

# Are poultry exhibitors at risk of Avian Influenza introduction?



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## Introduction:

Direct or indirect contact with wild birds infected with low pathogenic avian influenza (LPAI) viruses is the most likely pathway of exposure of domestic birds to AI viruses (Alexander, 2000). In Australia, LPAI detection rates in wild waterfowl is over 2%, suggesting the potential for exposure of domestic birds to LPAI viruses through wild birds exists. In the six highly pathogenic AI outbreaks reported in poultry in Australia, introduction of LPAI viruses from wild birds and subsequent mutation has been hypothesized as the most likely origin of the outbreaks (Hamilton et al., 2009).

Previous studies suggest that practices undertaken by poultry exhibitors might pose a risk for disease introduction and spread (Dusan et al., 2010; Hernández-Jover et al., 2013), some of these being:

- Most exhibitors (80%) keep their birds with outdoor access
- In most exhibition flocks (70%), wild bird contact with domestic birds can occur
- High frequency of movement of birds to attend poultry shows and close contact of birds of different species and from different origins at these venues
- Use of live bird sales to trade birds



## Objective:

Investigate the pathways of introduction of LPAI viruses from wild birds into poultry exhibition flocks and quantitatively estimate the probability of these pathways to occur.

## Methods:

### Exposure assessment model

- OIE methodology for risk analysis
- Define pathways of exposure and built scenario tree (Fig.1)
- Quantitative estimate the probability of these pathways to occur
- Monte Carlo stochastic simulation modelling with @RISK 6.0 .1 (50,000 iterations)
- Four flocks categories: 1. Only chicken; 2. Waterfowl (with/without chicken) 3. Turkeys (with/without chicken); 4. Only pigeons (*Different Relative Risk of infection; Only chicken = reference category*)
- Data sources :
  - ✓ Studies on backyard and poultry exhibition in Australia (Dusan et al., 2010; Hernández-Jover et al., 2009; Hernández-Jover et al., 2013)
  - ✓ Scientific literature on Avian Influenza
- Outcome: **Probability of LPAI infection after contact and exposure from wild birds**

## Results:

- The median probability of exposure for any poultry exhibition flock is **0.0046**. This probability is higher for turkeys and waterfowl than chickens due to the higher susceptibility of these species to AI viruses (Table 1).
- The probability of **contact with wild waterfowl** and the **proportion of flocks keeping waterfowl and turkeys** are the variables with most influence on the probability of exposure (Fig. 2).

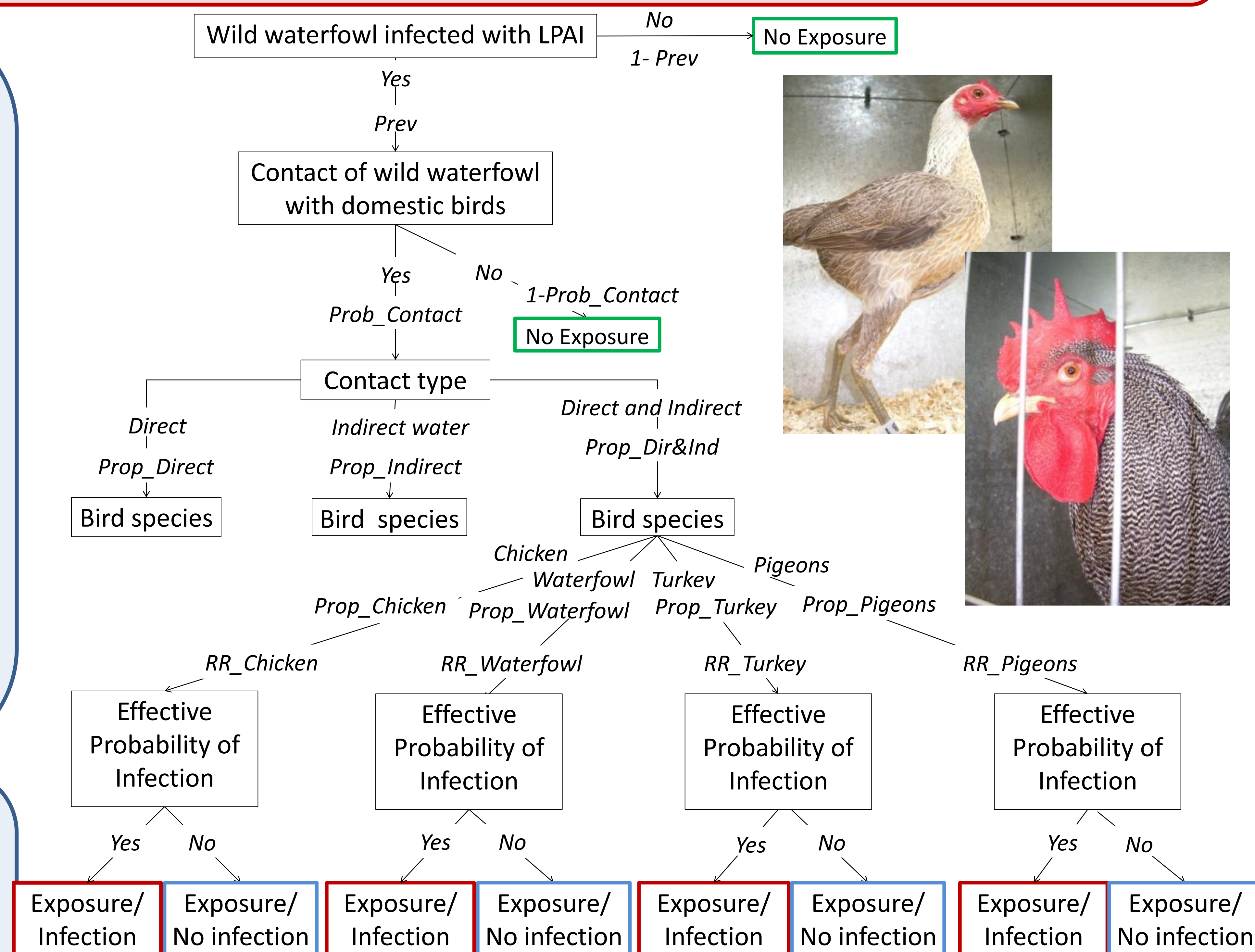


Figure 1. Exposure assessment scenario tree

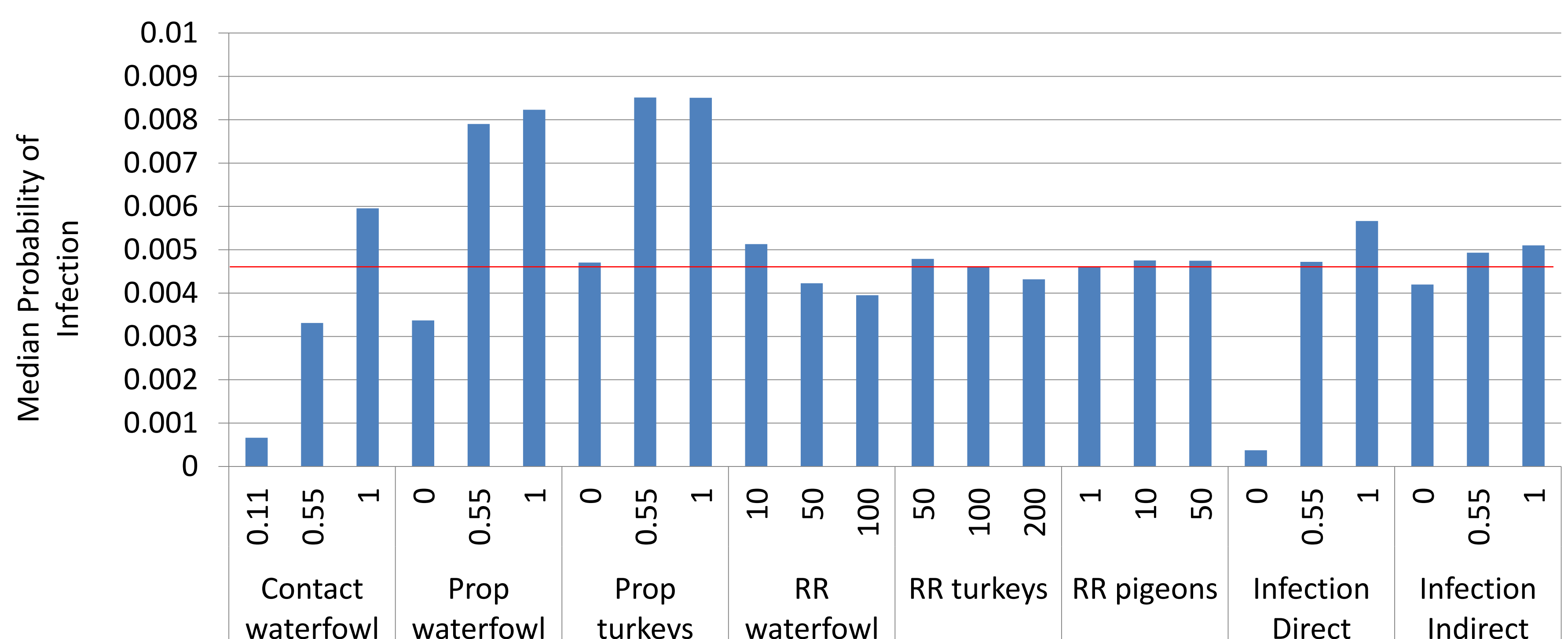


Figure 2. Sensitivity analysis on the median probability of LPAI infection of birds kept by poultry exhibitors after contact and exposure from wild birds

Table 1. Probability of LPAI infection of birds kept by poultry exhibitors after contact and exposure from wild birds

Outcome	Probability of Exposure		
	Median	5%	95%
Chickens	0.0012	0.0007	0.0019
Waterfowl	0.0177	0.0154	0.0200
Turkeys	0.0187	0.0166	0.0208
Pigeons	0.0001	$6.4 \times 10^{-5}$	0.0002
Overall	0.0046	0.0038	0.0055

## Conclusions:

- To reduce the potential risk of AI introduction into poultry exhibition flocks, domestic birds and their water and food sources should not have contact with wild birds, specially in those flocks keeping waterfowl and turkeys
- Avian Influenza surveillance among wild birds should be maintained to understand the dynamics of AI infection in these birds and better estimate the potential risks in different regions of Australia
- Further current research is quantitatively estimating the probability of spread of AI viruses from poultry exhibition flocks to better understand the biosecurity risks posed by this sector of the industry

### References:

- Alexander, 2000. *Vet Microbiology* 74, 3-13  
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