



Avian Influenza Guideline

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ISBN 978-1-920835-48-4

Acknowledgements

Technical contributions from:
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Design by: Studio Tweed
Images: Australian Eggs Limited
Editors: Noella Powell, Nick Baker

This guideline was funded from industry revenue together with funds provided by the Australian Government.

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Understanding Avian Influenza

Avian influenza, otherwise known as 'bird flu' or 'AI', is a type of influenza virus that can cause high numbers of deaths in birds and has the potential to infect humans.

AI is a notifiable disease in all states and territories of Australia because it is highly pathogenic to poultry and some strains (eg H5N1; H7N9) are able to infect humans.

There are two types AI virus:

- **Low pathogenic avian influenza (LPAI) – causes less disease and can readily mutate into HPAI.**
- **High pathogenic avian influenza (HPAI) – causes more disease with mortality rates up to 100% possible.**

AI can infect all bird species including domestic poultry - chickens, turkeys, pheasants, partridges, quail, pigeons, ducks, geese, guinea fowl and ostriches - and wild birds. It can also infect pigs, tigers, leopards and domestic cats but only by the H5N1 strain.

LPAI circulates naturally among Australian birds, and is more common in waterfowl (e.g. ducks and geese) and shorebirds (e.g. waders and sandpipers), both of which are the natural reservoirs of the virus. Most bird species are able to become infected and spread the virus.

HPAI has never been detected in wild bird populations in Australia and therefore Australia is considered free of HPAI.

Although the method used to deter AI is very similar to *Salmonella* Enteritidis, there are some difference. Table 1 shows some of the differences.

Table 1: Difference between *Salmonella* Enteritidis and Avian Influenza

<i>Salmonella</i> Enteritidis	Avian Influenza
Bacteria	Virus
Transfer usually by rodents	Transfer usually by wildbirds
Cause foodborne illness	Does not casue foodborne illness
Usually no signs and symptoms in birds	Birds die 100% (HPAI) and 3-15% (LPAI)

Infecting hens

It important to be aware of the signs of AI, rapid detection and response to AI in the flock will reduce the risk of the disease spreading between flocks and farms.

LPAI

The clinical signs of **LPAI** infection are variable and influenced greatly by the virulence of the viruses involved, the species affected, age, concurrent bacterial disease and the environment.

Clinical signs range from inapparent to mild or severe and may include:

Typical "sick bird" signs – ruffled feathers, dopiness, closed eyes

Respiratory distress (can be confused with infectious laryngotracheitis)

Rapid drop in feed intake, water intake and egg production

Death of small proportions of the chicken flocks of 3 to 15%

Coughing, sneezing, or rasping respiration

Egg production can drop by up to 45%, with recovery to normal in 2–4 weeks

HPAI

HPAI should be considered as a possible cause if a high proportion of a flock or group of birds become ill very quickly – **progressing from normal to gravely ill or dead within 24 to 48 hours.**

Clinical signs may include:

Sudden death

Swelling and purple discolouration of the head, comb, wattles and neck

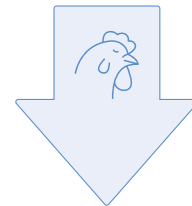
Rapid drop in feed intake, water intake and egg production

Typical "sick bird" signs – ruffled feathers, dopiness, closed eyes

Coughing, sneezing, or rasping respiration

Diarrhoea

Occasionally nervous symptoms



If you suspect a disease, contact your vet or call the Emergency Animal Diseases Hotline

1800 675 888

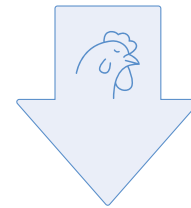
Table eggs and egg products

Severely AI affected birds will stop laying, eggs laid in the early phase of the disease could contain the virus. If the virus is on the outside of the egg shell, it can also contaminate the egg fillers.

Eggs laid by birds with HPAI infections have significant AI virus contamination, as the oviduct is a site of virus reproduction.

Table 2: Recommendations for the inactivation of AI virus in eggs and egg products

Egg products	Temperature (°C)	Time
Whole egg	60.0	188 seconds
Whole egg blends	60.0	188 seconds
Whole egg blends	61.1	94 seconds
Liquid egg white	55.6	256 seconds
Liquid egg white	56.7	228 seconds
10% salted yolk	62.2	138 seconds
Dried egg white	67.0	0.83 days
Dried egg white	54.4	21.38 days



Contaminated
eggs and fillers
can transfer
AI virus

Eliminating AI

Contaminated AI eggs and fillers can cross contaminate other materials.

The presence of lipid in the AI virus envelope makes the virus highly susceptible to disinfectants, including detergents. The two easiest ways to destroy AI are by heat or chemical.

HEAT

There are different time and temperature requirements for killing AI.

As a guide:

- 70°C for a minimum of 30 minutes;
- 75°C for a minimum of 5 minutes; or
- 80°C for a minimum of 1 minute

Steam can only be used only if the temperature of the surface can be raised to a sufficiently high temperature and held there long enough to inactivate the virus. Steam is most effective when used together with chemicals.

CHEMICALS

A wide range of chemicals such as oxidising agents, formaldehyde, alkalis and biguanides are all known to be effective against AI.

Importantly, however, direct contact with the organism must occur. Washing before sanitising is therefore critical to remove biofilms, organic and foreign matter.

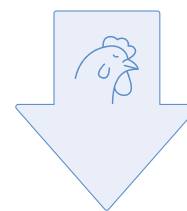
Regardless of the chemical that is used, it is extremely important to follow the instructions on the label are used. Table 2 is a list of chemicals, their appropriate uses and recommended application rates.

Warm soapy water is recommended for washing the face, hair and skin. Hair should be washed or sponged down with a shampoo. Hands must be scrubbed thoroughly.

VACCINATION

AI vaccine is not available in Australia as stamping out is the preferred control measure. Vaccines can be imported if the spread or likely spread of infection indicates that stamping out alone is not going to achieve eradication.

Vaccination has not been a necessary option in past Australian outbreaks, but its usefulness has been demonstrated in overseas outbreaks.



AI vaccines can be imported to **control spread** if needed

Table 3: Recommendation disinfectants and concentrations for the inactivation of AI

Disinfectant	Usual form supplied	Recommended working strength		Contact time	Application
		Usual dilution	Final concentration		
SOAPS AND DETERGENTS					
	Solids or liquids	As appropriate		10 mins	Through cleaning is an integral part of effective decontamination.
OXIDISING AGENT					
Sodium hypochlorite NaOCl	Concentrated liquid (50,000ppm available)	1:10	5,000ppm available chlorine	10–30 mins	Effective for most applications except when in the presence of organic material. Less stable in warm, sunny conditions above 15°C.
Calcium hypochloride Ca(OCl) ₂	Solid	7 g/L	5,000ppm available chlorine	10–30 mins	Effective for most applications except when in the presence of organic material. Less stable in warm, sunny conditions above 15°C.
Virkon	Powder	20 g/L	2% (w/v)	10 mins	Very effective disinfectant in most applications.
ALKALIS					
Sodium hydroxide	Pellets	10 g/L	1% (w/v)	10 mins	Very effective. Do not use in the presence of aluminium and derived alloys.
Sodium carbonate . Anhydrous (Na ₂ CO ₃) .Washing soda (Na ₂ CO ₃ .10H ₂ O)	Powder Crystals	40 g/L 100 g/L	4% (w/v) 10% (w/v)	20 mins 20 mins	Recommended for use in the presence of high concentration of organic materials. Efficiency is enhanced by addition of detergent.
ALDEHYDES					
Glutaraldehyde	Concentrated solution	As appropriate	2% (w/v)	10–30 mins	Very effective disinfectant.
Formalin	40% formaldehyde	1:12	8% (w/v)	10–30 mins	Disinfectant releases irritating, toxic gas.
Formaldehyde gas	Special generation required			15–24 hours	Toxic gas, recommended only if other methods of decontamination cannot be used.
OTHER CHEMICAL AGENTS					
Biguanidiness	Dilute according to manufacturer's instructions			> 5 mins	
Iodophors	Dilute according to manufacturer's instructions			> 10 mins	
Phenolic disinfectants	Dilute according to manufacturer's instructions			10 mins	





w/v = weight / volume

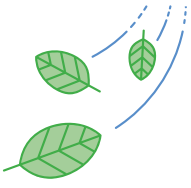



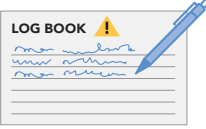

Reducing the risk of AI

As there are no AI vaccines available for Australian poultry, strict biosecurity is the best way to protect your birds from disease.

THE PROPERTY

The Property is the boundary that encompasses all buildings that house poultry, farm business buildings (e.g. office), water and feed storage, vehicle movement to/from and on/off the farm, equipment storage, cleaning and chemical equipment, out-buildings, and roads that service vehicle movement between buildings.

<p>Restrict entry</p> 	<p>Fence the Property, lock the gates and have a biosecurity sign restricting entry to any personnel at any traffic entry points.</p> <p>Minimise the movement of people, equipment and vehicles into the Property as much as possible. Only allow personnel and items</p>	<p>that are absolutely necessary for the functioning of the business.</p> <p>Provide designated parking outside production areas for those vehicles that do not need to travel inside.</p> <p>Do not share or borrow essentials from your</p>	<p>neighbours unless they have been thoroughly cleaned and disinfected.</p> <p>All properties need to have sanitation equipment available at the gate to wash down and sanitise vehicles and equipment that are entering the property.</p>
 Lock gates, have a biosecurity sign directing all people to call the farm manager or owner			
<p>Water bodies</p> 	<p>Surface water, including rivers, creeks and dams can contain AI virus when it has been visited by waterfowl.</p> <p>If unsecure water is used on the Property for drinking, cooling, and amenity use,</p>	<p>this could introduce an AI virus.</p> <p>Where surface water must be used, it should be effectively treated, including filtration and disinfection, with sufficient contact time</p>	<p>to ensure AI destruction.</p> <p>Refer to the National Water Biosecurity Manual Poultry Production for more information on water sanitation requirements.</p>
 Surface water must be disinfected before use			

<h2>Vegetation</h2> 	<p>Vegetation can be a refuge for wildlife and wild birds that can be carriers of AI. Wildlife and birds can potentially transmit AI to your birds. Vegetation may also impact on wind</p>	<p>movement, which can increase the risk of AI transfer between neighbouring properties.</p> <p>Waterfowl tend to land on open water and congregate. They then venture up the</p>	<p>banks to graze on grass and are attracted to poultry vegetated and green grass range and is considered to have contributed to AI outbreaks in the past.</p>
 Minimise the presence of vegetation			
<h2>Vehicle movements</h2> 	<p>Any vehicles entering your property may have been in contact with AI on another farm.</p> <p>Minimise the potential for vehicles to cross-contaminate your birds by restricting vehicle movement to one way in one day and follow the low risk (cleanest) to high risk (dirtiest) movement principles. This will lower contamination risks but it</p>	<p>is also important to wash down vehicles and have designated pick-up areas.</p> <p>Vehicles picking up or dropping off chicks, pullets and spent hens should only transfer one single age flock in any one day from a particular production area.</p> <p>Pick-up vehicles, modules and crates should be thoroughly cleaned and disinfected between loads</p>	<p>and farms. A thorough inspection of the vehicle and trailer should be undertaken prior to farm entry and movements of the driver and crew validated.</p> <p>Be aware of all vehicles coming to your property (through a vehicle log) and stipulate the pre-visit quarantine requirements prior to arrival.</p>
 Disinfect all external vehicles coming onto your farm			
<h2>Visitors and staff</h2> 	<p>All properties need to have clear biosecurity signage and entry instructions at the front gate. This includes having a visitor log book so all entries are recorded. These records should be kept for a minimum two-year period.</p> <p>As with the movement of vehicles and equipment, only people essential to the running of the business should be allowed into production areas – including poultry housing areas and packing and grading facilities.</p> <p>Employees must not have any contact with other poultry, pigs, livestock or</p>	<p>backyard birds in the previous 72 hours and have not returned from overseas travel in the last seven days.</p> <p>Any person entering the farm, such as service personnel or vets, should be wearing hair nets, coverall (disposable) suits and boot covers at a minimum and go through a foot bath containing a virucidal agent effective in the presence of organic matter. A change of clothing and boots is a better practice.</p> <p>Staff should shower and wear clean clothing each day. Best practice would require each staff member to shower upon entering the</p>	<p>farm premises and change into clean clothing provided by the farm.</p> <p>Staff should be trained in the Biosecurity procedures specific to that Property (with training documented and renewed regularly) and understand the risks of being a potential active or passive carrier of pathogens to the Property.</p> <p>Employees and other essential people on the farm should notify the farm manager if experienced symptoms of gastroenteritis or diarrhoea in the last seven days.</p>
 Staff and visitors must put on proper protective clothing and follow biosecurity procedures			

<p>Other animals</p> 	<p>Any animals should be kept away from the Property through fencing or other means.</p>	<p>Discourage wild birds from range areas, amenity areas and silo areas and do not have open water or feed outside. Also ensure dead</p>	<p>birds are disposed of in a way that is not accessible to any animals.</p>
 <p>Minimise wild birds and animals from sheds and ranges</p>			
<p>Essential supplies</p> 	<p>Ensure feed delivery vehicles are sanitised between farm visits and before entry onto any property.</p>	<p>Waste pickup vehicles should not enter the farm. This can be managed by putting a fenceline pickup arrangement in place.</p>	<p>Feed trucks should also be kept outside the production area if possible.</p>
 <p>Keep waste and feed trucks away from production area</p>			
<p>Free range</p> 	<p>Free range farming exposes flocks to greater risks of environmental infection compared to cage and barn housing. There needs to be greater focus on</p>	<p>management of environmental risks, particularly preventing contact with wild animals like birds.</p>	<p>Avoiding contact with wild waterfowl and their droppings minimises the risk of avian influenza outbreaks in domestic birds.</p>
 <p>Avoid contact with wild birds and their droppings</p>			







AT THE SHED

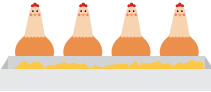

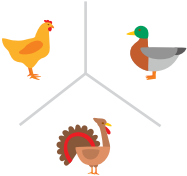




Controlling biosecurity risks at the shed level is the last line of defence against a pathogen infecting a flock. As a general rule, no-one should enter a shed unless it is absolutely necessary and there must be strict, controlled entry procedures for people that do. Use boots and outer clothing that can be cleaned or changed between houses or farms. Use rubber gloves as well or sanitise hands.

Hand washing and sanitising facilities should be available at the entry point. This may be in the form of a pump pack instant hand sanitiser (alcohol), or a tap, sink and soap. It is important to understand that sanitising with organic material on your hands will not necessarily kill all germs and it is therefore necessary to wash hands first.

Brooding and rearing facilities should be geographically separated from production facilities and, if possible, have dedicated staff for each so movement between them is minimised. If this is not possible, movement should occur from low-risk sites to high-risk sites and if the reverse direction is required, clean boots and clothing should be worn and strict hygiene principles applied.

While not all farms are large enough to assign individual employees to specific areas within the business, it is important that staff from grading or packing rooms do not enter sheds.

<p>Clean and dirty ends</p> 	<p>It is good practice to have a "clean" end of poultry housing for personnel entry and placement of birds and</p>	<p>a "dirty" end of the shed for manure, spent hen and waste removal.</p>
<p>Footbaths</p> 	<p>Establish disinfection areas (e.g. for foot baths) at the entrance to the farm or in each of the poultry houses.</p> <p>Footbaths needs to be covered when not in use. Check the concentration regularly as organic material</p>	<p>can "chew up" the active ingredients.</p> <p>As with sanitising hands, the effectiveness of a footbath in killing bacteria and viruses is greatly diminished by the presence of organic matter. For this reason,</p> <p>boots should be cleaned of organic matter before being disinfected.</p> <p>Always follow manufacture's instruction when using chemicals.</p>
<p>Anteroom</p> 	<p>All farms should introduce a version of an anteroom or hygiene lock or changing station, at farm and shed entrances. The anteroom should be divided into an external and internal zone separated by a low barrier.</p> <p>All outside clothes and footwear must remain in the external zone and shed-specific clothing and footwear (wherever possible), should stay in the internal zone. Hands should</p>	<p>also be washed or sanitised when crossing from the external to the internal zone.</p> <p>For a washing and sanitisation zone to be effective, the correct chemical must be used at the right concentration for an appropriate length of time (refer to Table 2 above).</p> <p>As much as possible, there should be specific equipment dedicated to each shed. If equipment needs to be brought in from</p> <p>outside, it should be sanitised in the anteroom. Using different coloured equipment for different sheds or farm sites will help to reduce spread and contamination. E.g. shed or farm one = red, shed or farm 2 = blue etc.</p> <p>Personal items, such as mobile phones, watches and jewellery should not cross the internal zone unless they can be disinfected.</p>
 <p>All outside clothes and footwears must remain in the external zone</p>		

<p>Feed</p> 	<p>Feed can be contaminated, hence keep feed and water inside sheds where practical, or ensure they are covered and difficult for wild birds to access.</p> <p>Ensure fresh feed and water is provided daily, and keep feed and water spaces clear</p>	<p>of faeces and other organic matter.</p> <p>Regular cleaning and disinfection of feed containers is encouraged, in addition to bird-proofing housing and feed storage areas.</p>	<p>If feed is manufactured onsite, strict staff movement controls, containment and separation of raw materials and finished feed and active pest control programmes should be in place.</p>
 Cover feed containers			
<p>Live and dead poultry</p> 	<p>Do not mix different species of poultry together - keep chickens, ducks and turkeys separate.</p> <p>If possible, keep new birds separate from your flocks (held in a quarantine pen) for at least 4 weeks until you are sure they are disease free after transportation.</p>	<p>Only source birds from a reputable breeder or producer.</p> <p>If possible, apply the principle of "all in/all out". This means that all animals in a poultry house are taken off the farm at the same time so that the ground and house can be properly</p>	<p>cleaned and disinfected.</p> <p>Inspect and clean bird areas at least once per week.</p> <p>Dispose of dead birds properly, especially sick birds, so that they are not accessible to other birds and animals.</p>
 Do not mix different poultry species together			
<p>Eggs</p> 	<p>Vertical transmission of AI via infected eggs has never been proved, although AI</p>	<p>virus has been detected on the shell surface and in the yolk and albumen of eggs,</p>	<p>suggesting that the potential for spread exists.</p>
<p>Fomites</p> 	<p>AI can spread very rapidly and can be carried over long distances by transport of contaminated equipment such as bird cages, pallets,</p>	<p>egg filler flats, manure and feed.</p> <p>Humans play a very important role in spreading the disease, because the</p>	<p>virus can easily be carried on dirty clothes, shoes, contaminated equipment and vehicles.</p>
 Humans can spread AI			

<p>Wild life, Rodents and Pests</p> 	<p>The Property should be fenced with mesh that is high enough to prevent wildlife movement.</p> <p>Vermin and pest bait stations should be used, particularly in areas close to feed, and checked weekly.</p>	<p>Fly bait and or fly surface spray should be used as required.</p> <p>Remove feed and water sources which could attract rodents and pests, including removing all vegetation, trees and shrubs within the immediate vicinity of poultry housing. Its recommended</p>	<p>to maintain a clear radius of 1.5m.</p> <p>No poultry feed and water should ever be supplied outside the poultry housing.</p> <p>Manure and dead birds should be stored securely and not on-site in open areas.</p>
 Implement pest control measures			
<p>Waste products</p> 	<p>Waste can be any of the unwanted byproducts of processing. This include:</p> <ul style="list-style-type: none"> wastes from hatcheries, laboratories (cultures and specimens, dead birds), farms and egg marketing establishments (unsaleable eggs, egg shells after 	<p>pulping, soiled egg fillers), as well as</p> <ul style="list-style-type: none"> chicken manure and litter. <p>All products that go into the production of rendered meals may also be discarded as waste.</p> <p>AI viruses have the potential to persist in these products</p>	<p>and could be spread by vehicles that transport them unless the products are treated before movement.</p> <p>Composting infected carcasses and internal organs for 10 days has been reported to eliminate HPAI infection.</p>
 Compositing can destroy AI virus			



Storage, grading and packing

There are no reported cases of human disease associated with consumption or handling of eggs to date, although AI virus has been detected on the shell surface and in the yolk and albumen of eggs, suggesting that the potential for spread exists.

AI can be spread via contaminated eggs onto surfaces, flats or fillers, packaging materials and pallets. Given the frequent movement of pallets of eggs from farms to grading and packing sites, it is essential to manage the risk of AI moving on items like cardboard or plastic flats. When sanitising flats to protect against AI, the same principles of heat or chemical use apply.

Cardboard fillers used during egg grading and processing should ideally be discarded after every single use as they are absorbent and can retain virus and other organic material. If this is not possible, cardboard flats can be heat treated to kill any AI virus but there is an obvious flammability risk to mitigate.

There are a number of commercial egg tray washing systems available for sanitising plastic trays and fillers but the cost burden may be unmanageable for some businesses.

INCOMING GOODS

Businesses should only receive eggs, packaging material and other incoming goods from an approved supplier. In addition, all deliveries need to be recorded so movement within the supply chain can be traced forward and back from a particular site.

Traded eggs should be handled in a packing and grading facility. At the end of the day, all equipment should be thoroughly sanitised.

STAFF

Grading and packing staff should be kept away from production sites and sheds as much as possible and follow the same biosecurity principles on external bids, livestock, overseas travel and illness as shed staff.

Businesses must maintain hygienic amenities for all staff and provide training in personal hygiene practices to prevent cross-contamination.

FACILITIES

Businesses must implement a full cleaning and sanitation program in the grading floor at the end of every day and the quality of sanitation should be checked by swab testing surfaces. As with shed cleaning, it is critical to check that the chemicals being used are effective against AI.

Where egg washing systems are in place, it is important to check the washing is properly sanitising the eggs and not spreading contamination. Any spills or broken egg material must be cleaned up as soon as it occurs.



Avian Influenza is a notifiable disease

IF YOU THINK IT IS ON YOUR FARM NOTIFY YOUR STATE AUTHORITY DIRECTLY, OR CALL:

1800 675 888
Emergency Animal Diseases Hotline

The EAD watch hotline is a 24-hour-a-day, seven-day service.

Avian deterrent techniques

Wild birds, especially waterfowl and shorebirds are the natural reservoir for AI viruses. The virus can be transmitted to domestic poultry through faecal contamination of water, housing and free-range areas, and on dust. Hence, it is important to deter wild birds on the farm / range.

Deterrence can be done both passively and actively, and a combination of both measures may be needed to be effective.

Passive deterrence for waterbirds in the context of poultry farms, defines various measures to ensure that the production area and surrounds are unattractive for waterfowl, and therefore do not encourage waterfowl to congregate.

Active control strategies target waterfowl that are attracted to a site and aim to eliminate or reduce congregation with scaring tactics. Active control is all about outsmarting unhabituated birds so that they move on.















Category	Type	Efficacy	
Auditory deterrents	Ultrasonic devices	low	
	Gas guns and cannons	moderate	
	Biosonics (bioacoustics)	high	
	Pyrotechnics	moderate	
Visual deterrents	Effigies	low	
	Falconry	moderate	
	Drones and robots	moderate	
	Dogs	high	
	Lasers and lights	high	
	Reflector tapes and flages	low	
Physical techniques	Exclusion	very high	
	Decoy natural wetlands	low	
	Habitat modification	high	
Lethal	Radar-activated deterrents	moderate	

Table 4: Types of deterrence and their efficacy

GAS CANNONS

Gas exploders using gas/propane cannons provide a temporary means of control, however, they are quickly subject to habituation by birds.

The exploders should be moved around to delay habituation for as long as possible, although various levels of success are reported for this method of control.

BIOSONICS (BIOACOUSTICS)

Biosonics involves the playback of acoustic signals that a species uses to communicate to conspecifics. The calls are typically distress and alarm signals.

They have shown promise in short trials but their long-term efficacy has not been proven.

PYROTECHNICS

Pyrotechnics use explosive noises together with visual effects (bright lights and smoke) to frighten birds away. The deployment of pyrotechnics is manual and generally not cost-effective.

Using rifles, shotguns and flare pistols with shell crackers bird bombs, bird whistlers and similar deterrents is possibly a better option.

EFFIGIES

The more life-like and animated the effigy is, the more effective they are. It also depends on how judiciously they are used, and how attached the birds might already be to the site (e.g. resting, breeding).

A common misconception is that birds will always react to a raptor shape, when in fact birds are very in tune with which raptors pose a real threat and don't react at all to others that do not.

In Australia, only the Peregrine Falcon and the larger Australian species such as Swamp Harrier, Wedgetailed Eagle, White-bellied Sea-Eagle and the Red Goshawk predate waterfowl will cause enough havoc for waterfowl to take flight en masse.

While birds may be wary initially, they tend to habituate quickly to effigies.

FALCONRY

Using falconry to disperse birds is generally impractical as it requires trained birds, experienced handlers, and favourable daytime conditions.

Falconry is not widely available for use in Australia.

DRONES AND ROBOTS

Drones are remotely controlled unmanned aerial vehicles (UAVs) that are usually fitted with cameras and sensors to collect data.

Wild birds are generally unperturbed by drones used for surveillance purposes and soon learn that it poses no real threat. Nevertheless, there is a critical distance at which any species will eventually take flight making drones a potentially useful tool in future, if the process of waterfowl detection and sending the drone to the detection area can be automated.

Currently, the Civil Aviation Safety Authority rules in Australia are too restrictive for UAVs to be launched and operated unattended, unsighted and at night.

The use of full-scale, bird of prey reproductions has proven a more practical and effective alternative to falconry for dispersing large flocks. Predator-like drones combining visual and bio-acoustic scare tactics are being marketed for 'stubborn species' but their long-term efficacy has not yet been demonstrated and the requirement for a manual operator precludes their general use.

DOGS

Some Australian poultry producers use guard dogs (for example, Merremas) in free-range farms to chase wild birds and predators and they are generally effective.

Disadvantages to using these dogs are their barking, which can be annoying for nearby neighbours, and they are a potential risk for disease and pathogen transmission.

LASERS

Lasers elicit a variable response across species depending on the wavelength and transmitted light. They are useful as a short-term scare tactic.

The negatives are laser can be expensive, labour intensive, not effective in daylight, and potentially harmful if shone in the eyes.

LIGHTS AND REFLECTORS

Toxic tailings dams, floating solar-powered beacons that rotated and were only activated intermittently can reduce the total waterfowl abundance in the short-term.

Reflector tapes and flags were found to be of limited use. Lights (e.g. Fox Lights, a commercial product) have been used successfully in the Australian rice industry to deter ducks and may present a cost-effective solution on range areas.





EXCLUSION

Exclusion netting and bird balls have also been found to be highly effective but generally cost-prohibitive. Exclusion netting is also logistically difficult to install on many established poultry farms. However, it may have some utility if used to cover water bodies, range areas or other areas used by waterfowl.

DECOY NATURAL WETLANDS

The use of decoy natural wetlands for attracting and retaining native waterbirds away from the risk areas in and around poultry farms is worthy of attention in the context of reducing the risk of AI outbreaks.

For this option to be viable, the natural wetland would need to be located some distance from the poultry farm and should be managed to provide available habitat for waterbirds, the idea being that making the natural water body more attractive, and a sanctuary for deterred waterbirds, will result in a decreased number and diversity of species frequenting the artificial farm storages.

This strategy remains untested, and indeed may have the opposite effect, attracting birds to the general region in which farms are located.

HABITAT MODIFICATION

Habitat manipulation by reducing the attractiveness of crops to birds or to make alternative food sources more attractive can be used to deter wild birds. These include:

- preventing grass from seeding by mowing at appropriate times,
- maintaining grass at around 30 cm in non-essential areas, and
- reducing the attraction of water in lakes, ponds, creeks and drains on and around the farm.

Removal of waterbird habitats and food resources may not be feasible or prudent, but minimising temporary surface water, improving drainage systems, and managing vegetation and grass are key strategies that all poultry farms could implement to reduce their AI-risk. Plastic flotation balls made of high-density polyethylene (HDPE) (for example, Bird Balls™, Armor Balls™; Appendix B), may be useful against waterfowls.

RADAR-ACTIVATED DETERRENTS

Radar-activated on-demand systems can be used to deter waterfowl. Radar-activated systems which fire gas cannons and also

activates large peregrine falcon effigies only when birds approach is effective at deterring birds from landing compared to randomly firing gas cannons and using stationary human effigies.

Radar has some disadvantages, particularly size, cost and signal interference.

For smaller areas, other detecting and ranging (DAR) technologies may be more suitable. This includes spinning multi-beam light DAR (LiDAR) systems.

More biosecurity information can be found on the Australian Eggs website <https://www.australianeggs.org.au/for-farmers/biosecurity/> as well as in the following resources:

National Farm Biosecurity Technical Manual for Egg Production <https://www.australianeggs.org.au/dmsdocument/728-national-farm-biosecurity-technical-manual-for-egg-production>

The SE Guide for Producers <https://www.australianeggs.org.au/assets/australian-eggs/Uploads/SE-guide-for-producers-6.pdf>

Producer checklist



1. Responsibility

- Have you appointed a competent biosecurity coordinator?
This could be you or anyone else properly trained in biosecurity.



2. Training and documentation

- Are all your staff trained in biosecurity and personal hygiene procedures?
- Are birds mortality monitored?



3. Facilities

- Do you have a biosecurity sign on all farm gates?
- Do you have a biosecure, fully fenced perimeter?
- Do you have change zones at shed entry points?
- Do you have footbaths with correct chemicals?
- Are the areas around the sheds neat and tidy?
- Do you have hand washing and sanitisers available?
- Do you have bird proof sheds?
- Do you have a close feed system?



4. Personnel

- Are you allowing only essential personnel only on farm?
- Does your farm have one-way human traffic flow, moving from areas of low to high risk only?
- Do staff or service personnel know not to come to work if they have gastrointestinal illnesses or food poisoning?
- Do staff or service personnel know they cannot own poultry / pigs or come into contact with any birds / pigs outside of work?
- Have you ensured that any service personnel have not visited another poultry farm in the past 72 hours?
- Do grading floor staff understand not to enter production sheds unless absolutely necessary? If so, what are the proper procedures?
- Are people visiting the site wearing protective clothing?



5. Pest Control and animals

- Is there an effective pest/rodent control program in place?
- Have you placed baits every 10m on the perimeter of sheds?
- Have you placed baits every 15m on the perimeter of the farm and/or range areas?
- Have you created a bait location map?
- Are the baits serviced regularly?





6. Inputs

- Are all your water sources sanitised?
- Are all your feed suppliers feedsafe accredited?



7. Transportation

- Do you have a visitor log book in place?
- Do you have wheel washing facilities in place for all vehicles entering the property?
- Do you have an off-site parking area for visitors?
- Do you have vehicle, delivery and stock transport logs in place?



8. Disposals

- Are all waste products disposed of so that they are not able to contaminate other sheds or poultry sites?
- Are all waste products transported in covered trucks?
- Have you dedicated clean (personnel, clean products, placement of birds) and dirty ends of the shed (spent hen, manure, waste removal)?
- Do you have a proper procedure to dispose of dead birds?



9. Cleaning and disinfection

- Do you have a cleaning program for the sheds?
- Do you regularly clean, remove dust, dirt and organic matter from any surfaces that contact eggs?
- Do you have strict cleaning procedures in place for washing, sanitising and disinfecting before placing new flocks into the sheds?



10. Health

- Do you have a poultry vet servicing your flock?



11. Audits

- Is there internal and external auditing of all biosecurity principles being undertaken?





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