



AUSTRALIAN **EGG**
CORPORATION LIMITED

Code of practice for biosecurity in the egg industry

Second Edition

**Funded by the Australian Egg
Corporation Limited**

Endorsed by Animal Health Australia

by T. Grimes & C. Jackson

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Code of practice for biosecurity in the egg industry

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Foreword

Effective biosecurity programs are essential for controlling and preventing the spread of economically important exotic and endemic diseases of commercial poultry. The importance of biosecurity procedures was highlighted during outbreaks of avian influenza and of virulent Newcastle disease in Australia in the late 1990s and in 2002 in NSW and Victoria. The need to formalize a joint industry and government approach to the funding of Emergency Animal Diseases (EAD) contributed to the development of EADRA (the Emergency Animal Disease Response Agreement – a joint industry and government partnership) managed by Animal Health Australia (AHA) and signed by the egg industry in 2002 as one of 14 livestock industry groups to collectively and significantly increase Australia's capacity to prepare for, and respond to, EAD incursions. Livestock Industry organisations were asked to take the lead in developing biosecurity standards for adoption by producers to support EADRA. In addition, biosecurity programs have an integral role in controlling important endemic diseases, thus facilitating ongoing industry trade in birds and egg products and improving bird health and welfare.

The development of the first edition of this Code of Practice was undertaken at the request of the Australian Egg Industry Association (now the Australian Egg Corporation Limited) to support its developing quality assurance (QA) program. The second edition of the Code was developed at the request of the Australian Egg Corporation Ltd (AECL) on behalf of AHA to further support the AECL QA program. AHA also asked AECL to develop a more descriptive biosecurity manual to support its obligations to EADRA that did not include hazard analysis and critical control point (HACCP) principles but provided "how to" information for farm workers. That biosecurity manual will be published separately to this Code but will be cross-referenced to this Code where appropriate.

This revised edition of the Code aims to assist the Australian egg industry to understand the issues related to biosecurity and to develop effective biosecurity plans to minimise the occurrence and impact of disease outbreaks. The Code has been developed using HACCP principles to facilitate the incorporation of biosecurity measures into farm QA programs.

The second edition of the Code has been funded from industry levy revenue and matched Federal Government funds.

This report is an addition to AECL's range of peer reviewed research publications and an output of our R&D program, which aims to support improved efficiency, sustainability, product quality, education and technology transfer in the Australian egg industry.

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Printed copies of this report are available for a nominal postage and handling fee and can be requested by phoning (02) 9409 6999 or emailing research@aecl.org.

Australian Egg Corporation Limited

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Abbreviations

AECL	Australian Egg Corporation Limited
AHA	Animal Health Australia
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
AUSTVETPLAN	Australian Veterinary Emergency Plan
CCP	Critical control points
EAD	Emergency Animal Diseases
EADRA	Emergency Animal Disease Response Agreement
HACCP	Hazard analysis and critical control points
GMP	Good management practice
QA	Quality Assurance
SCARM	Standing Committee on Agriculture and Resource Management

Executive Summary

A formal Biosecurity Plan to protect bird health is required by the Australian Egg Industry as part of an overall Quality Assurance (QA) Programme, that also covers bird welfare, food safety and egg labelling, and to assist with the prevention of Emergency Diseases such as virulent Newcastle disease. Originally, the Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ) requested that the QA Programme be based on hazard analysis critical control point (HACCP) principles and that it includes provision for third party auditing. This second edition of the Biosecurity Code of Practice (the Code) provides an on-going resource document to further support QA in Australia. A separate biosecurity manual, *National Farm Biosecurity Manual Egg Production*, has been prepared to support Australian Egg Corporation Limited's (AECL's) obligations to Emergency Animal Disease Response Agreement (EADRA).

Some current industry structures and practices may require modification in the most cost-effective way because they may jeopardise biosecurity and bird health, following the application of this Code.

Information is given in the Code that will enable producers to develop a Biosecurity Plan for their started pullet or egg producing farms based on defined risks to their farms. While there may be some commonality between Plans developed for different farms, a Plan developed for a cage layer farm is likely to differ from that for a free-range farm and Plans developed by producers in the Sydney area may differ from those in Western Australia, for example.

A 12-Step procedure is detailed in the Code to assist producers and their technical advisors when developing their Biosecurity Plan. This aligns with the Standing Committee on Agriculture and Resource Management's (SCARM) *A Guide to the Implementation and Auditing of HACCP – SCARM Report 60* (1997) that has been used in Australia to develop HACCP Plans for food safety of poultry products. In addition, examples given within these Steps and the associated Appendices provide technical data that may be appropriate to incorporate in Biosecurity Plans of particular farms.

In order to implement the 12-Step procedure, a HACCP Team should be formed to describe the Products to be produced, construct flow charts of production stages, determine potential hazards for the farm, conduct a hazard analysis to determine the severity and risk of the hazard to that farm, define control measures and how they are measured, identify critical control points (CCPs) in the production process at which control measures will be most effective, establish corrective actions to be taken if monitoring indicates that the control measure is not within specified limits and document the forms on which monitoring activities are recorded. CCP work instructions to clearly define how control measures at a CCP are to be undertaken and supporting programmes for control measures should also be documented.

A set of Good Management Practices (GMPs) can be compiled for a farm from the HACCP-based Biosecurity Plan and can form the "Biosecurity Policy" for the farm.

A Biosecurity Manual should be compiled which contains details of the HACCP Team, Product Description, Process Flow Charts, a Hazard Analysis Chart, a Biosecurity HACCP Plan Audit Table, CCP Monitoring Forms, CCP Work Instructions, Supporting Programmes, HACCP Plan Verification Activities, Staff Training Programmes and Good Management Practices. Third party auditors, whose main role is to examine the HACCP Plan that has been developed and check that it is being implemented correctly, will expect to be able to examine this Manual.

While the above tasks may appear to be difficult to develop and implement, it is expected that they can be completed readily following some staff training and by using the explanations

and examples given in the Code. This was the experience when HACCP programmes were introduced into poultry processing plants in Australia some years ago.

The outcome of developing a Biosecurity Plan using HACCP principles is that there will be greater assurance that commercial egg industry flocks are protected against serious disease outbreaks. The format developed in this Code could be used to include bird welfare, food safety and egg labelling parameters when developing a National QA Programme.

The critical monitoring points identified in this Code are:

- Entry of chicks, litter, equipment, vehicles, people and feed into started pullet farms
- Entry of litter, started pullets, adult fowls, equipment, vehicles, people and feed into egg production farms
- The presence of wild bird and rodent faeces in sheds or where hens and pullets range
- Water sanitation on farms using surface water for internal shed fogging or bird drinking water
- Disposal systems for dead birds, reject eggs and manure from the farm
- The presence of non-poultry bird species, other poultry and pigs on the farm.

1 Introduction

The first edition of this Code was developed following a request from the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (now The Standing Council on Primary Industries) that the Australian Egg Industry Association (now the AECL) prepare a Biosecurity Plan as part of a National QA Programme for:

- Bird welfare, bird health, food safety, biosecurity and egg labelling; and
- The prevention of Emergency Diseases (Virulent Newcastle Disease, Avian Influenza and Very Virulent Infectious Bursal Disease) and the allocation of compensation funds in the event of an outbreak of an Emergency Disease.

ARMCANZ also required that the National QA Programme be based on HACCP principles and that it must include provision for third party auditing.

This second edition of the Code has been prepared following a request from AECL to revise the First Edition and to make it a useful resource document to continue to support QA. Concurrently, Animal Health Australia (AHA) has requested AECL to prepare a separate document on biosecurity that is more user friendly for farm workers and will provide more “how to” instructions. The *National Farm Biosecurity Manual Egg Production* has been developed as a separate document. These two documents meet the obligations of AECL under the EADRA agreement and should be read together.

When the First Edition of the Code was developed some individual producers in the commercial egg industry had already implemented a Biosecurity Plan. However, there was no industry Code for Biosecurity documented in Australia at the time.

Biosecurity programmes and procedures (Biosecurity Plans) are an important part of health control measures to protect poultry flocks from harmful infectious organisms, pests and diseases.

2 About the Code

2.1 Aim and scope

The aims of the Code are to:

- Assist egg farmers or enterprises to develop and adopt an appropriate Biosecurity Plan, based on HACCP principles, for their started pullet and egg layer farms; and
- Recommend appropriate HACCP-based Biosecurity Programmes/Procedures and GMPs to prevent the occurrence of endemic and Emergency Diseases in layer and pullet flocks, the multiplication of pathogens on farm and their subsequent spread from farms into the environment or to other poultry.

The scope of the Code extends from shed setup through to production of started pullets and fresh whole eggs.

For the purposes of the Code a “farm” is defined as the shed and its immediate surroundings for caged and barn systems and the shed and area where hens or pullets range for the free-range system. The actual area designated as “the farm” must be defined in each case when implementing the Code. For biosecurity purposes a farm should have a boundary, whether fenced or otherwise, that enables the farmer to establish an effective biosecure zone around the hens or pullets that minimises the risk of disease organisms being brought into contact with the birds. Many control measures are implemented at the farm boundary.

An effective Biosecurity Plan based on HACCP principles will ensure healthy pullets are delivered to the egg laying facility where they can lay efficiently and produce quality eggs.

Production of hatching eggs or day old chicks on breeder farms is not included in this Code. However, the Code could be adapted by breeder companies when developing their own QA and HACCP Programmes.

The Code does not specifically cover bird welfare or food safety. National and State Codes of Practice and regulations that apply to the egg industry have already been jointly developed by government and industry for the welfare of poultry (PISC 2002; AHA 2012) and food safety (AECL 2009; FSANZ 2011). These documents contain base data that could be included in a National QA Programme.

The Code can be used for control of both endemic and exotic diseases, but the provisions of the relevant Australian Veterinary Emergency Plan (AUSTVETPLAN) Disease Strategies now under the management of AHA must be followed during outbreaks of Emergency Diseases (AUSTVETPLAN 2011; AUSTVETPLAN 2013). This includes following emergency response plans currently in force such as the *National Newcastle Disease Management Plan 2013-2016*.

It must be stressed that in accordance with HACCP principles, farm management should develop a specific, documented and auditable Biosecurity Plan for their own farm or enterprise, since hazards and risks vary between farms, and this Plan should be updated as the hazards and risks change.

2.2 Responsibilities

Full responsibility must be accepted by the owner and management of an enterprise or farm in the development and adoption of a Biosecurity Plan based on this Code or in ensuring the use of an alternative Biosecurity Plan based on HACCP principles.

While regular audits of the Biosecurity Plan should be undertaken by farm management, the Plan should be documented so that it can be audited by an independent third party, accredited by a recognised auditing organisation.

2.3 Definition of Biosecurity for the Purposes of the Code

Biosecurity can be defined as a set of programmes and procedures that will prevent or limit the buildup and spread of harmful microorganisms and pests in poultry houses, poultry farms and poultry production areas. The biosecurity programme is defined as the implementation of procedures to inhibit the movement of infectious agents harmful to poultry into, within or out of a facility containing poultry susceptible to those agents.

Microorganisms can be discharged from infected birds via body orifices mainly the mouth, nose and cloaca, feather and skin debris, eggs, hatched embryos or biting insects.

The extent to which organisms are discharged from infected birds depends on where and the degree to which the microorganisms multiply in the bird, whether the infection is modified by the bird's immune system and if the environmental/husbandry conditions to which the birds are exposed causes any stress that depresses the bird's immune response.

Whether harmful discharged microorganisms can infect other birds and cause disease depends on the resistance of the microorganisms to the external environment, such as temperature, humidity and sunlight; whether they can contaminate aerosol particles, equipment, vehicles, manure, dead birds, people, feed, water or other physical carriers of infectious organisms; if they can be spread by other animals, rodents, birds and insects; how far these physical and biological carriers of infectious organisms can travel and whether they come in close contact with poultry; and the number of organisms that are discharged from the original infected source and remain viable to constitute an "infectious dose".

Hence, biosecurity programmes and procedures may include:

- Controls on movement of poultry, equipment, people and vehicles between and into farms
- Separation of poultry from other poultry species, non-poultry bird species including wild birds, rodents and animals
- Geographical isolation or other means to minimize aerosol spread between farms
- Control of insects that transmit poultry diseases
- Vaccination to enhance immunity
- Hygiene practices and disinfection procedures to reduce infection levels
- Eradication of harmful microorganisms
- Medication to prevent or treat bacterial or protozoal diseases.

3 Industry Structure/Practices and Biosecurity

Some industry structures and practices cause biosecurity risks that should be minimised or eliminated in the most cost effective way to maintain industry competitiveness.

Producers should understand that particular circumstances that apply to their farm would necessitate an individualized HACCP Plan to be developed for each farm or enterprise.

Details of some industry structures and practices were obtained from surveys undertaken by industry and government following outbreaks of Avian Influenza and Virulent Newcastle Disease, providing some information on current industry biosecurity status. In summary:

- At the end of 2012 approximately 17 million egg-laying hens (together with some 5 million layer pullets) were housed on about 300 commercial farms and numerous smaller or “backyard” farms throughout Australia. Four breeding companies, each of which farm different genetic strains mainly derived from overseas, predominantly supply day-old chickens or 16 week-old started pullets to egg producers. Hatching eggs, chicks, started pullets and end-of-lay hens can act as carriers of disease organisms and pests, but stock suppliers to the commercial egg industry can usually produce hatching eggs, day-old chicks and started pullets of a specified vaccination, maternal antibody and health status, although formal certification of health status is not always provided to customers.
- Started pullet and egg farms are often concentrated around major population centres but in most areas are well separated from other poultry farms, thus minimising the spread of disease by aerosols. Geographical separation and siting of farms can provide protection against aerosol spread of disease organisms and should be addressed when building new farms.
- Farming systems include started pullets and egg layers housed in cages, started pullets and egg layers housed on litter in sheds (“barn-lay”), “free-range” egg layers including organic egg producers, and breeders that are housed mainly in sheds on litter. An increasing number of farms now have birds in more than one production system. An unknown percentage of the eggs produced in Australia are from numerous “backyard” and sometimes non-commercial flocks housed on the ground and there are particular biosecurity issues associated with these flocks.
- An increasing number of poultry are now being housed on free-range farms. This type of production system has specific biosecurity issues by design associated with common access to surface water that may attract water owl that could carry infectious diseases. Wild bird and rodent control are other important biosecurity issues for free-range production and are covered in some of the risk points described below.
- Technical servicing of the commercial egg industry is mainly by breeder companies, feed suppliers, vaccine companies and chemical companies via their sales/servicing representatives. Some consultant veterinarians and nutritionists provide direct technical support.
- People that need to enter sheds include farm staff, vaccination/beak trimming crews, litter removal contractors, bird transport crews, tradesmen, equipment suppliers, veterinarians and technical sales/service representatives.
- Equipment that is taken into sheds includes chick boxes, pullet delivery/hen removal crates, egg flats, vaccination/beak trimming implements, tools and in-shed “furniture” such as feeders, cages, drinkers and foggers.
- Precautions can be taken to prevent the entry of infectious organisms on people, equipment, wild birds, rodents and animals into poultry flocks in sheds, but this is more difficult to achieve for poultry outside sheds.

- Most started pullet-rearing farms, commercial egg layer farms and egg layer breeder farms are multiage. Most started pullet and breeder sheds are single age and some commercial egg-laying sheds are multiage, although sheds containing birds of the same age are becoming more common on larger commercial egg farms. Most free-range and barn-laid or “cage-free” sheds are single age.
- Most started pullet and breeder sheds are cleaned out and disinfected after each batch. Most commercial egg production farms are never totally cleaned out, although there is a trend towards single-age sheds that can be cleaned out after each batch on larger farms. Cleaning out and disinfecting sheds or farms at the end of a batch of birds is one way to eliminate some on-site disease organisms, but this is not considered to be commercially possible on many farms.
- Feed is purchased from either quality assured commercial or producer owned feed mills on farm, or smaller “home mixed” milling on farm. Both heat-treated crumbles or pellets and uncooked mash feeds are used. Feed trucks usually enter the farm and often drive close to sheds to deliver feed into on-farm bins. The use of heat-treated feed, organic acid feed additives, limiting feed truck proximity to sheds and use of truck disinfectant washes are some ways available for reducing the risk of some diseases being transferred into a flock by feed or feed truck operation.
- Most farms use town supply or bore water, which are relatively low risk for microbiological contamination. Some farms use dam/stream/drain water for bird drinking or for internal shed fogging/cooling, which can be contaminated by wild birds and animals.
- Many commercial layer sheds are not fully enclosed and are not totally bird proof (eg. water-fowl proof but not non-aquatic bird proof). A few producers have pet birds or other commercial poultry on their property. Some wild and pet birds can act as a reservoir for some diseases.
- Started pullet and egg layer sheds are usually wild and domestic animal proof, if well maintained and managed. Rodent control programmes are implemented on well-managed farms. Livestock can gain access to areas adjacent to sheds on many farms, which may in some cases present a disease risk.
- Commercial egg producers can require that their suppliers of stock, feed and services implement a QA Programme or Biosecurity Plan based on HACCP principles that prevents or minimises the spread of disease organisms and food-safety pathogens into commercial egg industry flocks, but this practice may not be widely implemented at this stage.
- The development of a formal programme, such as a HACCP Plan, is an accepted way of ensuring that management practices are in place to safeguard farm biosecurity. It is likely that there will be a need for farm management to be trained in HACCP principles, before programmes can be developed and implemented.

4 Hazard Analysis Critical Control Point (HACCP) Biosecurity Plan

HACCP techniques have been applied for many years to develop food safety plans and form the basis for poultry meat inspection programmes in Australia. HACCP provides an organised framework to identify hazards and develop monitoring and control procedures at critical points with some objectivity.

The Standing Committee on Agriculture and Resource Management (SCARM) Report 60 entitled *A Guide to the Implementation and Auditing of HACCP* (SCARM 1997), based on Codex Alimentarius Commission (1996: Annex 1 to Appendix II – ALINORM 97/13), has been used as a reference when applying HACCP principles in this Code.

Egg farmers should follow the steps below for developing and implementing HACCP plans.

Table 4-1: Outline of the 12-Steps for developing and implementing a HACCP Plan

Steps	Action
1	Form a HACCP Team and define the scope of the HACCP Plan
2	Describe the Products
3	Construct a detailed Flow Chart of the production process and conduct on-site verification
4	List all the potential Hazards associated with each stage of the production process, conduct a Hazard Analysis and consider any Control Measures to control Hazards
5	Determine Critical Control Points
6	Establish Critical Limits for each CCP
7	Establish a Monitoring System for each CCP
8	Establish Corrective Action Plans for CCP Deviations
9	Establish Record Keeping and Documentation
10	Establish Verifications Procedures
11	Train staff for HACCP implementation
12	Commence Monitoring the CCPs

Source: Based on SCARM (1997)

4.1 Detail of 12-Steps for developing and implementing a HACCP Plan

4.1.1 Step 1 - HACCP Team

A team representing farm management, the farm workforce and technical advisors should be formed to develop a HACCP Biosecurity Plan for the particular farm or enterprise. SCARM recommends that the team should include 3-5 people. The Plan should be documented so that an independent auditor can clearly understand how and why HACCP decisions were made.

4.1.2 Step 2 - Products of Commercial Egg Industry Farms

For the purposes of this Code, the products are defined as Started Pullets, Fresh Whole Eggs, Manure for Fertilizer and End-of-Lay Hens for Slaughter.

4.1.3 Step 3 - Flow Charts of the Production Process

Flow charting (such as shown in **Appendix 1**) is undertaken to ensure all relevant processes to produce the defined products are included. An on-site verification of the Flow Charts should be conducted.

Flow charting of livestock production systems, which include numerous Process Stages extending over months or years, are exposed to numerous hazards and are subject to many biological variations, is more difficult than for many factory-based food production systems for which HACCP is traditionally applied. For this reason, the Flow Charts of likely processes for Started Pullet and Commercial Egg Production given in **Appendix 1** are in a summarized, abbreviated form.

Egg washing, grading, packing, distribution and manufacture of further processed egg products are excluded from this Code, because they have little or no influence on bird health and they are included in existing Egg Industry food safety Codes.

4.1.4 Step 4 - Hazards, Hazard Analysis and Control Measures

For each Stage of the Flow Chart, the following questions should be asked:

- *What Inputs are there that could introduce a Hazard?*

The HACCP Team should compile a list of Inputs such as those given in **Appendix 1** that could result in Hazards entering farms or sheds on their poultry farm.

Because particular inputs often relate to many Stages in the process, Inputs have not been aligned to any particular Stage in the Flow Charts.

- *What Hazards are likely to be introduced by these Inputs?*

Hazards can be classified into 3 categories – Biological, Physical or Chemical. Biological causes are the most likely hazards to be addressed in a Biosecurity Plan for bird health in the commercial egg industry.

The HACCP Team should identify the likely hazards for the farm at each stage of the production process.

Suggested microorganisms/pests (Biological Hazards) of importance to the Australian commercial egg layer industry are given in **Appendix 2**. The Hazards listed are endemic to Australia or have been defined by AHA as the cause of Emergency Diseases. Key technical advisors to the Australian egg layer industry were consulted when developing this list of hazards.

- *What is the Significance (Severity and Risk) of the Hazard?*

The significance of a Hazard is influenced by how likely it is the Hazard will occur and the severity of the impact if the Hazard does occur.

The HACCP Team should identify those Hazards that are considered to be significant using a Hazard Analysis Matrix, such as that given in **Appendix 3**.

As an example, Significance attributed to the Biological Hazards in **Appendix 2** is given in **Appendix 4**.

The most likely Significant Hazards of Bird Health were considered to be:

- Virulent Newcastle Disease (ND) Virus - Exotic (EAD) and Endemic origins
- Avian Influenza (AI) Virus (H7 and H5 types are EAD)
- Very Virulent Infectious Bursal Disease (VV IBD) Virus (EAD)
- Infectious Laryngotracheitis Virus (ILT)
- Mareks Disease (MD) Virus
- *Pasteurella multocida*, the cause of Fowl Cholera (FC), mainly for free-range and barn production systems, and
- *Salmonella Pullorum* (SP) /*S. Enteritidis* (SE).

Under certain circumstances, other Significant Hazards may be:

- Egg Drop Syndrome (EDS) Virus
- Infectious Bronchitis (IB) Virus
- Avian Encephalomyelitis (AE) Virus
- Fowl Pox (FP) Virus
- *Mycoplasma gallisepticum* (MG)
- *Haemophilus paragallinarum*, the cause of Infectious Coryza (IC)
- External Parasites and
- Internal Parasites.

“Other Salmonella” were not considered to be significant for bird health although these may be judged to be significant in a Food Safety Code.

- *What Control Measures can prevent, reduce or eliminate the Hazard?*

The main means of spread of likely Biological Hazards to bird health on Started Pullet and Egg Production Farms and suggested means of control are also given in **Appendix 2**.

Data on means of spread and control were developed using the poultry disease text *Diseases of Poultry* (Saif 2008). Since there are few means by which infectious organisms and pests can spread, means of control of infectious diseases and pests are similarly limited, with much duplication and overlap occurring between Hazards.

4.1.5 Step 5 - Critical Control Points

A Critical Control Point (CCP) is a stage of the production process at which a control measure that is essential to prevent or eliminate a hazard or reduce it to an acceptable level can be applied. That is, a CCP is where a “shall do” control measure is applied.

A Significant Hazard warrants a CCP, which is established using a CCP Decision Tree (**Appendix 5**).

A CCP Decision Tree is applied to each stage of the process in the Flow Charts to determine where CCP’s are required to control a Significant Hazard. Every attempt should be made to minimise the number of CCP’s to limit the burden of monitoring and each CCP must be able to be readily monitored for control to be achieved.

A key premise in the CCP Decision Tree is that if a subsequent step in the process eliminates or reduces a hazard, then a CCP allocated prior to this process stage is not required. However, this does not preclude a Control Point (CP), or where a “should do” control measure is applied, at a prior process stage. For example, although it may be determined that vaccination during the Pullet Growing stage is a CCP for Egg Drop Syndrome, preventing entry to sheds of waterfowl faeces on footwear during the same stage may be a warranted CP.

A Hazard Analysis Chart (see **Appendix 6** which includes Significant Hazards and CCP’s only for brevity) should be compiled to ensure all Process Stages are considered and as a source of information for auditors as to how CCP’s and any CP’s were developed.

All Process Stages summarised in **Appendix 1** were considered to be CCP's for various Significant Hazards.

4.1.6 Steps 6 to 9 - Critical Limits, Monitoring, Corrective Action and Records

The Critical Limit or Limits for each control measure represents the boundaries of control acceptable for that control measure.

Monitoring of Critical Limits by either inspection or tests determines whether the Hazard is controlled at that process stage. Five key aspects need to be defined for each Critical Limit, namely - What, How, Where, When and Who?

Corrective Action should include a decision on what to do when limits for a CCP are exceeded, correction of any part of the process stage if warranted and documentation of the corrective action taken to prevent further violations of the Critical Limits.

Records are easily kept by designing CCP Monitoring Forms, examples of which are given in **Appendix 7**.

An appropriate means of developing and recording the key components of the Biosecurity Plan is to produce a HACCP Audit Table (**Appendix 8**). Significant Hazards and Control Measures defined in the Hazard Analysis Chart (**Appendix 6**) are transferred to the HACCP Audit Table to rows identifying Process Stages in the Flow Charts to which they apply. Critical Limits for each CCP, Monitoring Systems and Corrective Action Plans are then added to the HACCP Audit Table.

Further explanation of Critical Limits, Monitoring, Corrective Action and Records and the development of a HACCP Audit Table are given in SCARM (1997).

4.1.7 Step 10 - Verification Programme

The Biosecurity HACCP Plan should be verified to ensure that when followed correctly it achieves the documented aims. This may be achieved by:

- Independent audits of Control Measures by farm management or a technical advisor, e.g. a Vendor Audit of stock and litter suppliers to ensure approved QA/Health/Vaccination Programmes are being implemented successfully or certification that this process has been undertaken by an independent auditor, or
- Independent audits of CCP Critical Limits by farm management or a technical advisor in addition to the routine monitoring undertaken under the HACCP Plan.

Evidence that Hazards have not occurred on farms can be due to egg production standards having been achieved, there has been no evidence of clinical signs of diseases caused by Hazards and/or thorough investigations of production and health problems have not resulted in diagnoses of Hazards.

The technical adviser within the HACCP Team will be helpful in developing procedures to implement this step.

Third Party auditors will require documented details of how and when the various elements of the HACCP Plan were verified.

4.1.8 Step 11 - Training

Staff may need to undergo training to understand HACCP principles. Personnel nominated to monitor CCP's need to be adequately trained to do so. Records should be kept of training activities identifying the training description, the date undertaken, and signed off by the trainee.

4.1.9 Step 12 - Commence Monitoring the CCP's

A "Work Instruction" should be prepared to detail how control measures at a CCP are to be implemented and monitored.

For the CCP's identified in this Code, Work Instructions should be developed for:

- Entry of chicks, litter, equipment, vehicles, people and feed into started pullet farms
- Entry of litter, started pullets, adult fowls, equipment, vehicles, people and feed into egg production farms
- Daily monitoring and discouragement of the presence of wild birds and rodents in sheds or where hens and pullets range
- Weekly monitoring and maintenance of effective water sanitation on farms using surface water for internal shed fogging or bird drinking water and for disposal systems for dead birds, reject eggs and manure from the farm
- Six monthly certification that non-poultry bird species, other poultry and pigs are not kept on the farm.

Examples of CCP Work Instructions are given in **Appendix 9**.

4.2 Supporting Programmes

Programmes and procedures for control measures and monitoring of CCP's should be developed for the particular farm or enterprise and documented to support the Biosecurity HACCP Plan. Examples are given in **Appendix 10**.

4.3 Third Party Auditing

The role of the Third Party auditor is to examine the HACCP system that has been developed and be assured that it is being implemented correctly.

Appendix 11 (adapted from SCARM 1997) gives a general list of questions that a Third Party auditor may need to answer.

Third Party auditors should be trained in HACCP procedures and have practical experience of auditing a Commercial Egg Industry Biosecurity Plan.

4.4 Good Management Practices (GMP's)

Good Management Practices can be compiled, based on the Biosecurity HACCP Plan, to establish a "Biosecurity Policy" for the farm or enterprise.

Examples of GMP that may apply to most farms include:

- Control access of people, equipment and vehicles into farms and sheds and implement appropriate biosecurity measures to prevent transfer of disease causing organisms when entry is permitted
- Disinfect shed equipment (including internal surfaces of sheds, especially brooding sheds, at batch depletion) and vehicles that need to enter or closely approach sheds by an approved method
- Purchase poultry, feed and litter from approved suppliers implementing QA programmes that meet industry standards and your requirements

- Implement measures to minimise wild birds (particularly water fowl, pigeons and psittacines) and rodents entering sheds and to discourage the attraction of wild birds and rodents into areas where hens and pullets range
- Sanitise surface water supplies used for drinking and internal shed fogging by an approved method and prevent access of hens and pullets to surface water on ranges. Surface water includes water sourced from dams, open tanks, streams and open drains
- Vaccinate replacement pullets against endemic pathogens or Emergency Diseases (if vaccination is permitted) that are deemed to be Biological Hazards on your farm
- Don't keep non-poultry bird species (e.g. ratites, pigeons, and aviary birds), other poultry or pigs on the farm
- Dispose of manure, dead birds and reject eggs in an approved manner
- Implement precautions to minimise spread of hazardous aerosols into sheds from other sheds on the farm, other poultry farms, processing plants, manure stockpiles and non-poultry bird species.

The specific GMP's developed for a particular farm or enterprise will depend on the outcome of the Hazard Analysis undertaken on that farm.

4.5 Biosecurity Manual

A Biosecurity Manual should be compiled for the farm or enterprise to include:

- Details of HACCP Team Members
- Product Description
- Process Flow Charts
- Hazard Analysis Chart
- Biosecurity HACCP Plan Audit Table
- CCP Monitoring Forms
- CCP Work Instructions
- Supporting Programmes
- HACCP Plan Verification Activities
- Staff Training Programme
- Good Management Practices.

All the above documents should have been produced when developing and implementing the Biosecurity HACCP Plan. A Third Party Auditor will expect to be able to examine the Biosecurity Manual.

4.6 Glossary of Terms

A glossary of terms has been provided in **Appendix 12**.

5 References

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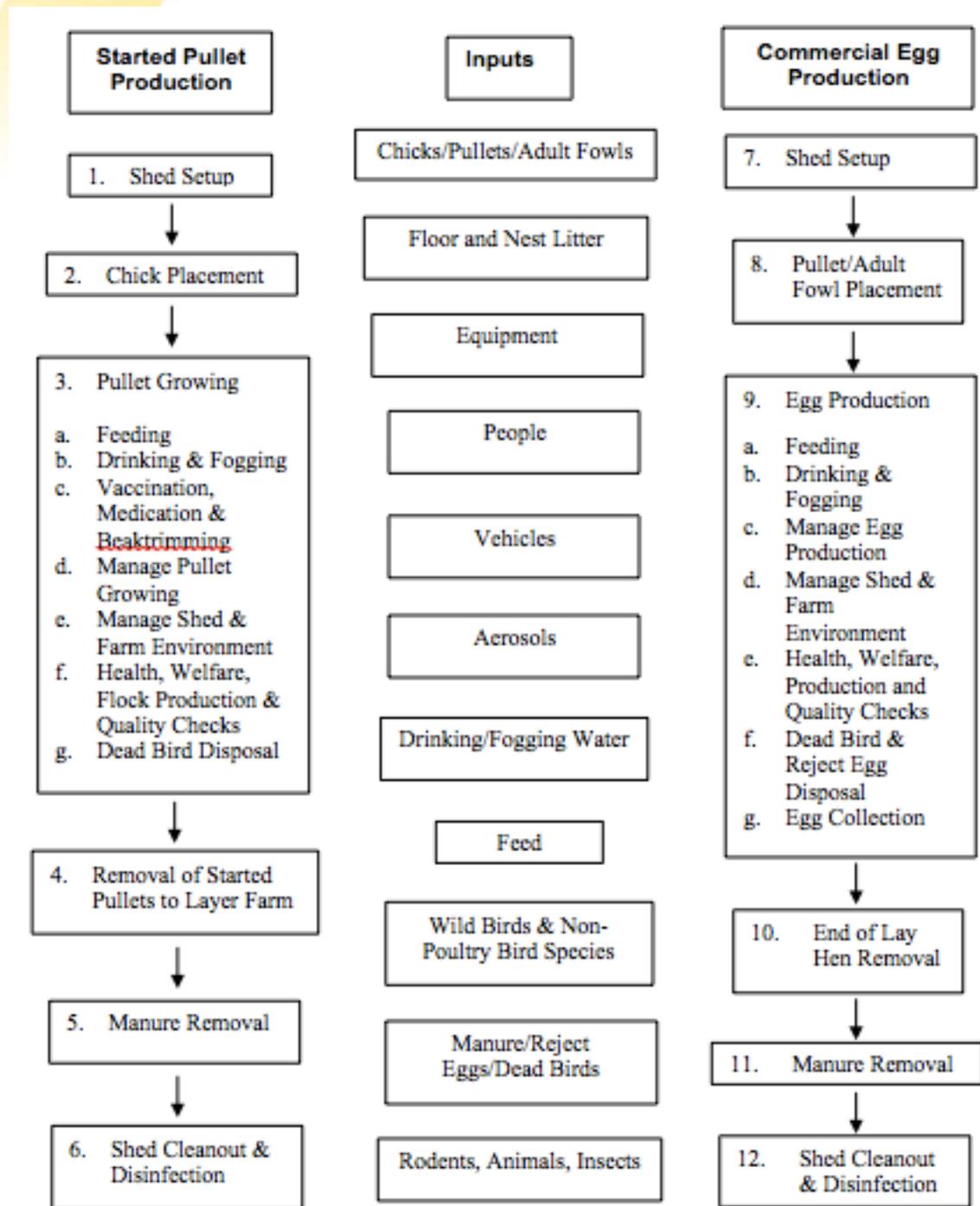
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6 Appendix

Appendix 1 - Flow Charts of Process Stages for Production of Started Pullets, Fresh Whole Eggs, Manure for Fertiliser and End-of-Lay Hens for Slaughter



Appendix 2 - Biological Hazards, Means of Spread and Control Measures

Microorganisms/Pests (HAZARDS)	Main Means of Spread between Australian Farms and Sheds	Main Means of Control
Virulent Newcastle Disease Virus (NDV) - Exotic and Endemic Origins*	Live poultry; people; aerosols; equipment and vehicles; litter, manure and dead poultry; ratites, pigeons and psittacines; feed	Purchase non-infected stock; movement controls/hygienic precautions for poultry/people/equipment/vehicles/litter into sheds/farms; geographical isolation of farms or other means of limiting aerosol spread into sheds; disinfection/hygiene of sheds and equipment; hygienic pickup/disposal of manure and dead birds; no non-poultry bird species kept on farm; prevent close contact of poultry with pigeons and psittacines; hygienic manufacture, transport and storage of feed; vaccination if permitted
Avian Influenza Virus (AIV)*	Live poultry; water fowl; contaminated drinking and fogging water; people, equipment and vehicles; manure and dead poultry; ratites	Purchase non-infected stock; prevent close contact of poultry with water fowl; sanitation of surface water supplies into sheds; boot disinfection/changing into sheds/ranges; movement controls/hygienic precautions for poultry/people/equipment/vehicles into sheds/farms; hygienic disposal of manure and dead birds; no non-poultry bird species kept on farm
Very Virulent Infectious Bursal Disease Virus (VV IBDV)*	Live poultry, manure and dead birds, people, contaminated water and feed, equipment	Purchase non-infected stock; movement controls/hygienic precautions for poultry/people/equipment into sheds/farms; hygienic disposal of manure and dead birds; sanitation of surface water supplies into sheds; hygienic manufacture, transport and storage of feed; vaccination if permitted
Infectious Laryngotracheitis Virus (ILTV)	Live poultry; equipment and vehicles; aerosols	Vaccination; movement controls/hygienic precautions for poultry/people/equipment/vehicles into sheds/farms
Egg Drop Syndrome Virus (EDSV)	Hatching eggs; live poultry; water fowl; contaminated water; equipment and vehicles	Purchase non-infected stock; vaccination; sanitation of water into sheds; prevent close contact of water fowl with poultry; boot disinfection/changing into sheds/ranges; disinfection/hygiene
Mareks Disease Virus (MDV)	Live poultry; equipment; manure; aerosols of feather dander; litter beetles	Vaccination; disinfection/hygiene of brooder sheds, litter and equipment; hygienic disposal of manure; geographical isolation of brooding sheds
Infectious Bronchitis Virus (IBV)	Aerosols; live pullets/adult fowls	Vaccination
Avian Encephalomyelitis Virus (AEV)	Hatching eggs; live chickens	Vaccination; purchase non-infected stock
Fowl Pox Virus (FPV)	Mosquitoes	Vaccination
Mycoplasma gallisepticum (MG)	Hatching eggs; live poultry; aerosols	Vaccination; purchase non-infected stock

Microorganisms/Pests (HAZARDS)	Main Means of Spread between Australian Farms and Sheds	Main Means of Control
Salmonella pullorum (SP) and S. Enteritidis (SE)	Hatching eggs (SP and SE); live poultry, people, rodents and feed (SE)	Purchase non-infected stock; movement controls; personal hygiene of farm staff and visitors; rodent control programmes; no non-poultry bird species kept on farm; hygienic manufacture, transport and storage of feed; vaccination if permitted (SE)
Other Salmonella	Feed; rodents; live poultry; wild birds and animals; equipment; manure and dead birds	Hygienic feed manufacture, transport and storage; rodent control programmes; disinfection/hygiene; prevent close proximity of wild birds and animals to poultry; hygienic disposal of manure and dead birds
Haemophilus paragallinarum or Infectious Coryza (IC)	Live poultry	Vaccination; purchase non-infected stock
Pasteurella multocida or Fowl Cholera (FC)	Live poultry; wild birds; equipment; pigs	Vaccination; disinfection/hygiene; prevent close proximity of wild birds and poultry in sheds or on ranges
External Parasites (EP)	Live poultry; wild birds; egg flats; rodents	Purchase non-infested stock; limit close proximity of wild birds and poultry in sheds or on ranges; rodent control; disinfection/hygiene of egg flats; insecticide programmes
Internal Parasites (IP)	Live poultry; insects; contaminated ground	Purchase non-infested stock; medication programmes; insect control; disinfection/hygiene of shed/range floor

Note: Only diseases/organisms/pests that have occurred in Australia or are defined by AHA to be Emergency Diseases* are included in the Table. Exotic diseases, such as Turkey Rhinotracheitis and Ornithobacteriosis, have not been included.

Appendix 3 - Hazard Analysis Matrix to Determine Significance (Severity and Risk) of a Hazard

Based on the Workplace Risk Assessment and Control system for Risk Management (Peters 1998), the modified matrix below permits a consistent and objective approach to determining the significance or otherwise of any identified hazard. This then allows the identification of CCP status control measures at a glance, i.e. for those control measures developed to eliminate, prevent or reduce significant hazards to an acceptable level at least one must be a CCP.

Severity (Consequence)

1. Can result in business failure
2. Can lead to serious illness or significant economic loss
3. Can result in economic loss
4. Can disrupt product supply
5. Not of significance.

Risk (Likelihood)

- A. Common occurrence
- B. Known to occur or “it has happened at our premises”
- C. Could occur or “I’ve heard of it happening” (published information)
- D. Not likely to occur
- E. Practically impossible.

Table 6-1: Risk matrix as a measure of the level of Severity of the Hazard with the Likelihood of its occurrence

Severity	Risk				
	A	B	C	D	E
1	1	2	4	7	11
2	3	5	8	12	16
3	6	9	13	17	20
4	10	14	18	21	23
5	15	19	22	24	25

Numbers in boxes are indicators of the Severity of the Hazard combined with the Likelihood of its occurrence.

A value of 1-10 indicates a **Significant Hazard** (i.e. above the line) which signifies that a CCP(s) should be put in place. CCP’s are established using a CCP Decision Tree (**Appendix 5**). Hazards that are not significant will have values of 11-25. It is up to the HACCP team to determine whether it makes good sense to have any control measures in place (i.e. CP status control measures) to further reduce the risk of the hazard.

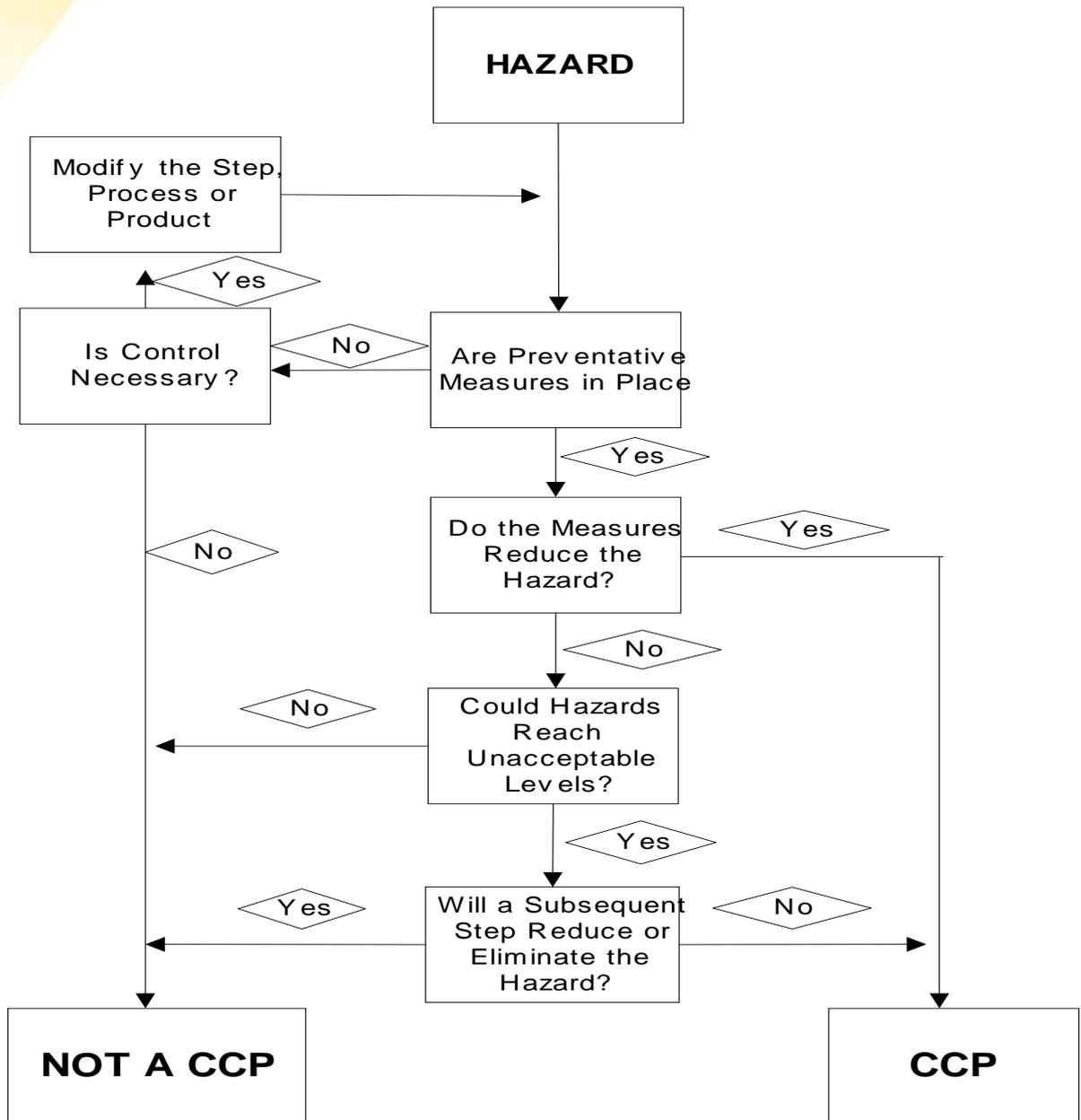
By recording the values in the Hazard Analysis worksheets, others (including poultry health auditors) can then better understand the logic applied by the original HACCP team.

Appendix 4 - Significance of Biological Hazards of Bird Health

Column header	Column header	Column header	Column header
X Virulent Newcastle Disease Virus (NDV) - Exotic and Endemic Origins	1 or 2	B or C	2, 4, 5 or 8
X Avian Influenza Virus (AIV)	1 or 2	B or C	2, 4, 5 or 8
X Very Virulent Infectious Bursal Disease Virus (VV IBDV)	1 or 2	D	7 or 12
X Infectious Laryngotracheitis Virus (ILTV)	2 or 3	B or C	5, 8, 9 or 13
X Egg Drop Syndrome Virus (EDSV)	3 or 4	B or C	9, 13, 14 or 18
X Mareks Disease Virus (MDV)	2 or 3	B or C	5, 8, 9 or 13
Infectious Bronchitis Virus (IBV)	3 or 4	B or C	9, 13, 14 or 18
Avian Encephalomyelitis Virus (AEV)	3 or 4	B or C	9, 13, 14 or 18
Fowl Pox Virus (FPV)	3 or 4	B or C	9, 13, 14 or 18
Mycoplasma gallisepticum (MG)	3 or 4	B or C	9, 13, 14 or 18
Salmonella pullorum (SP) and S. Enteritidis (SE)	2	C	8
Other Salmonella	4	B or C	14, 18
Haemophilus paragallinarum or Infectious Coryza (IC)	3 or 4	B or C	9, 13, 14 or 18
Pasteurella multocida or Fowl Cholera (FC)	2 or 3	B, C or D	5, 8, 9,12, 13 or 17
External Parasites (EP)	3 or 4	B or C	9, 13, 14, 18
Internal Parasites (IP)	3 or 4	B or C	9, 13, 14,18

Appendix 5 – Critical Control Point (CCP) Decision Tree

CCP DECISION TREE



Appendix 6 - Hazard Analysis Chart

Stages	Inputs	Hazards	Significance	Control measures
2	Chicks	EDSV, AEV, MG	9 - (CCP)	Purchase certified non-infected stock from breeder companies implementing a Quality Assurance Programme approved by farm technical advisor/management
		SP, SE	8 - (CCP)	Purchase certified non-infected stock from a breeder with an approved SP/SE Accreditation Programme
8	Pullets & Adult fowls	Virulent NDV, AIV, VV IBDV, SP, SE, IC, FC	2, 4, 7, 8 or 9 - (CCP)	Purchase certified non-infected stock from a supplier implementing a Quality Assurance Programme approved by farm technical advisor/management
		ILTV, EDSV, MDV, AEV, IBV, FPV, MG	5, 8 or 9 - (CCP)	Certified approved vaccination programmes
		IC, FC	5, 8 or 9 - (CCP)	Certified approved vaccination programmes or minimise contact with potential carriers, such as wild birds, pigs etc
1, 7 & 9	Litter for shed floors and nests in Barn-lay and Free-range sheds	Virulent NDV, AIV, VV IBDV	2, 4, 5, 7 or 8 - (CCP)	Obtain clean litter from a source approved by farm management
1-12	Equipment (includes internal shed surfaces, chick boxes, pullet delivery/ hen removal crates, egg flats, vaccination/ beak trimming implements, tradesmen's tools, cages, nest boxes, feeders, drinkers, foggers, dead bird/reject eggs/ manure removal equipment)	Virulent NDV, AIV, VV IBDV, EP, IP	2, 4, 5, 7, 8 or 9 - (CCP)	Use equipment disinfected by a process approved by farm technical advisor/management or new, non-contaminated equipment, eg. new cardboard egg flats
		ILTV, EDSV, MDV, FC	5, 8 or 9 - (CCP)	Certified approved vaccination programmes
		Virulent NDV, AIV, VV IBDV, SP, SE	2, 4, 5, 7 or 8 - (CCP)	Certify that no prior visits occurred to contaminated sites on the day and use clean coveralls and overshoes/ disinfected footwear for shed entry
	People (includes staff, visitors, tradesmen, vaccination/ beak trimming crews, servicemen and veterinarians, equipment suppliers, bird transport crews, dead bird/reject egg/manure removal contractors)	Virulent NDV, AIV, VV IBDV, SP, SE	2, 4, 5, 7 or 8 - (CCP)	Certify that no prior visits occurred to contaminated sites on the day and use clean coveralls and overshoes/ disinfected footwear for shed entry

Stages	Inputs	Hazards	Significance	Control measures
1-12	Vehicles (includes vehicles to supply litter, chicks, pullets and feed; vehicles to remove dead birds, end-of-lay hens and manure)	Virulent NDV, AIV, VV IBDV	2, 4, 5, 7 or 8 - (CCP)	Use vehicles disinfected by a process approved by farm technical advisor/management for all vehicles that need to enter or closely approach sheds
		ILTV, EDSV	5, 8, 9 - (CCP)	Certified approved vaccination programmes
	Aerosols from sheds on farm or from adjacent farms	Virulent NDV	2, 4, 5 or 8 - (CCP)	Limit infectious aerosol from entering sheds by siting sheds/farm a recommended distance "upwind" of other commercial poultry farms/processing plants/manure stockpiles and by planting trees as strategic windbreaks
		ILTV, MDV, IBV	5, 8 or 9 - (CCP)	Strategic siting of brooding shed a recommended distance from other sheds or manure stockpiles and certified approved vaccination programmes
1 - 3 & 7 - 9	Drinking/Fogging Water	AIV, VV IBDV	2, 4, 5, 7 or 8 - (CCP)	Sanitise drinking and fogging water derived from surface supplies (dams, streams, open tanks and drains) into shed
		EDSV	9 - (CCP)	Certified approved vaccination programme
1 - 3 & 7 - 9	Feed	Virulent NDV, VV IBDV, SE	2, 4, 5, 7 or 8 - (CCP)	Use feed processed with a QA Programme approved by farm technical advisor/management and a closed system of transport, storage and distribution in the feedmill and on farm
1 - 12	Wild Birds	Virulent NDV, AIV	2, 4, 5 or 8 - (CCP)	Discourage close contact of waterfowl, pigeons and psittacines with poultry and prevent introduction of wild bird faeces into sheds or areas where hens and pullets range by use of boot changing, overshoes/disinfected footwear
		EDSV, FC	5, 8 or 9 - (CCP)	Certified approved vaccination programme
		EP	9	Discourage wild birds co-habiting with poultry; insecticide programmes
1 - 12	Non Poultry Bird Species	Virulent NDV, AIV	2, 4, 5 or 8 - (CCP)	Don't keep non-poultry bird species, such as ratites, pigeons or psittacines on the farm
3, 5, 9, 11 & 12	Manure/Reject Eggs/Dead Birds	Virulent NDV, AIV, VV IBDV, MDV	2, 4, 5, 7, 8 or 9 - (CCP)	Dispose of manure, reject eggs and dead birds as approved by farm technical advisor/management
1 - 12	Rodents	SE, FC	5, 8 or 9 - (CCP)	Implement an effective rodent control programme on the farm

Stages	Inputs	Hazards	Significance	Control measures
1 - 12	Animals	FC	5, 8 or 9 - (CCP)	Don't keep pigs on the farm
6 & 12	Insects	MDV, FP, IP	5, 8 or 9 - (CCP)	Implement appropriate insecticide, medication and vaccination programmes.

Notes:

1. Stages and Inputs are as listed in **Appendix 1** "Flow Charts of Processes for Production of Started Pullets, Fresh Whole Eggs, Manure for Fertiliser and End-of-Lay Hens for Slaughter".
2. Numbers given in the "Significance" column were derived by applying the "Hazard Analysis Matrix" in **Appendix 3**. All Hazards with any Significance Value of 1-10 as given in **Appendix 4** have been included.
3. Control measures have been extracted from those given in **Appendix 2** "Biological Hazards, Means of Spread and Control Measures".

Appendix 7 - CCP Monitoring Forms

CCP Monitoring Form – People

Date/Time	Name of Person	Reason for Visit into Farm/Shed	No Prior Visits to “Contaminated” Sites that Day (Yes/No)	Clean coveralls, overshoes or disinfected (e.g. in footbath) footwear worn (Yes/No)	Corrective Actions	Signature of Nominated Farm Person

Note/s: This monitoring form may be in a “Visitors Book”. “Contaminated” site is any site that may have Biological Hazards as defined in this Code.

CCP Monitoring Form - Drinking and Fogging Water

Date/Time	Water Storage Vessel Monitored	Residual free Chlorine Level (ppm)	Residual free Chlorine Level (ppm) 6 hours later	Corrective Actions	Signature of Nominated Farm Person

Note/s: Water sourced from dams, open tanks, streams and open drains is to be monitored to confirm 3-5 ppm of residual chlorine.

CCP Monitoring Form – Wild Birds

Date/Time	Shed Identification	Wild birds in shed/ range (Yes/No)	Wild bird type	Corrective Actions	Signature of Nominated Farm Person

Note: Wild birds refers specifically to Waterfowl (e.g. ducks, geese), Pigeons and Psittacines (e.g. parrots) but contact with all other species of birds should be minimised or, if possible, prevented.

Appendix 8 - Biosecurity HACCP Plan Audit Table

Stage	Hazard	Control measures	Critical limits	Monitoring	Corrective action	Records
1,7 & 9	Virulent NDV, AIV, VV IBDV	Purchase litter from a source approved by farm management	Litter to be visually clean (soil, feathers or faeces detected) and from an approved source	What: Litter How: Inspection When: On arrival at farm Who: Nominated person	Reject litter	Date of litter inspection and any actions taken and copy of delivery docket
1 – 12	Virulent NDV, AIV, VV IBDV, ILTV, EDSV, MDV, FC, EP, IP	Equipment shall be cleaned and disinfected by a method approved by farm technical advisor/management	Equipment to be visually clean and determined to be disinfected by an approved method	What: Equipment (including internal shed surfaces) How: Inspection and questioning Where: Farm boundary When: At shed disinfection or subsequently prior to shed entry Who: Nominated person	Deny entry to farm or clean and disinfect by an approved method	Dates of inspection and any actions taken
1 – 12	Virulent NDV, AIV, VV IBDV, ILTV, EDSV	Vehicles that need to enter or closely approach sheds shall be cleaned and disinfected by a method approved by farm technical advisor/management	Vehicles to be visually clean and determined to be disinfected by an approved method	What: Vehicles How: Inspection and questioning Where: Farm boundary When: Prior to entering or closely approaching shed Who: Nominated person	Deny entry or clean and disinfect by an approved method	Dates of inspection and any actions taken
1 – 12	Virulent NDV, AIV, VV IBDV, SP, SE	People that need to enter farm/shed/range shall not have visited contaminated sites previously that day and shall wear clean coverall and overshoes/disinfected footwear	No visits to contaminated sites previously that day and use of protective clothing/footwear prior to entry into sheds or ranges	What: People How: Questioning and visual confirmation of approved protective clothing/footwear Where: Farm boundary When: Prior to entering sheds/ranges Who: Nominated person	Do not permit farm/shed/range entry unless adherence	Dates and names of visitors and any actions taken

Stage	Hazard	Control measures	Critical limits	Monitoring	Corrective action	Records
1 – 12	Virulent NDV, ILTV, MDV, IBV	Indirect control measures can be adopted to control aerosols such as farm siting in relationship to other farms, windbreaks, no other poultry or non-poultry birds species kept on farm, vaccination where approved	Aerosols containing Hazards cannot be directly monitored	Aerosols containing Hazards cannot be monitored	Not applicable	Not applicable
2	EDSV, AEV, MG, SP, SE	Chicks shall be from an approved supplier implementing QA/Health/Vaccination Programmes approved by farm technical advisor/management and with an approved SP/SE Accreditation Programme	Chicks to be clinically normal and from an approved supplier	What: Chicks How: Inspection of chicks and delivery docket When: On arrival at farm Who: Nominated person	Reject chicks that are diseased or from a non-approved source	Date of inspection of chicks, delivery docket and any actions taken
8	Virulent NDV, AIV, VV IBDV, SP, SE, IC, FC, ILTV, EDSV, MG, MD, EP, AEV, IP, IBV, FPV	Pullets/adult fowls shall be from an approved supplier using QA/Health/Vaccination Programmes approved by farm technical advisor/farm management and with an approved SP/SE Accreditation Programme	Pullets to be clinically normal and from an approved supplier	What: Pullets/adult Fowls How: Inspection of birds and delivery docket When: On arrival at farm Who: Nominated person	Reject birds that are diseased or from a non-approved source or revaccinate/medicate if appropriate	Date of inspection of birds, delivery docket and any actions taken
3 & 9	AIV, VV IBDV	Chlorine treatment of filtered water sourced from dams, open tanks, streams and drains or use of another approved sanitation method	Measure 3-5ppm residual free chlorine in treated water over a minimum period of 6 hours before using in sheds (or other approved sanitation method)	What: Drinking and fogging water How: Chlorine measuring device Where: Water storage tank When: Weekly Who: Nominated person	Re-chlorinate to achieve approved concentration-time	Dates, residual free chlorine levels in storage tank 6 hours apart and any actions taken
3 & 9	Virulent NDV, VV IBDV, SE	Where feasible feed shall be from a source with a QA Programme approved by farm technical advisor/management	Feed to be from an approved source and on-farm storage to be fully closed	What: Feed and on-farm storage systems How: Inspection Where: Farm When: Prior to use in sheds Who: Nominated person	Don't accept feed from a non-approved source and modify feed storage system	Date of inspections, delivery dockets and any actions taken

Stage	Hazard	Control measures	Critical limits	Monitoring	Corrective action	Records
3 & 9	Virulent NDV, AIV, FC, EDSV, EP	Sheds should exclude wild birds (waterfowl, pigeons and psittacines) and measures should be taken to minimise the attraction of wild birds into areas where hens and pullets range	No wild birds (waterfowl, pigeons or psittacines) or bird nests in sheds or where hens and pullets range	What: Wild birds How: Inspection in sheds and ranges When: Daily Who: Nominated person	Remove wild birds and nests from sheds and repair bird proofing and remove or exclude wild bird attractants from areas where hens and pullets range except for trees or other plants required for shade and shelter or for environmental reasons (eg no feed outside of sheds, fence off surface water or other areas where wild birds are known to congregate)	Dates of inspections, record of wild bird type in shed and ranges and any actions taken
3 & 9	SE, FC	A rodent-control programme shall be implemented which excludes rodents from sheds and measures should be taken to minimise the attraction of rodents into areas where hens and pullets range	No detectable evidence of rodent activity in sheds or in areas where hens and pullets range eg. no rodent droppings visible	What: Rodents How: Inspection in sheds and ranges When: Daily Who: Nominated person	Re-evaluate rodent control programme and repair shed barriers	Dates of inspections and any actions taken
1 – 12	Virulent NDV, AIV, VV, IBDV, MDV	Dispose of manure, dead birds and reject eggs by a method approved by technical advisor/farm management	No manure, dead birds or reject eggs to be held on farm outside sheds in a manner not approved	What: Manure, dead birds, reject eggs How: Inspection on farm When: Weekly Who: Nominated person	Remove from farm or store in an approved manner	Dates of inspections and any actions taken
1 – 12	Virulent NDV	Non-poultry bird species (eg. ratites, pigeons, aviary birds) shall not be kept on farm	No non-poultry birds being kept on farm What: Non-poultry birds	How: Certification When: Six monthly Who: Nominated person	Remove from farm	Dates of certification and any actions taken

Appendix 9 - CCP Work Instructions

CCP Work Instructions for Control of Access of Chicks, Litter, Equipment, Vehicles, People and Feed into Started Pullet Farms

- Intercept all chicks, litter, equipment, vehicles, people and feed at the farm boundary.
 - Inspect delivery dockets for day old chicks, litter and feed. Reject if not from an approved source or if chicks have clinical signs of disease.
 - Question people at farm boundary on whereabouts previously that day. Do not permit farm/shed entry if it is determined or suspected that contaminated sites have been visited.
 - Require people that are to enter sheds to wear clean coveralls and overshoes/disinfected boots donned at the shed entrance. Do not permit entry to sheds if approved clothing/footwear is not worn.
 - Inspect litter, equipment and vehicles that are to enter sheds at the farm boundary for cleanliness. Reject or clean/disinfect equipment and vehicles by an approved method if they are not clean (soil, feathers or faeces detected).
 - Question delivery person/driver on the disinfection methods used for equipment and vehicles. Reject or clean/disinfect by an approved method if there is suspected noncompliance.
- Consult with manager if considered necessary before acting on a noncompliance.
- Complete appropriate CCP Monitoring Forms.

CCP Work Instructions for Monitoring and Discouragement of Wild Birds and Rodents

- During daily health/welfare inspections of birds, examine within sheds and ranges for the presence of wild birds or wild bird nests and rodent activity such as live rodents, rodent droppings and rodent nests, where possible.
- Remove any wild birds from sheds and repair suspected entry point. Remove or exclude anything from ranges identified as attracting wild birds, except for trees or other plants required for shade and shelter or for environmental reasons.
- Re-evaluate the rodent control programme (baiting, control of long grass on farm particularly around sheds and on ranges, remove any suspected rodent havens (e.g. rubbish adjacent to sheds) and repair shed barriers.
- Complete appropriate CCP Monitoring Forms.

Appendix 10 – Supporting Programmes

Supporting Programme - Disinfection of Shed Equipment and Internal Shed Surfaces following Flock Depletion

- Remove all manure and feed from shed, preferably off farm but otherwise to an approved storage site at least 500 metres distant upwind (prevailing wind direction).
- Wash clean all shed equipment and internal shed surfaces. Using a detergent in the wash water can assist this process.
- Clean the water tank and flush the drinking system with an approved* sanitising solution at a specified concentration and application rate (give details).
- Spray/wash all equipment and internal shed surfaces with an approved* disinfectant solution at a specified concentration and application rate (give details).
- Introduce new equipment or undertake equipment and shed maintenance at this stage.
- Spray internal shed surfaces with an approved* insecticide solution at a specified concentration and application rate (give details).
- Close up shed and implement biosecurity procedures (give details) for people, equipment and vehicles entering shed and for rodent control.

*A registered chemical approved by farm technical advisor/management

Supporting Programme - Dead Bird Disposal

- Dead and cull birds are to be collected from sheds daily.
- Cull birds are to be euthanised humanely in accordance with the Domestic Poultry Welfare Code.
- Disposal means can include burying, incineration, composting or removal by “dead-bird pickup”.
- Environmental Protection Agency requirements must be adhered to at all times.
- While dead birds are stored on farm awaiting disposal, fully covered containers must be used.
- “Dead bird pickup” equipment and vehicles are not to enter farms as they cannot be cleaned and disinfected satisfactorily under usual operating conditions.

Supporting Programme - Sanitation of Surface Water Supplies

- All water derived from dams, streams, drains and open storage units used for internal shed fogging or drinking water for birds shall be sanitized.
- Water shall initially be coarse filtered (e.g. filters capable of removing 20 micron size particles) to remove particulate matter.
- Water distribution systems from the treatment tank to the shed shall be fully enclosed to prevent recontamination by wild birds or dust from the farm environment.
- Chlorination is a cost-effective method of inactivating pathogens. A level of 3-5 ppm of residual free chlorine must be present in water for 6 hours before use to ensure that even a hardy virus such as VV IBDV and certainly less hardy viruses such as AIV and NDV are inactivated in surface water of various ion concentration and temperature.
- Alternative systems of sanitation such as UV irradiation and ozone treatment can be used, but treatment levels shall be used that inactivate a hardy virus such as VV IBDV.
- Approved maintenance and monitoring systems (give details) shall be implemented.

Supporting Programme - Rodent Control Programmes

- Position bait stations strategically on farm boundary, along outside wall of sheds and inside sheds where poultry cannot gain access to baits.
- Use registered baits (give details) approved by the farm technical advisor.
- Vary bait types from time to time to maintain effective control.
- Keep grass and weeds under control on farm, particularly along the outside of shed walls.
- Maintain shed walls so as to be rodent proof.
- Remove possible rodent havens such as rubbish piles adjacent to sheds.
- Farm staff or the pest control contractor shall check bait stations sufficiently often to ensure they contain fresh baits.

Supporting Programme – Minimising Aerosol Contaminations Spreading Hazards into Sheds

- Site brooding sheds so as to limit entry of aerosols from other poultry sheds or other sources of hazardous aerosols, e.g. poultry processing plants, manure stockpiles, non-poultry bird species, e.g. at least 500 metres distant up wind (prevailing wind direction).
- Site sheds so that the air from the shed does not directly exhaust onto another shed.
- Plant suitable trees to act as a windbreak around farm.
- Don't keep non-poultry bird species or other poultry on farm.

Supporting Programme – Access of People, Equipment and Vehicles into Farms and Sheds

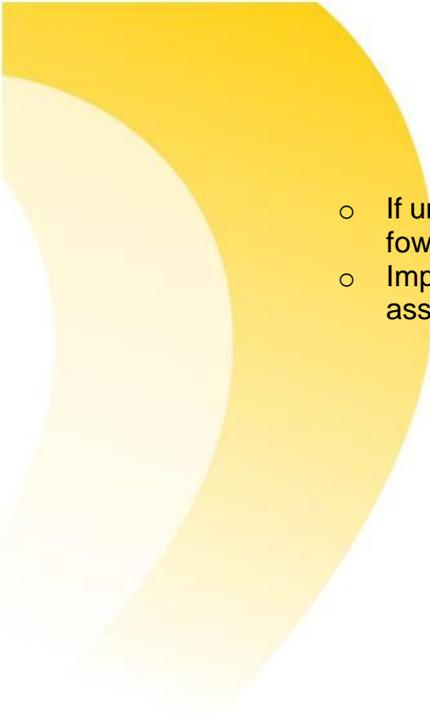
- Judiciously define farm boundaries so that contaminated equipment and vehicles do not closely approach sheds, but the boundaries permit easy operation of necessary farm processes.
- Fence the farm boundary to discourage entry other than by an approved procedure (give details).
- Erect warning signs to discourage unauthorised entry.
- Provide an alarm bell on boundary or other means of contacting farm staff for people wishing to enter the farm.
- Undertake required inspections and approved cleaning/disinfection at the farm boundary.
- Lock boundary gates and sheds doors when not in use.
- Permit entry of people, equipment and vehicles into sheds only if considered essential.
- Don't permit entry of people into sheds if they have previously visited contaminated sites that day.
- People are to wear approved protective clothing/footwear (give details) for entry into sheds.
- Provide footbaths containing approved disinfectant solution (give details) or other approved means (give details) to prevent entry of Hazards into sheds on footwear.
- Only equipment and vehicles cleaned and disinfected by an approved method (give details) are to enter sheds.

Supporting Programme – Prevention of Avian Influenza (AI)

- Highly pathogenic AI (HPAI) is one of the most devastating diseases that can affect poultry. Also some AI viruses can cause disease in humans and other mammals.
- An outbreak of HPAI or H5 and H7 low pathogenic AI (LPAI H5/H7) in commercial poultry in Australia is subject to eradication and quarantine measures in accordance

with the AUSVETPLAN for Avian Influenza Disease Strategy 2011 (AHA 2011). These measures result in severe disruption of egg production and economic loss to the egg industry, particularly to the affected farm.

- Waterfowl in the Order Anseriformes (ducks, geese and swans) are the main birds that can harbor the virus without becoming clinically ill and thus become reservoirs of infection, usually with LPAI viruses. Birds in the Order Charadriiformes (shorebirds, waders, gulls) are also known to be carriers of the virus but at lower levels. All AI outbreaks in Australia to date have had obvious or circumstantial evidence of contact with wild waterfowl or surface water contaminated by wild waterfowl, or an association with free-range farmed ducks. Most mammalian species can also be infected with influenza viruses and thus potentially spread AI virus between species, either directly or by prior mutation.
- Transfer of AI viruses from infected domesticated or wild waterfowl carriers is the most common means of AI disease in commercial chicken flocks. AI virus is secreted from the nose, mouth, eyes and cloaca of infected carriers. Infected faeces and surface water contaminated with faeces can contain large quantities of AI virus. AI virus could spread by aerosol means during depopulation activities of adjacent AI infected flocks. The disease occurs by inhalation or ingestion of infectious AI virus.
- People, poultry, eggs contaminated with infected faeces, egg fillers, farm equipment, vehicles, litter and manure can transfer AI viruses from contaminated sources (e.g. water, paddocks, ranges etc.) into commercial sheds or ranges.
- Egg producers should at all times undertake the preventative measures as outlined in the dot points below:
 - Don't keep other poultry species or ratites on chicken farms
 - Require staff to not keep poultry or ratites at their place of residence
 - Visitors to sheds and ranges, including veterinarians, vaccination crews and maintenance personnel, must wear farm-supplied coveralls and secure cover boots when entering sheds and ranges. Showering onto these facilities is preferable. Appropriate sanitising of cleaned equipment must be undertaken
 - Do not permit visitors or staff who have been on overseas poultry premises or involved with activities in Australia where contact with waterfowl is unavoidable to enter farms for the following seven days
 - Advise staff of the biosecurity risks in relation to AI of visiting bird shows, live bird markets, areas frequented by wild waterfowl and domesticated duck farms
 - Visitors' vehicles must remain outside the farm boundary
 - Dead bird pickup and waste collection management should ensure that staff, contractors external to the site and their vehicles must never enter farms or ranges
 - Drivers of feed and gas delivery trucks must never enter sheds
 - Prevent close contact of poultry with waterfowl. Don't have dams or other surface water attractive to waterfowl on farms. AI virus can survive in water for long periods in colder weather and at higher humidity. Specially trained dogs and aversion methods can be used to discourage ducks from entering ranges or coming in close proximity to poultry sheds
 - Disinfect surface water supplies used for drinking, cooling and fogging in accordance with DAFF Water Biosecurity guidelines (Scott and Ahern 2009)
 - Maintain a completely closed water holding and transport system for water into sheds to prevent contamination by wild birds
 - Disinfect boots when entering sheds via disinfectant foot baths following removal of soil from soles. Changing of boots into ranges and sheds or applying secure cover boots is a more biosecure procedure

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- If unused litter is stored on farm, this should be in a shed biosecure from water fowl contamination
 - Implement appropriate biosecurity procedures for staff, crates and other assorted equipment and disposables.

Appendix 11 - Biosecurity HACCP Plan Audit Checklist

Requirements	Results/Comments
HACCP Team	
Has a HACCP Coordinator been appointed	
Has a HACCP Team been selected	
What are the skills and experience of the team and are they appropriate	
Are external resources being used to augment knowledge of skills (details)	
Have product descriptions and intended uses been prepared for each product	
Has a flow chart been prepared for each product	
Is the flow chart complete – all units included and major inputs identified	
Has the flow chart been verified on farm - when	
Principle 1 – Hazard Analysis	
Have all reasonable hazards been identified at each stage	
Have the hazards been assessed for significance	
Have control measures been developed and implemented for the control of those hazards	
Principle 2 – Critical Control Points	
Have the Critical Control Points for each significant hazard been identified and transferred to the Hazard Audit Table	
Are they essential for the control of the nominated hazard	
Have Work Instructions been established for each Critical Control Point	
Principle 3 – Critical Limits	
Have critical limits been established for each preventative measure	
Is the relationship between the hazard and the critical limit correct	
How were the limits determined – experimental evidence, published results, other means	
Principle 4 – Monitoring Procedures	
Do the monitoring procedures specify what, when, how, where and who	

Requirements	Results/Comments
Is the frequency of monitoring sufficient to provide a high level of assurance that the process is under control	
Have examples of monitoring forms been provided in the Biosecurity Manual	
Principle 5 – Corrective Action	
Have corrective actions been developed for each Critical Control Point	
Do the corrective actions ensure that the CCP is brought under control	
Do the corrective actions cover product (including product produced prior to identification of an out-of-control CCP), process and prevention of recurrence?	
Principle 6 – Verification Procedures	
Have verification procedures been put in place to demonstrate that the HACCP programme is effective	
Do they verify that the CCP's are under control and the HACCP Programme is effective	
Principle 7 – Record Keeping	
Have records been maintained for all monitoring procedures	
Have all critical limits been adhered to	
Have records been maintained for all corrective actions	
Have records been maintained of all HACCP verification activities	
Documentation	
Is there a Biosecurity Manual	
Have Work Instruction forms and procedures for Supporting Programmes been documented	
Are there documented procedures for calibration of equipment	
Training	
Are there records of training	
Are training needs reviewed regularly (dates)	
Good Management Practice (GMP)	
Have GMP's been defined	
Overall Comments	
Audited and accepted/not accepted by.....	Date:

Appendix 12 - Glossary of Terms

Biosecurity Plan	A document prepared in accordance with principles of HACCP to ensure control of hazards that are significant for poultry health
Critical Control Point	A stage of the production process at which a control measure that is essential to prevent or eliminate a hazard or reduce it to an acceptable level can be applied
Critical Limit	A criterion which identifies, evaluates and controls hazards that are significant for poultry health
Control Measures	Actions and activities that can be used to prevent or eliminate a poultry health hazard or reduce it to an acceptable level
Corrective Actions	Actions to be taken when the results of monitoring at the CCP indicate a loss of control
Egg flats	Paper or plastic trays used for collection or packing of eggs
Emergency Diseases	Diseases defined as such by Government. Currently virulent Newcastle disease, Avian Influenza and very virulent Infectious Bursal Disease are the Emergency Diseases applicable to poultry
HACCP	Hazard Analysis Critical Control Point
Hazard	A biological, chemical or physical agent or factor with potential to cause an adverse poultry health effect
Hazard Analysis	The process of collecting and evaluating information on hazards and conditions to decide which hazards and conditions are significant for poultry health and therefore should be addressed in the Biosecurity Plan
Monitor	The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control
Psittacines	Parrot species
Ratites	Ostriches and emus
Verification	The application of methods, procedures and tests, in addition to those used in monitoring, to determine compliance with the Biosecurity Plan, and/or whether the Biosecurity Plan needs modification.