

# CASE STUDY:

# PIGEON PARAMYXOVIRUS

UPDATED: NOVEMBER 2017

**A case study of a failure to prevent, eradicate or contain a new bird disease.**

## Species

Pigeon paramyxovirus (an avian paramyxovirus serotype, closely related to Newcastle disease; both are serotype 1).

## Origin

Probably the Middle East. The strain is genetically identical to a European strain, genotype 6.

## Australian occurrence

First detected in August 2011 in Victoria in loft pigeons and in October in a feral pigeon. Detected in loft pigeons in NSW in May 2012 (as a result of illegal movements of pigeons from Victoria), and in feral pigeons in November 2012.<sup>1</sup> Detected in northwest Tasmania in June 2013 in loft pigeons.<sup>2</sup> Now considered established in Australia.<sup>3</sup>

## Potential ecological impacts<sup>4</sup>

The pigeon paramyxovirus (PPMV1) causes an often fatal disease in many bird species worldwide, not just pigeons. Overseas it has infected raptors, pheasants, swans, cockatoos and budgerigars (the latter Australian species in captivity overseas). So far in Australia the virus has infected racing, show and feral pigeons (rock pigeons and one spotted turtle dove). The one native species so far diagnosed with the disease was a collared sparrowhawk in a Melbourne park, which presumably ate a diseased pigeon.

Overseas, it has caused sporadic large die-offs in wild doves and pigeons, and in Australia several hundred (600 estimated) feral pigeons died at a grain storage facility in Geelong. With feral pigeons so widely distributed, we have cause to be concerned about their potential to spread it to native birds. The Australian region has by far the world's most diverse pigeon and dove fauna, with 22 native species in Australia and more than 50 in Papua New Guinea (in combination a quarter of the world's total). New diseases



Crested pigeons (left) and brush bronzewings (centre) are among Australia's 22 species of native pigeons and doves. Photos: Andrew Peters

can have catastrophic consequences. A very high rate of mortality (up to 100%) has been recorded in pigeon lofts. Even if spillovers into wild bird populations are rare, they could have dire consequences for native species.<sup>5</sup>

The virus is readily transmitted by direct contact between birds and by contact with faeces and other discharges. The virus can last several weeks in the environment. Where pigeons feed and drink with other species – bird feeders for example – could be high risk sites. Signs of PPMV1 include:<sup>6</sup>

- High morbidity and mortality (up to 100% in some flocks)
- Loss of appetite, lethargy
- Gastrointestinal signs including regurgitation and diarrhoea
- Neurological signs such as head shaking, torticollis
- Respiratory signs.

## Potential social and economic impacts

- Losses to keepers of hobby and racing pigeons and their costs of managing the disease (including by vaccination).
- Potential losses from trade restriction on racing pigeons.
- Potential impacts on the poultry industry if PPMV1 is diagnosed in meat pigeons.<sup>7</sup>

## Pathways

PPMV1 is thought to have derived from multiple events of chicken to pigeon transmission of Newcastle disease virus. Since the late 1970s, PPMV1 has spread from a likely Middle East origin into many other countries in Africa, Europe, Asia and America, probably largely through the export of infected pigeons for racing and ornamental purposes. How it got to Australia is unknown. Smuggling of infected pigeons is suspected. (Smuggling of infected pigeons and parrots has been identified as the main source of risk for Newcastle disease.) The disease readily spreads from infected birds through the air, and via drinking water and food contaminated with nasal secretions or faeces.

## BIOSECURITY ISSUES

### Summary

Despite the known potential of pigeon paramyxovirus to cause disease with high rates of mortality in many Australian bird species, there was no contingency plan for the virus. This is in contrast to the extensive preparation for the related Newcastle virus, which affects poultry. When the paramyxovirus was detected, there was no attempt to eradicate it even though it occurred for several months only in loft pigeons. It does not appear there was even a proper assessment



In Australia pigeon paramyxovirus has infected racing, show and feral pigeons.  
Photo: Andrew M Butler | CC BY-NC 2.0

of it as a potential eradication target. There was no comprehensive assessment of its risk for Australian bird species. If this disease had been of concern to industry (as Newcastle disease is) the response would undoubtedly have been much more rigorous (it is Australian policy to eradicate virulent Newcastle disease viruses in poultry). The response was flawed in several respects and failed to prevent spread of the disease between pigeon lofts. The importation of a vaccine from overseas was refused and trials of a chicken vaccine used for Newcastle disease were slow. Vaccination of kept pigeons is recommended by state biosecurity agencies but is not a requirement. The pathogen allegedly arrived with smuggled pigeons, highlighting the need for stronger enforcement against wildlife smuggling.

### Contingency planning

Because this virus had been spreading around the world for several decades it was likely to eventually arrive in Australia. Despite it clearly posing a significant risk for Australian birds (because it has infected a wide range of Australian species or their relatives overseas), it was not on Australia's national list of notifiable diseases<sup>10</sup> and there was no contingency plan for it.<sup>11</sup> In contrast, the closely related Newcastle Disease is notifiable and does

have a contingency plan. There was an initial delay in diagnosis because the first vet to treat sick pigeons did not consider paramyxovirus as a possible cause because the 'virus did not occur in Australia'.<sup>12</sup> (Other pigeons were infected in the clinic during the period of investigation.)

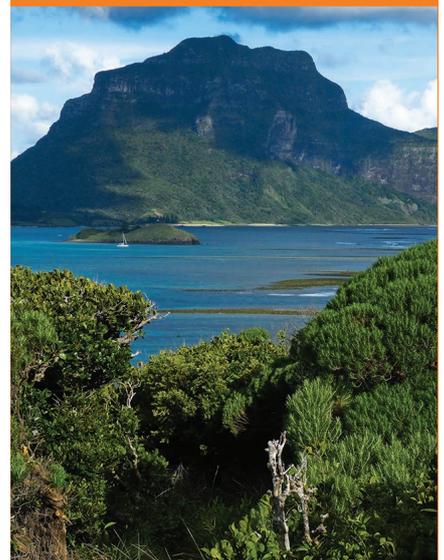
### Preventive measures/surveillance

One of the most important preventive measures would have been to ensure there was ready access to a vaccine (one had been used overseas for many years). But there had been no application for its use in Australia and authorities have refused to allow its importation without a time-consuming approval process (see below). Arzey (2013) considers the inability to quickly access a vaccine 'the most critical aspect in the PPMV1 saga'.

A more general failure of prevention is in poor biosecurity practices evident in some premises with pigeons. For example, when a large number of pigeons died (from the yet undiagnosed PPMV1) in a pet shop in Melbourne (where pigeon fanciers sell excess pigeons on consignment), the shop owner invited his customers to collect their pigeons, thus spreading the disease to many lofts.

## OUR MISSION

To protect the environment from harmful new invasive species through prevention and early action.



Lord Howe Island, Robert Whyte

## Emergency response

After the disease was detected in August 2011, a decision was very quickly made (presumably by the Consultative Committee on Animal Exotic Diseases) to not attempt national eradication. There was no comprehensive risk assessment or feasibility assessment done. The decision of the Victorian government was only to try to limit its spread rather than eradicate it. This decision was made despite there being no reports of the disease in wild pigeons. There are no documents publicly available that analyse the feasibility of eradication or provide any justification for the limited approach. ISC is concerned that the decision lacked precaution, that the risks to native birds of this disease were not fully considered and that eradication was not properly assessed as an option.

The measures used by the Victorian government were to quarantine affected flocks, conduct tracing and do surveillance. Initially, pigeon keepers were encouraged to avoid shows, racing and gathering, and only a year later were they banned. (These restrictions have since been lifted.) The disease spread rapidly, mostly between lofts of fancy pigeons. At the time of diagnosis, 12 lofts were infected. Seven months later, 74 lofts were affected. Up to December 2012 the disease was recorded in 16 locations in wild birds, mostly within 5 km of infected lofts. Nine months after initial detection the disease spread to NSW and it was detected a year later in Tasmania.

It is clear from the different approaches taken in the different states and the slow response (eg. in assessing a vaccine and banning pigeon events at which the virus could spread) that the approach to the PPMV1 outbreak was weak and lacked national cohesion and clear protocols. Because it was not recognised as an emergency disease (triggering a national response and national cost sharing) and regulations and approaches in each jurisdiction was different, Arzey (2013) says the approach was 'partially fragmented and lacked clear vision'.

There is a lack of knowledge in Australia of the feral pigeon population – size, movements, habitat and ecological interactions – which compromised decision-makers' capacity to assess

risks. This lack of knowledge may have contributed to a premature assumption that the disease was difficult to eradicate or could not be eradicated. A more precautionary approach would have more actively considered eradication despite this lack of knowledge.

## Risk assessment

There has been no comprehensive risk assessment for PPMV1 in native Australian birds. There was a brief assessment by Wildlife Health Australia – acknowledged as rudimentary – which considered there were possible high risks for some native species. A comprehensive assessment would have taken into account the capacity of viruses to evolve to infect a wider range of hosts and the greater difficulty of detecting new strains of the virus once the disease became endemic and the risks of multiple strains exacerbating impacts of the disease. To engender confidence, any risk assessments should be publicly released and peer reviewed.

## Learning from failure

As far as we know, there has been no review of the response to PPMV1 to assess its adequacy and what can be learned from it. As far as we are aware, there have been no changes to limit the risk of new strains entering the country.

## Community engagement and communication

There were clear inadequacies in engaging different sectors and communicating about PPMV1. Arzey (2013) comments that the hobby pigeon sector was fragmented, there was little knowledge of the sector within government and it was difficult 'to establish effective communication with the industry in each jurisdiction and nationally'. In the limited publicity about this disease, most of the focus has been on racing and show pigeons and risks to poultry, with the potential for harm to native birds barely mentioned. There was also little communication with the bird watching or environmental communities.

## Enforcement

There are allegations that the source of pigeon paramyxovirus was illegally

smuggled pigeons, as aired in a report on ABC Radio National 'The parrot smugglers' (November 2012), which investigated deficiencies in enforcement against bird smuggling. Here are excerpts from that program:

*Hagar Cohen (the reporter):* Two sweeping wildlife investigations were launched in the past decade. They revealed sophisticated networks of criminals trading eggs of native parrots with eggs of exotic parrots from South Africa, Singapore and the Philippines. But as we'll hear, these two investigations were dropped at the last minute. None of the key players identified were prosecuted.

Australia has some of the toughest penalties for wildlife crime—up to ten years in jail and a \$100,000 fine—but these laws are rarely used. The previous National Manager of Investigations with Customs says smugglers operate with impunity. Here's Richard Janeczko:

*Richard Janeczko:* I believe with a bit more resources, effort, and equipment those people could be successfully prosecuted, so I'm concerned about that. No point in having all these great penalties without anybody who is actually going to find the crime, do the paperwork, take it to court, and prosecute people.

*Hagar Cohen:* A chilling example of the dangers involved in wildlife smuggling was documented last summer. Two diseased pigeons were smuggled into Australia. They carried the highly infectious and deadly paramyxovirus. ... A similar incident, involving exotic parrots, wasn't made public. Some of the infected parrots showed up at a vet clinic in Brisbane run by Dr Adrian Gallagher.

*Hagar Cohen:* Is it simply an issue of not enough resources?

*Richard Janeczko:* Well, I think firstly it's the recognition that it's a problem. And I think that's what's missing at the moment; there's not a recognition that the problem is as important as it is. So I think that's the key issue. If you accept that this is a danger to the future existence of Australia's vibrant ecology, you'd find the money.

*Background Briefing* has seen internal documents from the Department of Environment in Victoria about Operation Janitor. One document says:

*Via reader:* There is ample evidence that there is a thriving illegal trade in wildlife, both into and out of Australia, and that Victoria is significant in that trade.

## CHANGES NEEDED

### Planning and preparation

- Planning and preparedness for diseases such as pigeon paramyxovirus need to be greatly strengthened. This includes adding them to the list of notifiable diseases and contingency planning.
- Preparations should include ensuring that any vaccines are readily available.
- A comprehensive peer-reviewed assessment of risks to wildlife should be prepared for diseases such as pigeon paramyxovirus to inform eradication decisions.
- Pathway assessment and quarantine measures should be taken to limit the risks of new strains of pigeon paramyxovirus entering Australia and potentially exacerbating the threat to native birds.

### Disease management

- Consideration should be given to mandatory vaccination of pigeon-keepers' flocks (if and when a vaccine is available) to limit the risks to domestic pigeons and to wild birds that come into contact with them.

### Enforcement

- Enforcement of laws against bird smuggling should be a high priority, including for biosecurity reasons.

### Learning from failure

- A review of the response to PPMV1 should be conducted.

## ABOUT OUR CASE STUDIES

Our case studies illustrate the need for changes in how Australia prevents the establishment of new invasive species. They were compiled using publicly available information at the time of the last update. We would welcome new information or updates to biosecurity response for inclusion in future updates.

## CONTACT US

- Visit [invasives.org.au](http://invasives.org.au) for more information about the Invasive Species Council and to get in touch.

## REFERENCES

Aldous E, Fuller C, Mynn J, Alexander D. 2004. A molecular epidemiological investigation of isolates of the variant avian paramyxovirus type 1 virus (PPMV-1) responsible for the 1978 to present panzootic in pigeons. *Avian Pathology* 33:258–269.

Arzey G. 2013. PPMV1, Melbourne and Sydney.

Animal Health Australia. 2010. Disease strategy: Newcastle disease (Version 3.2). Australian Veterinary Emergency Plan (AUSVETPLAN), Edition 3, Primary Industries Ministerial Council, Canberra, ACT.

Wildlife Health Australia reports, available by keyword search at <https://www.wildlifehealthaustralia.com.au/Resources.aspx>

Background Briefing. 2012. The parrot smugglers. Transcript . ABC Radio National. (<http://www.abc.net.au/radionational/programs/backgroundbriefing/2012-11-18/4370820#transcript>).

Biosecurity Tasmania. 2014. Avian Paramyxovirus in Pigeons (APMV1). (<http://dppw.tas.gov.au/biosecurity-tasmania/animal-biosecurity/animal-health/poultry-and-pigeons/avian-paramyxovirus-in-pigeons>).

Cowan M, Monks D, Raidal S. 2014. Granuloma formation and suspected neuropathic pain in a domestic pigeon (*Columba livia*) secondary to an oil-based, inactivated Newcastle disease vaccine administered for protection against pigeon paramyxovirus-1. *Australian Veterinary Journal* 92:171–176.

Department of Agriculture. 2013. National List of Notifiable Animal Diseases. (<http://www.agriculture.gov.au/pests-diseases-weeds/animal/notifiable>).

Department of Agriculture, Fisheries and Forestry (Qld) (2012). Avian paramyxovirus type 1 in pigeons: Guidelines for veterinary practitioners. Queensland Government.

Duchatel JP, Vindevogel H. 1986. Assessment of vaccination of pigeons against paramyxovirus type 1 infection with inactivated aqueous-suspension or oil-emulsion vaccines. *Avian Pathology* 15:455–465.

Duchatel JP, Flore PH, Hermann W et al. 1992. Efficacy of an inactivated aqueous suspension of Newcastle disease virus vaccine against paramyxovirus type 1 infection in young pigeons with varying amounts of maternal

antibody. *Avian Pathology* 21:321–325.

Kim M, King D, Guzman H, Tesh R, Travassos da Rosa A, Bueno R, Dennett J, Afonso C. 2008. Biological and Phylogenetic Characterization of Pigeon Paramyxovirus Serotype 1 Circulating in Wild North American Pigeons and Doves. *Journal of Clinical Microbiology* 46(10): 3303–3310.

NSW Department of Primary Industries. 2017. Pigeon paramyxovirus type 1. Primefact 1121. Seventh edition. August. ([http://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0005/408146/Pigeon-paramyxovirus-type-1.pdf](http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/408146/Pigeon-paramyxovirus-type-1.pdf)).

Schuler K, Green D, Justice-Allen A, Jaffe R, Cunningham M, Thomas N, Spalding M, Ip S. 2012. Expansion of an exotic species and concomitant disease outbreaks: pigeon paramyxovirus in free-ranging Eurasian collared doves. *EcoHealth* 9: 163–170.

Scott P, Wilson T, Walker C. 2013. Serological and growth rate responses to the use of chicken Newcastle disease vaccines in pigeons. *Australian Veterinary Journal* 91:525–530.

Ujvari D, Wehman E, Kaleta E, Werner O, Savic V, Nagy E, Czifra G, Lomnicz B. 2003. Phylogenetic analysis reveals extensive evolution of avian paramyxovirus type 1 strains of pigeons (*Columba livia*) and suggests multiple species transmission. *Virus Research* 96: 63–73.

Walker K. 2011. The PMV Outbreak in Victoria. Melbourne Bird Veterinary Clinic.

Walker K. 2012. The PMV Outbreak – Part 2. Melbourne Bird Veterinary Clinic.

## ENDNOTES

- 1 NSW Department of Primary Industries (2013).
- 2 Biosecurity Tasmania (2014).
- 3 Cowan et al. (2014).
- 4 Aldous et al. (2004), Kim et al. (2008), Schuler et al. (2012), Ujvari et al. (2003), Australian Wildlife Health Network reports.
- 5 Schuler et al. (2012).
- 6 Department of Agriculture, Fisheries and Forestry (Qld) (2012).
- 7 George Arzey, personal communication.
- 8 Animal Health Australia (2010).
- 9 Animal Health Australia (2010).
- 10 Department of Agriculture (2013). It was also not on notifiable disease lists for Victoria, Tasmania, Northern Territory and ACT.
- 11 Animal Health Australia (2010).
- 12 Walker (2011).