HAZARD ANALYSIS MATRIX TO DETERMINE SIGNIFICANCE (SEVERITY AND RISK) OF A HAZARD

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SUMMARY: A formal Biosecurity Plan to protect bird health is required by the Egg Industry as part of an overall Quality Assurance 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. The Agricultural and Resource Management Council and requested that the Quality Assurance Programme be based on Hazard Analysis Critical Control Point (HACCP) principles and that it include provision for third party auditing. 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.

Keywords: Biosecurity Plan, HACCP, commercial layers.

INTRODUCTION

The Agriculture and Resource Management Council prepare a Biosecurity Plan as part of a National quality Assurance 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.

while individual producers in the commercial egg industry have implemented a Biosecurity Plan, there was no industry Code for Biosecurity. 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.

AIMS AND SCOPE OF THE CODE

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, to recommend appropriate HACCP-based Biosecurity Programmes/Procedures and Good Management Practices (GMP) 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 minimizes 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, but the Code could be adapted by breeder companies when developing their own quality Assurance (qA) and HACCP Programmes.

The Code does not specifically cover bird welfare or food safety. Codes of Practice that apply to the egg industry have already been jointly developed by government and industry for the welfare of poultry (Standing Committee Agriculture and Resource Management Report 60, 1997) and food safety (Standing Committee Agriculture and Resource Management, 1995; Standing Committee Agriculture and Resource Management, 1998). These documents contain base data that could be included in a National quality Assurance Programme.

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.

**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 recognized auditing organization.

**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, poul-
try farms and poultry production areas and the biosecurity programme 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 fruit of 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; and medication to prevent or treat bacterial or protozoal diseases.

INDUSTRY STRUCTURE/PRACTICES AND BIOSECURITY

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

Producers should understand that particular circumstances will apply to their farm, which will 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 recent outbreaks of Avian Influenza and Virulent Newcastle Disease, providing some information on current industry biosecurity status.

Started pullet and egg farms are often concentrated around major population centers but in most areas are well separated from other poultry farms, thus minimizing the spread of disease by aerosols. Geographical separation and sitting of farms can provide protection against aerosol spread of disease organisms and should be addressed when building new farms (Ausvetplan, 2000).

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, and breeders that are housed mainly in sheds on litter. More and more farms now have birds in more than one production system. An unknown percentage of the eggs produced are from nu-
merous backyard and sometimes non-commercial flocks housed on the ground and there are particular biosecurity issues associated with these flocks.

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/beaktrimming 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/beaktrimming 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 most commercial egg-laying sheds are multiage, although sheds containing birds of the same age are becoming more common on larger commercial egg farms. Some free-range and barn-laid sheds are single age. Multiage systems are often more economical, but they can perpetuate infectious diseases by allowing disease agents to spread from older layers to new pullet replacements in the same shed or on the same farm, unless there are control measures that prevent this occurring.

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 commercial feedmills or "home mixed" 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, acidic 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 quality Assurance 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.

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

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Numbers inboxes are indicators of the Severity of the Hazard combined with the Likelihood of its occurrence (Victorian Government of Human Resources, 1998).

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.
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.

## LITERATURE


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**MATRIKS ANALIZE HAZARDA ZA ODREĐIVANJE ZNAČAJA (TEŽINE I RIZIKA) HAZARDA**

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**Izvod**

Industrijska proizvodnja konzumnih jaja zahteva zvaničan Plan biosigurnosti za zaštitu zdravlja ptica kao segmenta sveopštega Programa obezbeđenja kvaliteta (quality Assurance Programme) i u cilju pomoći prevenciji zaraznih bolesti kao što je Njukastl bolest. Ovim Programom obuhvaćeni su i dobrot ptica, bezbednost hrane i obeležavanje jaja. Prema zahtevu Saveta za poljoprivredu i upravljanje dobrima Program obezbeđenja kvaliteta se zasniva na principima HACCP (The Hazard Analysis of Critical Control Point) uz obezbeđenje treće strane u svojstvu proveere.

Neke postojeće strukture industrije i praksa zahtevaju modifikaciju na najefikasniji način zbog toga što mogu da ugroze biosigurnost i zdravlje ptica, nakon primene ovog Pravila.

**Ključne reči:** Plan biosigurnosti, HACCP, komercijalne nosilje.