Determining resource requirements for removal of waste from egg farms

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Foreword

This project produced a tool to support disposal of waste by the Australian egg industry. Development of the tool was used to determine additional waste disposal resources required by the industry to ensure relevant information may be available when needed. At this stage, it appears that production of a reference document is needed that aligns the understanding of waste management risks by industry and government stakeholders, as well as management of these risks under different circumstances, and by different stakeholders, including government and industries. This project coincides with other investments by Australian Eggs in improving waste disposal and aimed to identify opportunities to leverage current and past investments, made by a range of stakeholders, for the benefit of the Australian Egg industry.

This project was funded from industry revenue, which is matched by funds provided by the Australian Government.

This report is an addition to Australian Eggs Limited'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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1. Introduction

In Australia, the egg industry is a critical and intensive animal production system. The industry comprises several large producers which make up approximately 50% of the national flock numbers, as well as medium sized producers, an increasing number of small, niche market segments, and some backyard production. There were 6.2 billion eggs produced in the 2018-19 financial year, which is an average of 16.9 million eggs per day. Egg consumption in Australia has risen strongly over the past decade, effectively doubling to 247 eggs per person per year in June 2019. This represents a total industry retail value of $828m.

There are three main egg production systems in Australia: cage, barn, and free-range. Organic egg production is a niche segment within the free-range system. Eggs are produced in all Australian states and the Australian Capital Territory, and there are some small free-range farms in the Northern Territory. New South Wales/ Australian Capital Territory (~30%), Queensland (~25%) and Victoria (~26%) produce most of the overall egg production in Australia, with Western Australia (8%), South Australia (7%) and Tasmania (1%) supplying the remainder (Australia Eggs Ltd, 2019b). There are also several breeding facilities spread throughout these states and territories.

Biosecurity is an integral part of any successful poultry production system. As defined in the National Farm Biosecurity Technical Manual for Egg Production (AHAa, 2015), biosecurity refers to the measures taken to prevent or control the introduction and spread of infectious pathogens to a flock. Such infectious pathogens, whether they cause clinical or subclinical disease to the hens or human foodborne illness (e.g. *Salmonella*), can significantly reduce the productivity, profitability and long-term financial viability of a poultry operation and potentially the entire industry.

Management of waste streams is critical to limiting the incursion and spread of infectious poultry pathogens. The capacity to manage the volume and type of a particular waste on farm is influenced by a number of factors, including the type of waste, whether there is a known infectious pathogen present, and whether that agent is notifiable (in the Region or on the farm). A jointly funded project by Australian Eggs and AgriFutures Australia focuses on mapping the disposal options for individual sites in the event of a mass mortality (e.g. disease or natural disaster). This collaborative project aims to produce a planning tool that supports farm managers and regulators to limit the impact to the business should a mass mortality event occur. However, there are several scenarios where waste disposal of smaller volumes may also be supported by pre-planning to reduce the potential biosecurity risks associated with poultry waste. There is also a need to consolidate the resources that are currently being developed, and have been developed in the past, into a single point of reference for all stakeholders. However, given the extensive amount of information and number of resources that exist to support different aspects of poultry waste disposal, there is a further need to determine the best way to consolidate this information so that it is in a form that is most useful. This is particularly important in emergency situations as significant time can be spent trying to find information and preparing operating procedures which is not ideal when actions are required immediately.

There is a substantial number of resources that provide direction on disposal of poultry waste (e.g. AHAb, 2015; AHA, 2011a; AHA, 2011b), however the format of these resources does not often support practical implementation of practices, and many are focused solely on management of emergency animal diseases, which makes it difficult to amend these recommendations for different circumstances. Further, waste materials are many and varied and, depending on their infectious status, could fall under the Australian Dangerous Goods Code, which is compounded by the fact that the classification of waste may also vary between state and territory jurisdictions. There are numerous ways to approach the development of resources, however, minimisation of duplication needs to be a priority. Further, a reactionary approach to developing guides that are needed to manage a particular scenario as it is

occurring, is not ideal as it misses the opportunity to leverage the information gathered for a particular scenario and document how it would apply in other situations. The ability to learn from each occasion will significantly improve preparedness for a range of scenarios, which is the ideal outcome for the industry. For example, the recent identification and spread of *Salmonella Enteritidis* in the egg industry in NSW and Victoria has highlighted knowledge gaps regarding management of situations involving a non-emergency animal disease (EAD) that is of high importance to human health, and remaining recommendations from past EAD incursions that are yet to be addressed.

A workshop to identify lessons learned after the High Pathogenic Avian Influenza outbreak in Young in 2013 (AHA report, confidential) made recommendations for the development of standard operating procedures for waste disposal processes (including transport of wastes, rendering and composting) that take a risk-based approach to managing waste, but also allow for situation-specific nuances to be managed. This type of resource would sit alongside other resources for decontamination and disposal planning that are currently under development through other Australian Eggs and AgriFutures Australia investments.

The aim of this current project is to use a risk-based approach to identify what resources are needed to support the disposal of all types of poultry farm waste, and to produce a framework for the prioritisation and production of resources that will support the management of poultry waste under a number of scenarios.

2. Definitions

In the context of this report, the below are definitions for terms not covered in specific sections throughout the report.

Capacity to manage

'Capacity to manage' is defined as the capability of the farm to manage a particular type of waste. This includes all aspects such as the volume, technical know-how and operating procedures, access to equipment, land/ space, and even time to complete the treatment. Farm management may achieve this either internally or they can be supported by appropriate equipment and resources from third parties.

Emergency Animal Disease (EAD)

The term 'Emergency Animal Disease' (EAD) is the same as that defined in the Emergency Animal Disease Response Agreement (EADRA, 2019), that is:

An EAD is a disease that has met one or more of the following criteria:
*(a) It is a known disease that does not occur in endemic form in Australia, including without limitation the diseases listed in **Parts 1.2 to 1.5** inclusive of **Schedule 3**, and for which it is considered to be in the national interest to be free of the disease.*
(b) It is a variant form of an endemic disease which is itself not endemic, caused by a strain or type of the agent, which can be distinguished by appropriate diagnostic methods, and which if established in Australia, would have a national impact.
*(c) It is a serious infectious disease of unknown or uncertain cause, which may on the evidence available at the time, be an entirely new disease, or one not listed in the categorised disease list set out in **Parts 1.2 to 1.5 inclusive** of **Schedule 3**.*
(d) It is a known endemic disease but is occurring in such a fulminant outbreak form (far beyond the severity expected), that an emergency response is required to ensure that there is not either a large-scale epidemic of national significance or serious loss of market access.

Infectious pathogen

'Infectious pathogen' is defined as any pathogen of viral, bacterial or protozoal nature that may infect and be transmitted by poultry, which may cause disease in either poultry or humans. It includes live vaccine strains that may be transmitted to unvaccinated flocks and may be transmitted directly from flock-to-flock via aerosol, fomite or faeces/ manure, or indirectly via pests, vectors, equipment, people and vehicles.

Manage waste

'Manage waste' is defined as the collective processes and procedures that effectively eliminate infectious pathogens from the waste, or ensure non-infected waste management practices do not inadvertently result in contamination that could be bought back to a farm and infect a flock or people.

Notifiable

'Notifiable' is defined as any pest or disease that is listed as 'notifiable' by each respective Australian State and Territory, regardless of whether it is of human or animal health concern, whereby the human/ animal health authorities must be advised within a specified period depending upon the nature of the infectious pathogen.

Off-Property

The term 'off-Property' is defined as any land area, shedding or waste disposal system outside the Property perimeter, whether under the control of farm management or completely separately operated. There is no minimum limit or buffer distance from the property thus 'off-Property' could include an area on an adjacent property, or another Region or state where people, supplies/ suppliers, vehicles and equipment have come into contact with prior to entering the Production Area.

On-Property

The term 'on-Property' is defined as any land area, shedding or waste disposal system inside the Property perimeter waste management activities that are conducted within the Property boundary perimeter fence. Generally, On-Property waste management activities are conducted outside of the Production Area unless they involve *in situ* disposal.

Organic / Inorganic

Includes wastes that contain carbon-based materials that are derived from plants and animals. Organic waste can be intrinsically contaminated with an infectious pathogen, or support growth and transmission of the pathogen, and is the primary form of waste generated on farm. Organic waste includes litter, manure, dead birds, eggs and egg by-products, feed, feathers, dust, washdown water, cellulose coolcell pads, fillers and cardboard. All other wastes are considered Inorganic.

Production Area

The 'Production Area' is the biosecure zone that "*includes the poultry sheds, the egg collection amenities, egg storage areas, egg grading and processing floors, dry storage areas, on site feed production or storage areas, loading pads and truck movement areas and the ranges used for free-range production*." (AHAa, 2015).

Property

The Property includes the land on which the Production Area is located, and typically includes the facility manager's home together with other farm land used for livestock or cultivation in the immediate

vicinity of the Production Area that is controlled and managed by the poultry farm. The Property boundary should be clearly defined and is usually larger than the Production Area boundary, however they may be the same (AHAa, 2015).

Region

The Region is that area outside the Property, but within a close enough geographic area that staff reside and visit, local supplies are sourced, including grain, feed and/or bedding and waste removal.

Waste

'Waste' is defined as any material that exists on farm, whether brought in from outside the farm or produced on the farm, that needs to be discarded, either because it is no longer needed, is infectious, or comprises carcasses, animal products and materials. Wastes may be solid or liquid; they may be Organic or Inorganic.

3. Scope

The scope of this project was to produce a tool that helps identify the appropriate pathway for managing poultry waste in Australia, with a particular focus on the control of and infectious pathogens that may be transmitted through these waste streams, and then use this tool to determine additional waste disposal resources required by the industry to ensure relevant information may be available when needed. A proposed project was then prepared to capture the time and cost estimated of producing these additional resources. It was outside the scope of this project to undertake an extensive literature review of what information may already exist to support waste management (this would be a project in itself given the volume of materials that exist), and also outside the scope to produce any guides to waste management.

4. Objectives

The main objectives for this project are to:

1. Develop a tool to guide decision and prioritisation for the removal of waste from egg farms using a risk-based approach, that can be used to inform what additional support resources are required
2. A framework for the development of resources that are identified in objective 1.

To do this, the project will:

- Consolidate risks from the Biosecurity Risk Identification report that relate to the management of waste and use these to inform the development of the tool
- Consult with AEL, ACMF and NSW DPI and incorporate their feedback into the tool.

Dr Vivien Kite from the Australian Chicken Meat Federation (ACMF) and Byron Stein from NSW Department of Primary Industries (DPI) were consulted during this project and their feedback has been incorporated into sections 5 – 9 below. The waste and disposal options and term definitions may need to be refined prior to commencement of the project proposed in Section 8, given there are different interpretations and views of the broader stakeholder group that would need to be engaged as part of that project.

5. Farm waste types and viable waste disposal options

To identify what wastes may exist in each scenario, and what waste disposal options might be most viable, the Australian Eggs Biosecurity Risk Identification report (Australian Eggs, 2019a) was reviewed to for biosecurity risks and their likelihood of occurrence. Tables 5.1 and 5.2 formed the first part of the Waste Disposal Tool (Appendix 1).

5.1 Farm waste types

Typical waste types on a poultry farm are outlined in Table 5.1. Waste types were classified as either 'organic' or 'inorganic' and categorised based on the general properties of the waste e.g. 'dead birds' relates to birds that have died from natural causes or from culling.

Table 5.1. Waste types on a poultry farm.

Waste type	Definition	Inorganic/organic
Cardboard	Material made of cardboard or paper, including egg fillers and packaging.	Inorganic/organic
Chemicals and medications	Disinfectants and hazardous chemicals, including chemical packaging and medications such as vaccines.	Inorganic/organic
Dead birds	Birds that have died from disease or other causes, including culling.	Organic
Disposable clothing, footwear	Material that may be single-use or single-premises use.	Inorganic
Dust	Particulate matter captured in filters or on equipment, may include bird materials e.g. feathers, dander.	Organic
Feed	Materials stored and provided to the birds as feed, including in the silo and within the shed.	Organic
Litter	Material used for bedding, which could be used or unused.	Organic
Manure	Raw faecal-based solid waste from the birds.	Organic
Metals	Metal components or old equipment and machinery that may not be able to be adequately cleaned and sanitised.	inorganic
Other organic material	Material that is organic, such as grass/tree clippings, soil, compost and wooden pallets.	Organic
Plastics	Material made of plastic, including egg fillers and packaging and plastic pallets.	Inorganic
Poultry products	Materials produced by the birds that is to be discarded e.g. broken or unusable eggs, including table and hatching eggs.	Organic
Water	Water provided to the birds for drinking and ventilation, prior to or after cleaning, including external and header tanks	Organic

5.2 Viable disposal options

Determining what actually constitutes 'viable' disposal options in each situation are farm and situation-specific decisions and often relate to two key factors – the volume of waste to be discarded, and the capacity for that waste to be disposed of on-Property or not (i.e. off-Property). It should be noted that development of a waste volume calculator is part of the 'Disposal Mapping' project and should be integrated into any future waste disposal resources.

Table 5.2 outlines waste disposal options approved in Australia (conditions of 'approval' are situation-specific), and highlights those options that are considered 'viable' options from an egg industry perspective – i.e. those options that are going to be viable in most situations for most farms in Australia. Several farm/situation-specific constraints will need to be taken into consideration to determine if an option is actually viable.

Before a waste disposal option can be adopted, the decision will need to be made regarding whether the waste disposal can, or will, need to be carried out on or off-Property. Waste disposal is often not approved to be conducted in the Production Area, but this may be viable for *in situ* disposal options. There are several variables that will dictate this, including the volume of waste to be managed, the type of waste, whether the waste being disposed of is organic or inorganic and the capacity of the farm/farm management to manage the waste disposal process.

Lastly, the time to complete a waste disposal process could be short (less than 1 month), medium (1-3 months), or long (greater than 3 months), which can substantially influence the overall management of biosecurity risk and is a factor that also needs to be taken into consideration.

Table 5.2. On-Property and off-Property waste disposal options for poultry

Waste disposal option	Is it an on-Property option?	Is it an off-Property option?	Potentially viable option?	Inorganic / organic	Time to completion
Landfill/burial [a]				Inorganic / organic	Short
Composting [b]				Organic	Medium
Rendering [c]				Organic	Short
Processing [d]				Organic	Short
Burning/incineration [e]				Inorganic / organic	Short
Anaerobic Digestion [f]				Organic	Long
Alkaline hydrolysis				Organic	Short-medium
Ocean disposal				Organic	Short
Refeeding to non-susceptible species				Organic	Short

[a] 'Landfill/burial' refers to the process of burying waste material, either on-Property or off-Property and

includes dumping and disposal via required avenues for chemical and medical wastes.
[b] 'Composting' refers to the process of decaying organic waste through a process that involves the generation of heat by microbes. May involve the material be managed *in situ*.
[c] 'Rendering' refers to the process of using high temperatures to convert waste from animal production into fat and protein meal products
[d] 'Processing' refers to commercial processing, including pasteurisation of egg pulp and in-plant processing of birds.
[e] 'Burning/incineration' refers to the combustion of waste using controlled conditions at high temperature.
[f] 'Anaerobic digestion' refers to the process of decaying organic waste using bacteria in the absence of oxygen

6. Identifying biosecurity risk scenarios

To identify the scenarios that may benefit from a waste management support, a decision tree (Figure 1) was developed and integrated into the Waste Disposal Tool (Appendix 1). This decision tree used the criterion of whether the waste may contain an infectious pathogen. Other criteria assessed for appropriateness related to the type of waste, what the volume of waste to be removed was or the type of farming operation. The 'infectious pathogen' criterion was chosen as it was concluded that whether or not an infectious pathogen was present should be (and in most cases is) the priority consideration when disposing of waste.

It is important to determine whether a waste type has come into contact with live birds, either directly or indirectly, and whether it is a risk to human health. This means that any waste on a property can potentially be contaminated with an infectious pathogen present in the flock and could potentially be transmitted to other flocks/ farms (i.e. an infectious pathogen on-Property or in the Production Area). The reverse is also possible; if the material has been in contact with other flocks/farms before entering the farm and subsequently becomes waste that needs to be disposed, pathogens could be transferred from those contact points to birds on the farm (i.e. an infectious pathogen 'in the Region'). Risk mitigation biosecurity procedures need to take these possibilities into consideration, as well as the biomass to be disposed of and whether there is capacity to manage the volume of waste on-Property. This approach resulted in eight 'scenarios' that may require management of poultry waste. Scenario-based resources could be a particularly useful approach to waste management as it would provide information in context, and which wouldn't need to be amended to fit a particular situation (beyond specific farm characteristics that influence the waste disposal option decision).

Pathogens that are infectious to both humans and poultry (e.g. Avian Influenza; *Salmonella Enteritidis*) are covered under the scenarios relating to waste infected with a poultry pathogen.

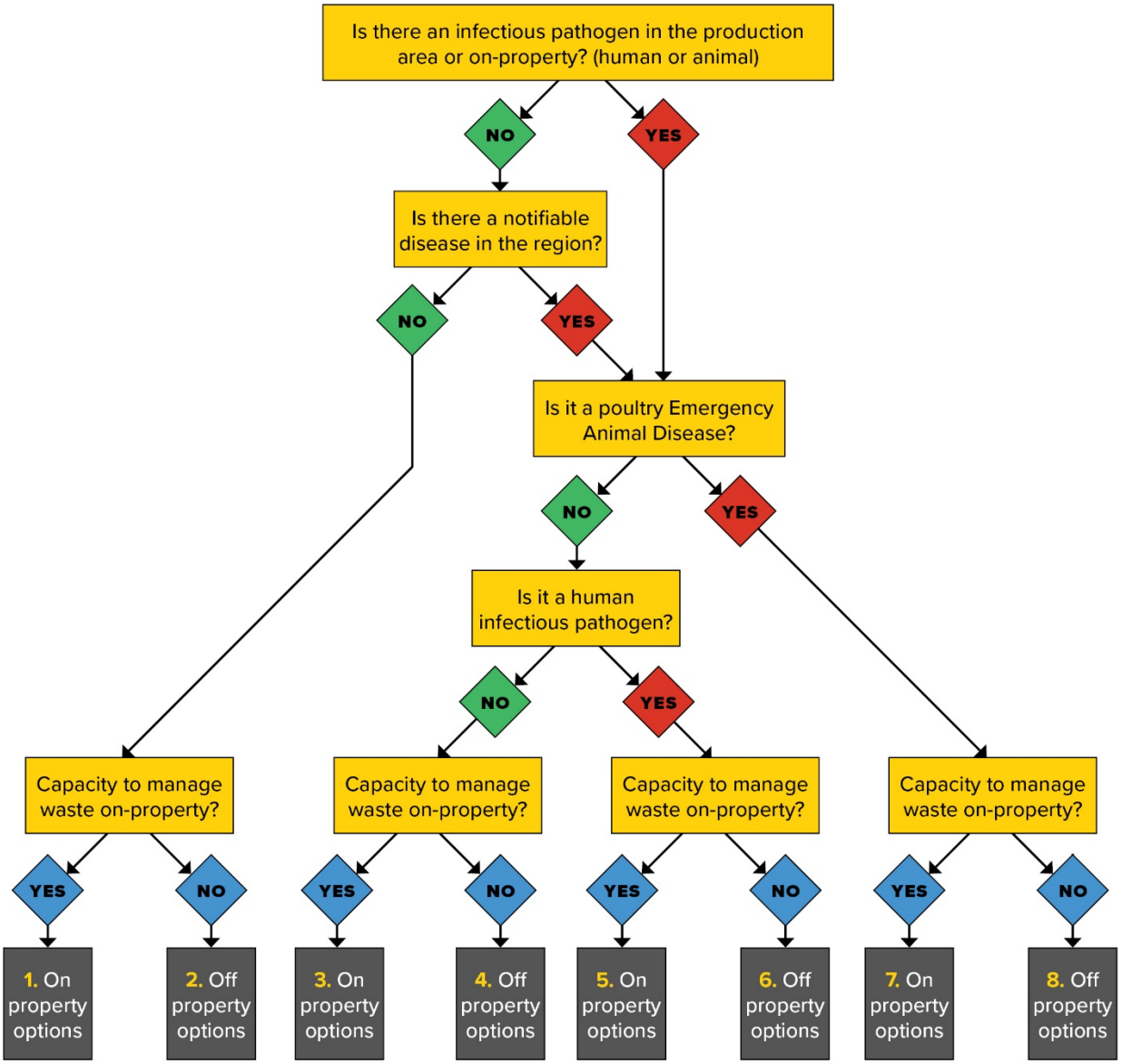

Figure 1. Decision tree to support identification of the types of waste management resources that might be needed to support waste management in the poultry industry. Numbers indicate scenario.

7. Linking scenarios with wastes and disposal options

A brief literature review revealed that there are a considerable number of existing resources that outline components of waste management including risk, practical considerations and procedures. The resources that currently exist appear to cover management of the five main areas of risk relating to poultry waste:

- biosecurity risks (i.e. minimising risk of spread)
- environmental risks
- occupational health and safety risks
- social risks
- resource and equipment availability risks.

An extensive literature review will be required to avoid duplication in any future waste disposal resource and ensure all relevant information is consolidated and true gaps in knowledge identified. To that end, Tables 7.1-7.8 below may change depending on information gathered during that review. While the tables for various scenarios may be identical, the nuances of the risks to be managed in each scenario will influence the actual operating procedures put in place to manage risks during waste disposal. These are the types of nuances that will need to be detailed in any future waste disposal resource.

7.1 Scenario 1 – No infectious pathogen in Production Area or on-Property; capacity to manage waste on-Property

Waste	Landfill/ burial	Composting	Digestion	Burning/ incineration
Cardboard				
Chemicals and medications				
Dead birds				
Disposable clothing, footwear				
Dust				
Feed				
Litter				
Manure				
Organic Material				
Plastics				
Poultry Products				
Water				

Other waste disposal options were either off-Property only or not considered viable.

Resource to support this scenario:

- Managing non-infectious waste on-Property:
  - landfill/burial
  - composting
  - digestion
  - burning/incineration.

7.2 Scenario 2 – No infectious pathogen in Production Area or on-Property; waste must be managed off-Property

Waste	Landfill/ burial	Processing	Rendering	Composting	Digestion	Burning/ incineration
Cardboard	■					■
Chemicals and medications	■					
Dead birds	■		■	■	■	
Disposable clothing, footwear	■					■
Dust	■			■	■	
Feed	■			■	■	■
Litter	■			■	■	■
Manure	■			■		■
Organic Material	■			■	■	■
Plastics	■					■
Poultry Products	■	■		■		
Water	■				■	

Resource to support this scenario:

- Managing non-infectious waste off-Property:
  - landfill/burial
  - composting
  - digestion
  - burning/incineration
  - processing
  - rendering.

7.3 Scenario 3 – Non-EAD poultry infectious pathogen in Production Area or on-Property; capacity to manage waste on-Property

Waste	Landfill/ burial	Composting	Digestion	Burning/ incineration
Cardboard	■			■
Chemicals and medications	■			
Dead birds	■	■	■	
Disposable clothing, footwear	■			■
Dust	■	■	■	
Feed	■	■	■	■
Litter	■	■	■	■
Manure	■	■	■	■
Organic Material	■	■	■	■
Plastics	■			■
Poultry Products	■	■		
Water	■		■	

Other waste disposal options were either off-Property only or not considered viable.

Resource to support this scenario:

- Managing poultry infectious waste on-Property:
  - landfill/burial
  - composting
  - digestion
  - burning/incineration.

7.4 Scenario 4 – Non-EAD poultry infectious pathogen in Production Area or on-Property; waste must be managed off-Property

Waste	Landfill/ burial	Processing	Rendering	Composting	Digestion	Burning/ incineration
Cardboard	■					■
Chemicals and medications	■					
Dead birds	■		■	■	■	■
Disposable clothing, footwear	■					■
Dust	■			■	■	
Feed	■			■	■	■
Litter	■			■	■	■
Manure	■			■		■
Organic Material	■			■	■	■
Plastics	■					■
Poultry Products	■	■		■		
Water	■				■	

Resource to support this scenario:

- Managing poultry infectious waste off-Property:
  - landfill/burial
  - composting
  - digestion
  - burning/incineration
  - processing
  - rendering.

7.5 Scenario 5 – Poultry waste infected with a human-infectious pathogen is in the Production Area or on-Property; capacity to manage waste on-Property

Waste	Landfill/ burial	Composting	Digestion	Burning/ incineration
Cardboard	■			■
Chemicals and medications	■			
Dead birds	■	■	■	■
Disposable clothing, footwear	■			■
Dust	■	■	■	
Feed	■	■	■	■
Litter	■	■	■	■
Manure	■	■	■	■
Organic Material	■	■	■	■
Plastics	■			■
Poultry Products	■	■		
Water	■		■	

Other waste disposal options were either off-Property only or not considered viable.

Resource to support this scenario:

- Managing poultry waste that may contain a human-infectious pathogen on-Property:
  - landfill/burial
  - composting
  - digestion
  - burning/incineration.

7.6 Scenario 6 – Poultry waste infected with a human-infectious pathogen is in the Production Area or on-Property; waste must be managed off-Property

Waste	Landfill/ burial	Processing	Rendering	Composting	Digestion	Burning/ incineration
Cardboard	■					■
Chemicals and medications	■					
Dead birds	■		■	■	■	■
Disposable clothing, footwear	■					■
Dust	■			■	■	
Feed	■			■	■	■
Litter	■			■	■	■
Manure	■			■		■
Organic Material	■			■	■	■
Poultry Products	■	■		■		
Plastics	■					■
Water	■				■	

Resource to support this scenario:

- Managing poultry waste that may contain a human-infectious pathogen off-Property:
  - landfill/burial
  - composting
  - digestion
  - burning/incineration
  - processing
  - rendering.

7.7 Scenario 7 – Poultry EAD in Production Area or on-Property; capacity to manage waste on-Property

Waste	Landfill/ burial	Composting	Digestion	Burning/ incineration
Cardboard	■			■
Chemicals and medications	■			
Dead birds	■	■	■	■
Disposable clothing, footwear	■			■
Dust	■	■	■	
Feed	■	■	■	■
Litter	■	■	■	■
Manure	■	■	■	■
Organic Material	■	■	■	■
Plastics	■			■
Poultry Products	■	■		
Water	■		■	

Other waste disposal options were either off-Property only or not considered viable.

Resource to support this scenario:

- Managing poultry EAD waste on-Property:
  - landfill/burial
  - composting
  - digestion
  - burning/incineration.

7.8 Scenario 8 – Poultry EAD in Production Area or on-Property; waste must be managed off-Property

Waste	Landfill/ burial	Processing	Rendering	Composting	Digestion	Burning/ incineration
Cardboard						
Chemicals and medications						
Dead birds						
Disposable clothing, footwear						
Dust						
Feed						
Litter						
Manure						
Organic Material						
Plastics						
Poultry Products						
Water						

Resource to support this scenario:

- Managing poultry EAD waste off-Property:
  - landfill/burial
  - composting
  - digestion
  - burning/incineration
  - processing
  - rendering.

8. Conclusion

It is not surprising that this project has identified that three to four years and nearly three quarters of a million dollars would be required to produce a comprehensive waste management resource for the poultry industry. There exists the strong possibility that other industries, such as chicken meat and pigs, and state governments, would benefit from the existence of such a resource, and should therefore be collaborative funding parties in the project. This includes Animal Health Australia, which is responsible for management of the AusVetPlan Disposal Manual (AHAb, 2015). Essentially, what is required is along the lines of replicating the process of developing an industry biosecurity manual, although in this case, six such 'manuals' need to be produced (to cover each of the main waste disposal options). To produce an industry manual requires extensive literature review, comprehension and coordination of the information and high levels of consultation with industry, and potentially government and stakeholders. These types of consultative processes usually take years to complete because they often generate questions that are difficult to obtain a consensus answer on, and therefore considerable discussion is required on each point.

We consider that this type of project will be most successful, economically viable and efficient if all required sections were prepared concurrently as a concentrated effort, as opposed to being drawn out over numerous years. There are many benefits to using this approach as the people preparing the documents have no other priorities, and the risk of lost corporate knowledge from within stakeholder organisations that need to be involved in the consultation is reduced. There exists the possibility of only funding those sections that are considered a priority at the time, however the need for all sections to be produced will not fade. While it may be cheaper in the short term to prepare each section as needed, this approach will likely be more expensive in the long term because it does not allow for the leveraging of resources and consultations and often results in duplication of effort. The suggestion to require two full-time resources to complete the project will also create experts in the area of poultry waste disposal which will have longer term benefits for the industry. As their sole priority during the project would be the completion of the resource, this would likely further reduce project management issues related to engaging consultants that have other priorities and may therefore require time extensions to manage all priorities.

The existence of a comprehensive waste management resource for the poultry industries would be highly valuable to align the understanding of waste management risks by industry and government stakeholders, as well as align the management of these risks under different circumstances, and by different stakeholders, including government and industries. The existence of such a resource will also be beneficial to progress towards planning and preparedness for emergency and human disease incursions.

Development of a comprehensive waste management resource was the basis of past recommendations from emergency animal disease outbreaks and such a resource would become a legacy resource for the industry (i.e. the type of resource that only needs to be produced once, and then maintained with regular reviews, similar to the National Farm Biosecurity manuals). If completed, as described, to a high quality and required comprehensiveness, the waste management resource would become the basis for waste management practices used across the industry in all situations and ideally minimise the time needed to implement waste management practices during events of urgency.

9. References

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10. Appendix 1 - Waste Disposal Support Tool

Please see attached.