Protecting bird health: the keys to successful biosecurity

The literal translation of biosecurity is the safety of living things. Biosecurity is one of the most effective and perhaps economical means of disease control. Working on the principle that prevention is better than cure, a biosecurity programme is a series of operational procedures, encompassing cleaning and disinfection, appropriate biosecurity practices (such as boot dipping) and vaccination programmes.

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Together these procedures aim to prevent exposure to disease-causing organisms by reducing the introduction and spread of pathogens both within and between farms, thereby protecting health and welfare.

Integral to best practice management

Biosecurity is an integral part of any farm operation and, as such, must be supported and understood at all levels of the business. An applied biosecurity programme should be practical as well as cost effective and financial resources must be dedicated to support and develop the processes in place.

A robust biosecurity programme should be designed with flexibility in mind, with regular reviews to ensure disease prevention. Routine procedures may need to be changed in the event of a disease challenge and staff training and education are essential to ensure understanding and buy-in for the biosecurity procedures in place.

Location, location, location

Biosecurity really begins right from the point of farm construction. Farms should be located so that they are isolated (at least 3.2km/2.0 miles) from any other livestock facilities to minimise the risk of disease migration.

The houses themselves should be designed to facilitate cleaning and disinfection, and to be wild bird and rodent proof. In addition, when constructing houses it is important to incorporate an area of concrete or gravel directly around the house exterior to discourage rodents and the growth of vegetation.

Appropriate procedures should be in place to control the movement of people, feed, equipment and animals on to the farm and a barrier surrounding the farm is necessary to prevent unauthorised access.

An example of good farm location and planning.

Boot sanitising prior to entry into a house.

Farm clean out

Once the farm has been depleted it must be cleaned out and disinfected. A plan detailing standard operational procedures (dates, times, labour and equipment requirements) should be drawn up prior to depleting the farm. This will ensure all tasks are completed effectively, successfully and in a timely manner.

Site cleaning and disinfection must cover both the interior and exterior of the house as well as the feeding and drinking systems, and all staff facilities. The cleaning and disinfection schedule should cover the following areas:

- Insect control.
- Litter removal and disposal.
- Washing and disinfecting the house, all equipment and the feeding and drinking systems.
- Cleaning – external areas and supplementary rooms (egg room, storage rooms, etc).
- Evaluation of cleaning and disinfection efficiency.

Cleaning and disinfection procedures must be routinely evaluated and reviewed. The effectiveness of cleaning and disinfection is commonly assessed by completing salmonella isolations, but taking samples for total viable bacterial counts may also be useful.

If cleaning and disinfection have been effective then the sampling procedure should not isolate any salmonella species. Monitoring trends in salmonella and total viable bacterial counts will allow continuous improvements in farm hygiene to be made.

Clean out also provides the ideal opportunity to complete any repairs and maintenance. With this in mind, it is good practice for each farm to have its own dedicated tool box to limit the tools that need to be brought on farm by external contractors.

Placing farms on an all-in, all-out basis improves the effectiveness of both cleaning and vaccination programmes, reducing the risk of health problems developing.

Length of downtime, defined here as the period between cleaning and disinfection and placing the next flock, reduces the potential for contamination between flocks. The length of downtime is generally an economic decision but the longer the downtime between flocks, the lower the risk of disease transmission between flocks.

Water quality

Water quality should be routinely tested to determine mineral content and ensure freedom from pathogens; specifically, water should be free from Pseudomonas species and Escherichia coli. Upon visual

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assessment water should be clear with no suspended organic matter.

There should be no more than one coliform/ml in any one water sample and consecutive samples must not contain any coliforms in more than 5% of samples taken.

Water quality standards for poultry are given in Table 1.

Criteria	Concentration (ppm)
Total dissolved solids	0-1000
pH	5-7
Sulphates	50-200
Chloride	250
Potassium	<300
Magnesium	50-125
Nitrate nitrogen	10 (max level)
Nitrates	trace
Iron	<0.3
Fluoride	2 (max level)
Bacterial coliforms	0 cfu/ml
Calcium	600 (max level)
Sodium	50-300

Table 1. Water quality criteria for poultry.

Chlorination is the most effective way of controlling bacteria and viruses in water. Chlorination to achieve between 3-5ppm of free chlorine at the end of the drinker line is normally sufficient to maintain water quality. It is important to remember that when treating water with chlorine, the water pH must be kept between 5 and 7, otherwise the effectiveness of chlorination will be reduced.

A total water quality test should be completed once a year. However, it would be good practice to routinely check water quality during a flock by making a visual assessment of water clarity (freedom from organic or suspended matter). Water should also be sampled for bacterial contamination after house cleaning and prior to chick placement.

Bacterial contamination of drinking water can also occur if biofilms are allowed to build up in the water pipes. Regular treatment to remove biofilms should be in place. Between flocks, chlorine or peroxygen compounds, applied at appropriate levels, will remove any biofilm that has built up. Care must be taken that sanitisers are completely flushed from the drinking system before birds drink.

Dead bird disposal

There are various methods available for dead bird disposal (Table 2).

Importantly the disposal of dead birds must be completed in accordance with local legislation, avoiding contamination of the environment, and cross-contamination with other livestock and poultry.

Biosecurity during production

During production there must be clear biosecurity practices in place to prevent disease that could be transmitted by either humans or animals.

The number of visitors to the farm should be minimised and anyone entering the farm should shower and change into approved clothing.

A visitor record including name, purpose of visit, previous farm visited and next farm to be visited, will aid in tracking disease progression in case of a change in health status.

When entering and leaving a poultry house, as a minimum hands and boots must be sanitised. However, it is best practice to completely change boots upon entering the house. Personal equipment and tools are a potential source of disease. Only necessary items should be taken into the poultry house and only once they have been cleaned and disinfected. Any vehicles entering the farm are required to be thoroughly disinfected when entering and leaving the farm.

To reduce the potential of disease being transmitted by animals, a rodent control programme must be in place including a baiting plan, rapid removal of any feed spills and appropriate storage of feed and litter. All buildings should be wild bird proof, and a full insect control programme should be in place.

Insects can play a significant role in transmitting disease-producing micro-organisms and maintaining hygienic conditions while birds are in the house will help minimise the presence of insects. During cleanout, insecticides should be used immediately after depletion while the house is still warm.

Vaccination

Vaccination is an essential part of biosecurity. Vaccination programmes should be developed in consultation with a local veterinarian and be based on the local disease challenges and vaccine availability.

Vaccination is only effective if disease challenges are minimised through good sanitation and biosecurity management.

Disease investigation

While every effort should be made to prevent disease, it is important to rapidly identify and resolve any suspected disease outbreak. If health problems are seen or a disease outbreak is suspected then veterinary advice should be sought immediately.

However, a systematic approach to monitoring/reviewing flock management can be a useful part of the disease investigation process, including:

- **Feed:** availability, consumption, distribution, palatability, nutritional content, contaminants, and toxins.
- **Light:** adequate for efficient growth and development, uniform exposure and intensity.
- **Litter:** material used, depth, distribution. moisture level, pathogen load, toxins and contaminants.
- **Air:** speed, availability, humidity, temperature, contaminants (ammonia level and toxins), and barriers.
- **Water:** availability, consumption, distribution, source, contaminants and toxins, pathogen load, additives and sanitisers.
- **Space:** bird density, limiting obstacles, limiting equipment, feed and water availability.
- **Sanitation:** hygiene of premises, pest control, maintenance, cleaning and disinfection practices (house and grounds, feeders, drinkers, feed bins).
- **Security:** biosecurity risks (house design and biosecurity practices).

Importantly, disease investigation requires knowledge of what to expect from a flock at a given age and then to be able to rapidly identify any deviations from the 'normal' expectations for that particular flock.

Summary

Hygienic conditions within the poultry house are achieved through the implementation of correct biosecurity, cleaning and disinfection, and vaccination programmes. Biosecurity, cleaning and disinfection prevent the introduction of disease and vaccination addresses the issue of endemic disease. If any one of these parameters is inadequate, the effectiveness of the others will be reduced. The biosecurity programme must be fully integrated into the operational procedures of the farm, and be regularly reviewed and tested for efficacy, if it is to protect the welfare and health of the birds on the farm. ■

Table 2. Methods for dead bird disposal.

Method	Advantages	Disadvantages
Disposal pits	Inexpensive to dig and tend to produce a low odour.	Can be a reservoir for diseases and requires adequate drainage. Ground water contamination is also a concern.
Incineration	Does not contaminate ground water or produce cross contamination with other birds when facilities are properly maintained. Little by-product to remove from the farm.	Tends to be more expensive and may produce air pollution. Must ensure that there is sufficient capacity for future farm needs. Must ensure that carcases are burned completely to white ash.
Composting	Economical and if designed and managed properly will not contaminate ground water or air.	If not done correctly, live viable diseases may be present on the farm. Can also attract rodents.
Rendering	There is no on-farm disposal of dead birds. Requires minimal capital investment. Produces minimal environmental contamination. Materials can be turned into feed ingredients for other appropriate livestock.	Requires freezers to keep birds from decomposing during storage. Requires intense biosecurity measures to ensure that personnel do not transfer diseases from the rendering plant to the farm.