAC in the domain of food safety. For food products of animal origin, hazards to human health may arise at the farm or at any subsequent stage in the food production continuum. Since 2001, at the request of its Members, the OIE mandate has included setting standards for animal production food safety, i.e. the management of risks arising at the level of the farm to primary processing.

In 2002, the OIE established a Working Group on Animal Production Food Safety with the view to improving the coordination and harmonisation of standard setting activities of OIE and CAC. The Secretary of Codex and, on an observer basis, the Chair of Codex, regularly attend the annual meeting of the Working Group. Through this mechanism and through participation in each other's standard setting procedures, the OIE and CAC collaborate closely in the development of standards relevant to the whole food production continuum, taking care to avoid gaps, duplications and contradictions in the SPS standards of these two WTO reference organisations.

The OIE will continue to address food safety-related issues as a high priority in its standard-setting work and will work closely with CAC and its Committees, and with other international bodies in promoting safe international trade in animal products.

The OIE provides the following information on OIE standard setting activities relevant to the Agenda item 4. to be considered at this CCFH meeting.

Agenda Item 4. Proposed Draft Guidelines for the Control of *Campylobacter* and *Salmonella* spp. in Chicken Meat at Step 4

Following is a brief summary of OIE work to date regarding the prevention, detection and control of *Salmonella* in poultry production. The development of the following OIE standards also took account of the Codex proposed draft Guidelines for the control of *Campylobacter* and *Salmonella* spp. in chicken meat and the final pre-publication report from the FAO/WHO Technical Meeting on *Salmonella* and *Campylobacter* in chicken meat (Rome, Italy, 4-8 May 2009).

1. Chapter 6.5. Prevention, Detection and Control of *Salmonella* in Poultry

A new chapter in the *Terrestrial Animal Health Code (Terrestrial Code)* on the *Prevention, Detection and Control of Salmonella in Poultry* was adopted by the OIE World Assembly of Delegates at the OIE General Session in May 2009. This new chapter (6.5.) is included in the 2009 edition of the *Terrestrial Animal Health Code* available at (http://www.oie.int/eng/normes/mcode/en_chapitre_1.6.5.htm).

This Chapter provides recommendations for methods for on-farm prevention, detection and control of *Salmonella* in poultry, and complements the Codex Alimentarius Code of Hygiene Practice for Meat (CAC/RCP 58-2005) and Code of Hygienic Practice for Eggs and Egg Products (CAC/RCP 15-1976). The recommendations presented in the chapter are relevant to the control of all *Salmonella* with special attention to *S. Enteritidis* and *S. Typhimurium*, as these are common *Salmonella* serotypes in many countries. A pathogen reduction strategy at the farm level is seen as the first step in a continuum that will assist in reducing the presence of foodborne pathogens in eggs and meat.

The *Terrestrial Code* Chapter 6.5. is presented in Annex I.

2. *Terrestrial Code* Chapter 6.4. Hygiene and disease security procedures in poultry breeding flocks and hatcheries

The current *Terrestrial Code* Chapter 6.4. has been extensively reviewed by an OIE *ad hoc* Group taking into account Member comments. The scope of the revised draft chapter has been broadened to include recommended biosecurity procedures applicable to infectious disease agents of poultry (i.e. all poultry establishments). To reflect the broader scope of the draft chapter, the title has been amended to *Biosecurity procedures in poultry production*. The aim of the recommendations is to minimise the introduction and subsequent dissemination of infectious disease agents (that can be a threat to poultry and at times human health) in the poultry production chain.

The draft chapter includes recommendations applicable to the location and construction of poultry establishments (i.e. poultry farms, hatcheries and breeder farms); recommendations applicable to the operation of poultry establishments; and recommendations for the prevention of further dissemination of infectious disease agents of poultry.

The draft chapter (presented in Annex II) has been circulated to OIE Members for comment as part of the September 2009 Report of the Terrestrial Animal Health Standards Commission and is being proposed for adoption at the 78th OIE General Session in May 2010.

The draft *Terrestrial Code* Chapter 6.4. is presented in Annex II.

CHAPTER 6.5.

PREVENTION, DETECTION AND CONTROL OF *SALMONELLA* IN POULTRY

Article 6.5.1.

Introduction

This Chapter provides recommendations on the prevention, detection and control of *Salmonella* in *poultry*.

Salmonellosis is one of the most common foodborne bacterial *diseases* in the world. The great majority of *Salmonella* infections in humans are foodborne with *Salmonella* Enteritidis and *Salmonella* Typhimurium accounting for a major part of the problem. *Salmonella* serotypes and prevalence may vary considerably between localities, districts, regions and countries and therefore, *surveillance* and identification of the prevalent *Salmonella* serotypes in humans and *poultry* should be carried out in order to develop a control programme for the area.

In most food animal species, *Salmonella* can establish a clinically inapparent *infection* of variable duration, which is significant as a potential *zoonosis*. Such animals may be important in relation to the spread of *infection* between *flocks* and as causes of human foodborne *infection*. In the latter case, this can occur when *meat* and eggs, or their products, enter the food chain thus producing contaminated food.

Article 6.5.2.

Purpose and scope

This Chapter deals with methods for on farm prevention, detection and control of *Salmonella* in *poultry*, and complements the Codex Alimentarius Code of Hygiene Practice for Meat (CAC/RCP 58-2005) and Code of Hygienic Practice for Eggs and Egg Products (CAC/RCP 15-1976 Revision 2007). A pathogen reduction strategy at the farm level is seen as the first step in a continuum that will assist in reducing the presence of foodborne pathogens in eggs and *meat*.

Hygiene and biosecurity procedures to be implemented in *poultry flocks* and hatcheries are described in Chapter 6.3. Hygiene and Biosecurity Procedures in Poultry Production.

The recommendations presented in this Chapter are relevant to the control of all *Salmonella* with special attention to *S. Enteritidis* and *S. Typhimurium*, as these are common *Salmonella* serotypes in many countries. It should be noted that the epidemiology of animal and human salmonellosis in a particular locality, district, region or country is important for effective control of *Salmonella*.

Article 6.5.3.

Definitions (for this Chapter only)*Breeders*

means *poultry* destined for the production of fertile eggs for incubation for the purpose of producing day-old chicks.

Competitive exclusion

means the administration of defined or undefined bacterial flora to *poultry* to prevent gut colonisation by enteropathogens, including *Salmonella*.

Culling

means the depopulation of a *flock* before the end of its normal production period.

Layers

means *poultry* during the period of laying eggs for human consumption.

Article 6.5.4.

Surveillance of *poultry flocks* for *Salmonella*

Where justified by *risk assessment*, *surveillance* should be carried out to identify infected *flocks* in order to take measures that will reduce the prevalence in *poultry* and the risk of transmission of *Salmonella* to humans. Sampling methods, frequency and type of samples required should be determined by the *Veterinary Services* based on a *risk assessment*. Microbiological testing is preferred to serological testing because of its higher sensitivity in broilers *flocks* and higher specificity in *breeders* and *layer flocks*. In the framework of regulatory programmes for the control of *Salmonella* in *poultry* and salmonellosis in humans, confirmatory testing may be required to ensure that decisions are soundly based.

Sampling**1. Available methods for sampling**

Drag swabs: sampling is done by dragging swabs throughout the *poultry* building.

Boot swabs: sampling is done by walking throughout the *poultry* building with absorbent material placed over the footwear of the sampler.

Faecal samples: multiple fresh faecal/caecal samples collected from different areas in the *poultry* building.

Meconium, chick box papers, dead in shell and culled chicks at the hatchery.

Hatchery samples: throughout the hatchery, including the inner liner of the incubators.

Additional sampling of equipment and surfaces may be performed to increase sensitivity.

2. Sample size

Refer to the *Terrestrial Manual*.

3. Laboratory methods

Refer to the *Terrestrial Manual*.

4. Time and frequency of testing

Time and frequency of sampling for each *poultry* type are listed below:

a) *Breeders* and hatcheries**i) *Breeder flocks* before lay**

- Before the end of the first week of life when the status of the breeding farm and the hatchery is not known or does not comply with this Chapter.
- Within the four weeks before being moved to another house, or before going into production if the animals will remain in the same house for the production period.
- One or more times during the growing period if there is a *culling* policy in place. The frequency would be determined on commercial considerations.

ii) *Breeder flocks* in lay

- At least at monthly intervals during the laying period.
- Additional testing should be determined by the *Veterinary Services*.

iii) Hatcheries

- Testing hatcheries may complement on farm testing.
- The minimal frequency should be determined by the *Veterinary Services*.

b) Poultry for the production of eggs for human consumption**i) *Flocks* grown to be *layers***

- Before the end of the first week of life when the status of the breeding farm and the

hatchery is not known or does not comply with this Chapter.

- Within the four weeks before being moved to another house, or before going into production if the animals will remain in the same house for the production period.
- One or more times during the growing period if there is a *culling* policy in place. The frequency would be determined on commercial considerations.

ii) *Layer flocks*

- At expected peak of lay for each production cycle (the period of time in the laying cycle when the production of the *flock* is highest).
- One or more times if there is a *culling* policy in place or if eggs are diverted to processing for the inactivation of the pathogen. The minimal frequency should be determined by the *Veterinary Services*.

c) Poultry for the production of *meat*

- i) *Flocks* should be sampled at least once.
- ii) Where sampling occurs on farms and where there is a long period (2 weeks or more) between thinning and final depopulation further testing should be considered.
- iii) Where sampling occurs on farms, *flocks* should be sampled as late as possible before the first birds are transported to the slaughter house. Where this is done to allow for the implementation of control measures during processing, this must be done at a time that ensures the results are available before slaughter.

Whether sampling occurs on the farm or at the processing plant, there should be an integrated system in place which allows for investigation of the source of positive flocks.

d) Empty building testing

- i) Bacteriological monitoring of the efficacy of *disinfection* procedures is recommended when *Salmonella* have been detected in the previous *flock*.

As appropriate, sampling of equipment and surfaces as well as boot swabs or drag swabs of the empty building after depopulation, cleaning and *disinfection*.

Results from *surveillance* may lead to the implementation of additional prevention and control measures to reduce the risk of transmission of *Salmonella* to humans:

- a) In *breeders*, control measures may be implemented to reduce the transmission of *Salmonella* to the next generation, especially for trans-ovarian transmitted serotypes such as *S. Enteritidis*.
- b) In *layer flocks* control measures will reduce and may eliminate contamination of eggs with *Salmonella*.
- c) In *poultry* for *meat* production, control measures may be implemented at *slaughter* or further down the food chain.

Article 6.5.5.

Prevention and Control measures

Salmonella prevention and control may be achieved by adopting Good Agricultural Practices and Hazard Analysis Critical Control Point (HACCP), and general measures detailed in Chapter 6.3. Hygiene and Biosecurity Procedures in Poultry Production, in combination with the following additional measures, where appropriate. No single measure used alone will achieve effective *Salmonella* control.

Additional prevention and control measures include: vaccination, *competitive exclusion*, *flock culling*, organic acids and product diversion to processing.

Antimicrobials should not be used to control *infection* with *Salmonella* in *poultry* because the effectiveness of the treatment is limited, may mask the infection at sampling, has the potential to produce residues in *meat* and eggs and can contribute to the development of antimicrobial resistance. Antimicrobials may also reduce

normal flora in the gut and increase the likelihood of colonisation with *Salmonella*. In special circumstances antimicrobials may be used to salvage animals with high genetic value.

1. Day old chicks used to stock a *poultry* house should be obtained from breeding *flocks* and hatcheries that are free from at least *S. Enteritidis* and *S. Typhimurium* and have been monitored according to this Chapter.
2. *Layer* and *breeder flocks* should be stocked from *flocks* that are free from at least *S. Enteritidis* and *S. Typhimurium* (under study) and have been monitored according to this Chapter.
3. Feed contamination with *Salmonella* is known to be a source of *infection* for *poultry*. Therefore, it is recommended to monitor the *Salmonella* status of *poultry* feed, and if found positive to take corrective measures. The use of heat treated feeds or feeds subjected to other bacteriostatic or bactericidal treatment (e.g. organic acids) is recommended. Feed should be stored in clean closed containers to prevent access by wild birds and rodents. Spilled feed should be cleaned up immediately to remove attractants for wild birds and rodents.
4. *Competitive exclusion* may be used in day old chicks to reduce colonisation by *Salmonella*.
When used, *competitive exclusion* should be administered according to the instructions provided by the manufacturer and in accordance with the standards and recommendations of the *Veterinary Services*.
5. Vaccines are used against *Salmonella infections* caused by different serotypes in various *poultry* species, including single or combined vaccines. Vaccines produced according to the *Terrestrial Manual* should be used.

If live vaccines are used it is important that field and vaccine strains be easily differentiated in the laboratory. If serology is used as the *surveillance* method, it may not be possible to distinguish between vaccination and *infection* with a field strain.

Vaccination can be used as part of an overall *Salmonella* control programme. It is recommended that vaccination not be used as the sole control measure.

When the status of the breeding farm and the hatchery from which the *flock* originates is not known or does not comply with this Chapter, vaccination of *flocks*, starting with day-old chicks, against the *Salmonella* serotypes known to be significant should be considered.

Vaccination against the *Salmonella* serotypes known to be significant should be considered when moving day-old chicks to a previously contaminated shed so as to minimise the risk of the birds contracting *Salmonella infection*.

When used, vaccines should be administered according to the instructions provided by the manufacturer and in accordance with the standards and recommendations of the *Veterinary Services*.

Vaccination against *S. Enteritidis* can cause a positive reaction in *Salmonella Gallinarum* serological tests and needs to be considered when implementing measures for these pathogens.

6. Depending on animal health, *risk assessment*, and public health policies, *culling* is an option to manage infected *breeder* and *layer flocks*. Infected *flocks* should be destroyed or slaughtered and processed to minimise human exposure to *Salmonella*.
If *poultry* are not culled, eggs for human consumption should be diverted for processing for inactivation of *Salmonella*.
7. *S. Enteritidis* is characterised by its ovarian transmission pattern. Countries should set targets for eradicating (or significantly reducing) *Salmonella Enteritidis* from egg-producing flocks through a guided policy for eradication from the top of the production pyramid, i.e. from grandparent *flocks* through *breeder flocks* to *layer flocks*.
8. As far as the veterinary involvement is concerned, the responsible veterinarian should monitor the results of *surveillance* testing for *Salmonella*. This information should be available to the veterinarian before marketing if a veterinary certificate for *flock Salmonella* status is required. When required by the *Competent Authority*, the veterinarian or other authorised person should notify the *Competent Authority* if the presence of *Salmonella* of the relevant serotype is confirmed.

Prevention of *Salmonella* spread from infected flocks

If a *flock* is found infected with specific *Salmonella* serotypes of concern, the following actions should be taken in addition to general measures detailed in Chapter 6.3. Hygiene and Biosecurity Procedures in Poultry Production:

1. According to the epidemiological situation, investigations should be carried out to determine the origin of the *infection*.
2. Movement of *poultry flocks* at the end of the production cycle should only be allowed for *slaughter* or destruction. Special precautions should be taken in the transport, *slaughter* and processing of the birds, e.g. they could be sent to a separate slaughterhouse or processed at the end of a shift before cleaning and *disinfection* of the equipment.
3. Litter should not be reused. Poultry litter/faeces and other potentially contaminated farm waste should be disposed of in a safe manner to prevent the direct or indirect exposure of humans, livestock and wildlife to *Salmonella*. Particular care needs to be taken in regard to *poultry* litter/faeces used to fertilise plants intended for human consumption. If litter is not removed then it should be treated in a manner to inactivate infectious agents, to prevent the spread from one *flock* to the next.
4. Particular care should be taken in cleaning and *disinfection* of the *poultry* house and equipment.
5. Before restocking the facility, a bacteriological examination should be carried out as detailed in this Chapter and the *Terrestrial Manual*.

DRAFT CHAPTER 6.4.
BIOSECURITY PROCEDURES
IN POULTRY PRODUCTION

Article 6.4.1.

Introduction

This chapter provides recommended biosecurity procedures in *poultry* production.

Infectious *disease* agents of *poultry* are a threat to *poultry* health and, at times, human health and have significant social and economic implications. In *poultry* production, especially under intensive conditions, prevention is the most viable and economically feasible approach to the control of infectious *disease* agents.

Biosecurity procedures should be implemented with the objective of preventing the introduction and dissemination of infectious *disease* agents in the *poultry* production chain,. The adoption of Good Agricultural Practices and the Hazard Analysis Critical Control Point (HACCP) system will help to achieve these objectives.

Article 6.4.2.

Purpose and scope

This chapter deals with biosecurity procedures in *poultry* production. It should be read in conjunction with the Codex Alimentarius Code of Hygiene Practice for Meat (CAC/RCP 58-2005) and Code of Hygienic Practice for Eggs and Egg Products (CAC/RCP 15-1976 Revision 2007).

This chapter provides general recommendations for infectious *disease* agents of *poultry*. Recommendations on specific *diseases* may be found in relevant *disease* chapters in the *Terrestrial Code*.

This chapter identifies several relevant biosecurity measures. The choice of measures to be implemented will vary according to national conditions, including *poultry disease* status, the risk of introduction and dissemination of infectious *disease* agents and the cost effectiveness of control measures.

Article 6.4.3.

Definitions (for this Chapter only)

Breeders: means *poultry* destined for the production of fertile eggs for incubation for the purpose of producing *day-old birds*.

Culling: means the depopulation of a *flock* before the end of its normal production period.

Live bird markets: means markets where live birds from various sources are sold for slaughter or further rearing.

Article 6.4.4.

Recommendations on the location and construction of *poultry establishments*

1. All establishments (*poultry farms and hatcheries*)

- a) A suitably isolated geographical location is recommended, taking into account the direction of the prevailing winds, location of other *poultry establishments* and the distance from roads used to transport *poultry*.
- b) *Poultry establishments* should be located and constructed to provide adequate drainage away from the site.
- c) *Poultry* houses and hatcheries should be designed and constructed (preferably of smooth impervious materials) so that cleaning and *disinfection* can be carried out effectively. Ideally, the area immediately surrounding the *poultry* houses should be paved with concrete or other impervious material to facilitate cleaning and *disinfection*.
- d) The *establishment* should be surrounded by a security fence to prevent the entry of unwanted animals and people.

- e) A sign indicating restricted entry should be posted at the entrance to the farm.

2. Additional measures for poultry farms

- a) *Establishments* should be designed for use with single species and single purpose. Whenever possible, the 'all-in all-out' single age group principle should be used. If this is not feasible and several *flocks* are maintained on one *establishment*, each *flock* should be managed as a separate *epidemiological unit*.
- b) *Poultry* houses, and buildings used to store feed or eggs, should be constructed and maintained to prevent the entry of wild birds, rodents and insects.
- c) Where feasible the floors of *poultry* houses should be constructed using concrete or other impervious materials and designed so that cleaning and *disinfection* can be carried out effectively.
- d) Where feasible, feed should be delivered into the farm from outside the security fence.

3. Additional measures for hatcheries

- a) The design of the hatchery should take account of work flow and air circulation needs, with 'one way flow' ' movement of eggs and *day-old birds* and one way air flow in the same direction.
- b) The hatchery buildings should include physical separation of areas used for the following:
 - i) personnel changing, showering and sanitary facilities;
 - ii) receipt, storage and transfer of eggs;
 - iii) incubation;
 - iv) hatching;
 - v) sorting, sexing and placing of *day-old birds* in boxes;
 - vi) storage of egg boxes and chick boxes, egg flats, box pads, chemicals and other items;
 - vii) washing equipment;
 - viii) waste disposal;
 - ix) dining facilities for personnel;
 - x) office space.

Article 6.4.5.

Recommendations applicable to the operation of poultry establishments

1. All establishments (poultry farms and hatcheries)

- a) There should be good communication between all those involved in the *poultry* production chain from breeding to production and consumption to ensure that steps are taken to minimise dissemination of infectious *disease* agents. Personnel should have access to basic training in biosecurity relevant to *poultry* production and food safety.
- b) Traceability at all levels of the *poultry* production chain should be possible.
- c) Records of production should be maintained. On farm, this includes treatment, vaccination, *flock* history, mortality and *disease surveillance* data. This should be maintained on an individual *flock* basis. In hatcheries, relevant records include fertility, hatchability, vaccination and treatment. Records should be readily available for inspection.
- d) A veterinarian should be responsible for monitoring *poultry* health on the *establishment*.
- e) Access to the *establishment* should be controlled to ensure only authorised persons and *vehicles* enter the site.
- f) *Establishments* should be free from unwanted vegetation and debris.
- g) Procedures for the prevention of entry of wild birds, and the control of vermin such as rodents and arthropods should be implemented on a routine basis.

- h) All personnel and visitors entering an *establishment* should follow a biosecurity procedure. The preferred procedure is for visitors and personnel to shower and change into clean clothes and footwear provided by the *establishment*. Where this is not practical, clean outer garments (coveralls or overalls, hats and footwear) should be provided.

Before entering and after leaving a *poultry* house, personnel and visitors should wash their hands with soap and water and use a properly maintained disinfectant footbath. The disinfectant solution in the footbath should be changed on a regular basis to ensure its efficacy, according to the manufacturer's instructions.

- i) Personnel and visitors should not have had recent contact with other *poultry*, *poultry* waste, or *poultry* processing plant(s). This time period should be based on the level of risk of transmission of infectious *disease* agents. This will depend on the *poultry* production purpose, biosecurity procedures and *disease* status (e.g. the time between visiting a breeder *flock* and then a broiler *flock* would be less than the time between visiting a broiler *flock* and then a breeder *flock*).
- j) Delivery *vehicles* should be cleaned, and *disinfected* before loading each consignment of *hatching* eggs, *day-old* birds or *poultry*.

2. Additional measures for all *poultry* farms

- a) Animals, other than *poultry* of the appropriate (resident) species and age, should not be permitted access to *poultry* houses. No animals should have access to other buildings (e.g. those used to store feed or eggs).
- b) The water supply to *poultry* houses should be potable according to the World Health Organization or to the relevant national standard, and microbiological quality should be monitored if there is any reason to suspect contamination. The water delivery system should be *disinfected* between *flocks* when the *poultry* house is empty.
- c) Birds used to stock a *poultry* house should preferably be obtained from breeder *flocks* and hatcheries that are free from vertically transmitted infectious *disease* agents.
- d) Heat treated feeds with the addition of bacteriostatic or bactericidal treatments is recommended (e.g. organic acids). Where heat treatment is not possible, the use of bacteriostatic or bactericidal treatments is recommended.

Feed should be stored in a manner to prevent access by wild birds and rodents. Spilled feed should be cleaned up immediately to remove attractants for wild birds and rodents.

- e) The litter in the *poultry* house should be kept dry and in good condition.
- f) Dead birds should be removed from *poultry* houses as quickly as possible or at least daily. These should be disposed of in a safe and effective manner.
- g) Personnel involved in the catching of birds should be adequately trained in bird handling and basic biosecurity procedures.
- h) *Poultry* should be transported in well ventilated *containers* and should not be over crowded. Exposure to extreme temperatures should be avoided.
- i) *Containers* should be *cleaned* and *disinfected* between each use.
- j) When a *poultry* house is depopulated, it is recommended that all faeces and litter be removed from the house and disposed of in a manner approved by the *Veterinary Services*.

If litter is not removed and replaced between *flocks* then the litter should be treated in a manner to inactivate infectious *disease* agents, to prevent the dissemination of infectious *disease* agents from one *flock* to the next.

After removal of faeces and litter, cleaning and *disinfection* of the building and equipment should be done in accordance with Chapter 4.13.

All litter removed from a *poultry* house should be disposed of in a safe manner to prevent the dissemination of infectious agents.

- k) For *poultry flocks* that are allowed to range outdoors, attractants to wild birds should be minimised e.g. feeders should be kept inside the *poultry* house. *Poultry* should not be allowed access to sources of contamination (e.g. household waste, other farm animals, stagnant water and litter storage areas). The nesting area should be inside the *poultry* house.
- l) To avoid the development of antimicrobial resistance, antimicrobials should be used according to relevant directions of the *Veterinary Services* and manufacturer's instructions and in accordance with *Terrestrial Code* Chapters 6.7., 6.8., 6.9., 6.10. and 6.11.

3. Additional measures for breeder farms

- a) Nest box litter and liners should be kept clean.
- b) *Hatching eggs* should be collected at frequent intervals, at least daily, and placed in a new or clean and *disinfected* packaging material.
- c) Grossly dirty, broken, cracked, or leaker eggs should be collected separately and should not be used as *hatching eggs*.
- d) *Hatching eggs* should be cleaned and sanitised as soon as possible after collection using an approved sanitising agent, in accordance with the manufacturer's instructions.
- e) *Hatching eggs* or their packaging materials should be marked to assist traceability and veterinary investigations.
- f) The sanitised *hatching eggs* should be stored in a dedicated room as soon as possible after collection. Storage conditions should minimise the potential for microbial contamination and growth and ensure maximum hatchability. The room should be well ventilated, kept clean, and regularly *disinfected* using disinfectants approved for this purpose.

4. Additional measures for hatcheries

- a) Dead in shell embryos should be removed from hatcheries as soon as they are found and disposed of in a safe and effective manner.
- b) All hatchery waste, garbage and discarded equipment should be contained or at least covered while on site and removed from the hatchery and its environs as soon as possible.
- c) After use, hatchery equipment, tables and surfaces should be promptly and thoroughly cleaned and *disinfected* with an approved disinfectant.
- d) Egg handlers, chick sexers and chick handlers should wash their hands with soap and water before commencing work and between working with batches of *hatching eggs* or *day-old birds* from different breeder *flocks*.
- e) *Hatching eggs* and *day-old birds* from different breeder *flocks* should be kept separate during incubation, hatching, sorting and transportation.
- f) *Day-old birds* should be delivered to the farm in new *containers* or in clean, *disinfected containers*.

Article 6.4.6.

Prevention of further dissemination of infectious disease agents of *poultry*

When a *flock* is determined to be infected, in addition to the general biosecurity measures described previously, management procedures should be adjusted to effectively isolate the infected *flock* from other *flocks* on the *establishment* and other epidemiologically related *establishments*. The following measures are recommended:

- 1. Personnel should be trained in the management of infected *flocks* to prevent the dissemination of infectious *disease* agents to other *flocks* and *establishments*, and to humans (relevant measures include: handling of an infected *flock* separately, last in sequence and the use of dedicated personnel and clothing and equipment).
- 2. Epidemiological investigations should be carried out to determine the origin and route of transmission of the infectious *disease* agent.

3. *Poultry* litter/faeces and other potentially contaminated farm waste should be disposed of in a safe manner to prevent dissemination of infectious *disease* agents.
4. Depending on the epidemiology of the *disease*, the results of a risk assessment, and public and animal health policies, culling may be used to manage infected *flocks*. When infected *flocks* are destroyed or slaughtered they should be processed in a manner to minimise exposure of humans and other *flocks* to the infectious *disease* agent, and in accordance with recommendations of the *Veterinary Service* and relevant Chapters in the *Terrestrial Code*. Based on risk assessment, non-infected, high risk *flocks* may be culled. Movement of culled *poultry* should only be allowed for slaughter or destruction.

Before restocking, the *poultry* house or *establishment* should be cleaned, *disinfected* and tested to verify that the cleaning has been effective. Special attention should be paid to feed equipment and water systems.

Microbiological monitoring of the efficacy of *disinfection* procedures is recommended when pathogenic agents have been detected in the previous *flock*.

5. Depending on the epidemiology of the *disease*, risk assessment, vaccine availability and public and animal health policies, vaccination is an option to minimise the dissemination of the infectious *disease* agent. When used, *poultry* should be vaccinated in accordance with the directions of the *Veterinary Services* and the manufacturer's instructions. Recommendations in the *Terrestrial Manual* should be followed as appropriate.

Article 6.4.7.

Recommendations to prevent the dissemination of infectious disease agents from live bird markets

1. Personnel should be educated on the significance of infectious *disease* agents and the need to apply biosecurity practices to prevent dissemination of these agents. Education should be targeted to personnel at all levels of operations in these markets (e.g. drivers, owners, handlers, processors). Programmes should be implemented to raise awareness of consumers of the risks associated with activities of live bird markets.
2. Personnel should wash their hands with soap and water before and after handling birds.
3. All *containers* and *vehicles* should be cleaned and *disinfected* every time they leave the market.
4. Live birds that leave the market should be housed separately from other birds for a period of time to minimise the potential dissemination of infectious *disease* agents of *poultry*.
5. Periodically the market should be emptied, cleaned and *disinfected*. This is of particular importance when an infectious *disease* agent of *poultry* deemed significant by the *Veterinary Services* has been identified in the market or the region.
6. Where feasible, *surveillance* should be carried out in these markets to detect infectious *disease* agents of *poultry*, especially those agents of zoonotic significance. The *surveillance* programme should be determined by the *Veterinary Services*, and in accordance with recommendations in relevant *disease* specific chapters of the *Terrestrial Code*.
7. Attempts should be made to ensure the possibility of tracing all birds entering and leaving the markets.